Aesthetic Facial Surgery

Juarez M. Avelar
Editor

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Tribute to Prof. Pitanguy

I dedicate this book to the memory of Prof. Ivo Pitanguy for his constant incentive for scientific publications during all my professional activities. Although he is not among us anymore, I felt his presence all the time during the last 2 years while preparing each chapter of this book. I am happy to conclude the scientific program, yet I am very sad because during my 20 previous books, Prof. Pitanguy was there, following my hard work and waiting to hear my voice informing to him that my book has been completed. In fact, this is the first time I cannot share with him the accomplishment of one more important stage of my life. He is *not physically in our world, but wherever he is, I feel his presence around me, blessing me for one more victory achieved due to my personal effort and perseverance in reproducing my imagination and knowledge in words on the pages of this book.*

In all my previous books, Prof. Pitanguy used to always help me with his superb participation. For some of my publications he wrote the foreword, in another book he contributed an outstanding chapter, and in others he did both: writing the preface and important chapters. About this book - although it is physically. away from me - in my mind and in my heart, its soul is always listening me, pouring out its blessings with continuous encouragement.

Besides giving me the unique opportunity to learn and graduate as a plastic surgeon, Prof. Pitanguy opened the world for my professional future – he encouraged me to visit, as fellow, his renowned friends and outstanding professionals as well as professors. I had the privilege to be Fellow of Prof. Ralph Millard at Miami University; Profs. Converse, Rees, and Roger at New York University; Profs. Tessier (at the Foch Hospital), Dufumentel, Mouly (at Saint Louis Hospital), and Tubiana (at Victor Hugo Clinic) in Paris; Prof. Mathews at Children's Hospital in London; and Prof. Mustardé (at Cannisburn Hospital) in Glasgow, Scotland. I was fortunate to meet all those memorable professors who gave me the chance to learn even more about the techniques used in plastic surgery, and all of them encouraged me to devote myself to scientific publication. All of them were

brilliant authors of important scientific articles in several journals, as well as book chapters and renowned conference papers and most of them were editors of high-level textbooks, who encouraged me to work on scientific publications. I consider that most of the merit of my publications should go to Prof. Pitanguy and his colleagues as it is they who initiated me to the scientific field.
Juarez M. Avelar, MD

Tribute to My Professors

It is my privilege to pay homage to some of my professors who gave me a special chance to learn more techniques in plastic surgery after my postgraduation course with Prof. Pitanguy. I am particularly grateful to the following individuals.

1. Prof. Ralph Millard at Miami University who besides giving me an opportunity to learn his personal techniques encouraged me to work on ear reconstruction field and on scientific research. During our conversations, he felt that I was already well prepared professionally to start my work so he stimulated me to write articles and even books. At the end of my fellowship, he gave me almost one hundred articles that he had published and a copy of his book written with Sir Harold Gillies. Once when I was with him and his wife at his house, he became very emotional when talking about the preparation of their book. He showed me the chair where Prof. Gillies used to sit and work for long hours writing the chapters. He also showed me several photos taken by Prof. Gillies in order to select one of them for illustrating the cover of their book. I keep *their book as well as all reprints of Prof. Millard's publications with lots of affection in my clinic's library.*

2. Profs. John M. Converse, Thomas Rees, and Blair Rogers at New York University for the memorable opportunity to absorb their knowledge and their techniques, as well as to follow activities at their superb private practice in New York. I had the opportunity to attend a few scientific sessions discussing very complex deformities of the face and skull and other kinds of clinical cases before and after reconstructive surgery similar to those I used to attend at Prof. Pitanguy's unit at Santa Casa da Misericordia in Rio de Janeiro, Brazil. For me it was a useful session spent together with outstanding surgeons. Prof. Converse used to be the chief of his large team of surgeons. Prof. Rees used to perform his operations daily at a private hospital, since his very charming office that was located at a beautiful house in the most sophisticated area in New York City where I used to be besides him.

3. Prof. Paul Tessier for his kindness to allow my presence at the Foch Hospital in Paris and to share some of his immense knowledge with me. I used to observe his hands' ability and creativity and was very impressed to see him perform 14 hours of reconstructive surgery as well as perform aesthetic surgeries with the same proficiency. Before his operations, he used to have a special moment of concentration, thinking about the surgical planning of the operation he was about to perform. He was a very clever surgeon, full of imagination, and a physically strong man. Once his former residents

founded the Prof. Tessier Association, he kindly invited me to be part of it. I am deeply thankful for all his affection toward me.
4. Prof. Jonh Mustardé at the Cannisburn Hospital in Glasgow, Scotland, and his superb group of professors: Ian Jackson, McGregory, Gibson, and others. I attended many surgeries performed by Prof. Mustardé and from whom I learned from him his personal technique for correction of prominent ears. I also had the chance to attend brilliant operations performed by the other professors. They even allowed me, with special permission, to attend and participate at the first postgraduate course in Cannisburn Hospital in Glasgow in March 1973.
5. Prof. Ernesto Malbec (from Argentina) – It is with immense happiness that I pay homage to him for the opportunity to be his friend during the last years of his life. I invited him several times to give lectures at some congresses that I had organized in Brazil. We even published a book together with several of his publications from 1920 until 1960 as a product of his superb and outstanding work. He died 1 year after our book was published.
6. Prof. Yves Gerard Illouz – I am thankful for the opportunity to learn his technique and have had the privilege to invite him several times to Brazil to teach his new method of liposuction to all plastic surgeons in my country. We even had the opportunity to publish one of the first books in medical literature concerning his new technique. In fact, our book Liposuction was printed with all my effort by collecting his publications, with outstanding participation from several

Brazilian colleagues taking part of the Table of Contents.

7. Profs. Fernando Ortiz Monasterio, Mario Gonzalles Ulloa, and Jose Guerrerosantos (all from Mexico) – Although I was more than 25 years younger than each of them, we shared a warm relationship through so many decades, since I met them during the Second ISAPS International Congress held in Jerusalem, Israel, in June 1973. Afterwards, they invited me to give lectures in several congresses in their country and even in meetings of their services organized by their former residents. They considered me as their former resident due to our constant friendship. Also, I invited them to make memorable conferences in some congresses here in Brazil. We even were partners in some books that we published covering several topics on plastic surgery.

Finally, I take this opportunity to thank all of my professors for sharing their knowledge with me, which were and still are very important in my professional activities. I confess that mostly of the merit of my publications belong to them, since I just prepared with so much care and affection the scientific manuscripts to publish this book as well as my previous twenty ones. For this reason, I register here my gratitude to all of them for giving me a solid foundation in plastic surgery as well as for introducing me to a select group of publishers, which opened up my career to a wide field. Wherever they are, I am sure that they are still blessing me

with their warm words to follow my way having in my soul and in my heart special filling of gratitude.
Juarez M. Avelar, M.D.

Celebrating 100 Years of Rhytidoplasty

Raymond Passot, MD
(1886–1933)

Historically, Raymond Passot, a French surgeon, is credited to have pioneered the first scientific publication concerning facial rejuvenation operations in 1919. I am thankful to him and all other surgeons who, along the course of a hundred years, have contributed to improving this special field of plastic surgery.

Once again, I thank all the authors of the chapters of this book for accepting my invitation in celebrating the centenary of rhytidoplasty.
Juarez M. Avelar, MD

Foreword

Here is a totally original book that comes from the innovative spirit of Professor Juarez M. Avelar!

It bears the hallmark of many innovations from contemporary surgeons practicing in Latin America, but also in the United States and Europe. The design of this book reveals the surgical spirit of the one who undertook to give the surgical community a comprehensive review of existing effective techniques, but also to recall the necessary prior evaluation of patients, including the necessary initial psychological approach, the immense body of usable techniques and that each colleague chooses and modifies in his own way, finally the treatment of complications that no responsible practitioner can ignore, thinking that he is too good operator never to meet them. One can only rejoice that all these experienced and often innovative authors have been grouped together to deliver their considerable and attentive experience concerning all types of cervicofacial facelifts! Modern volumetric repair is widely developed in the book because it represents a considerable improvement in the biological and aesthetic aspects of the repair treatment of facial aging.

At a time when aesthetic medicine is experiencing a real media and commercial triumph, attracting a large number of patients who dream of avoiding the scalpel, it seems appropriate to offer, on the contrary, surgical solutions that have been recognized as effective but also sustainable in time. At the same time, the author's presentation encourages us to avoid the harmful consequences of the operative procedure and to minimize the legitimate anxieties of patients in front of a cervicofacial lifting operation, which remains in their eyes a formidable surgical procedure, expensive and binding, thanks to all the precautions that are exposed in this book.

Paris
March 2019

Vladimir Mitz, MD

Foreword

I have had the pleasure of knowing Dr. Juarez Avelar since 1982. He had just been elected president of the São Paulo branch of the Brazilian Society of Plastic Surgery, and in his welcome speech he asked who would like to help organize congresses and meetings. I volunteered and became part of the organizing and editorial committees. For the next 4 years, his administration organized the Society's best meetings. Juarez, with his dynamic leadership style, revolutionized our Society by organizing annual symposiums, publishing annals, monthly newsletters, and bringing together surgeons from different backgrounds to share their experiences. His first successful symposium in São Paulo was the Brazilian Symposium on Abdominoplasty in 1982. The second was the Brazilian Symposium of Facial Contour in 1984.

Those were the early days of liposuction. Drs. Yves Illouz and Pierre Fournier were constant guests, teaching Brazilian surgeons the details of the liposuction and fat grafting techniques. Professor Ivo Pitanguy, with whom Juarez did his plastic surgery training, was an honored guest at all our meetings, generously collaborating with lectures and book chapters.

Juarez never stopped. After the São Paulo chapter, he was president of our National Society for two terms, again elevating the quality of the meetings and bringing together surgeons to write about and to share their experiences.

And so, this is the basis of this publication, the friendship established over the years among plastic surgeons has resulted in this ambitious project of bringing together more than 60 experiences on aesthetic facial surgery.

As a Brazilian, I like to compare plastic surgery to a football match. It is a team game. One player gets the ball and takes it forward. Then he passes to another who will continue going forward with it. Sometimes a player misses the goal and must start the process all over again. Sometimes he scores a goal. With plastic surgery, one develops or learns a technique and adapts it to their abilities, produces good results with it, and teaches it; later someone finds the idea interesting and starts using it, again adapting to their style. This is why there are many ways to do a blepharoplasty or a neck lift. Therefore, we have all these different chapters on aesthetic facial surgery. Far from repeating the same procedure, we are exposed to a myriad of new ideas. We choose the ones that adapt better to our surgical style and start using it.

Change is good. As the famous French painter Francis Picabia said: “If you want to have new ideas, you have to change your ideas as if they were shirts.” And we need to change. We must welcome change, because there can be no progress if there is no change. I am sure in this book you will find many innovations and better ways to do some of your facial rejuvenation techniques.

Dubai
March 2019

Luiz S. Toledo, MD

Preface

Ever since I began my professional activities, I was conscious that my training with Prof. Pitanguy during my postgraduation at Pontificia Universidade Catolica (PUC) in Rio de Janeiro gave me adequate knowledge to practice my specialty. Among all fields of plastic surgery, I was sure that rhytidoplasty was one of the most important due to its great demand from patients worried about their aging face. In fact, aging is a natural phenomenon that changes progressively all the organs of the human body with constant alteration, but on the face those modifications are even more noticeable with evident signs.

Throughout my practice, I have been employing Prof. Pitanguy's technique because all its surgical details are clear in my mind. So far, I have introduced some important modifications in my basic technique due to personal improvisations and due to valuable suggestions from other plastic surgeons. However, I am so consciousness that to maintain my basic approach, I learned from my professor because it promotes excellent surgical results with smooth facial contour.

I mentioned in some chapters of this book that young plastic surgeons may learn from their professors the basic technique of performing a facelift. In fact, performing this procedure requires solid training under the same technical orientation. It means that if young surgeons do not have adequate training, they cannot perform successful operations and the surgical results will not be acceptable. Also, I emphasized that no qualified surgeon has performed a facelift operation with poor outcome, as that would be a disaster for our specialty.

To promote the art of rhytidoplasty and to maintain its reputation, it is mandatory that high levels of perfection are targeted, which means to do outstanding procedures and take good care of patients after operations.

Due to the high level of acceptance of my previous books, based on their performance on Springer's website, I took the decision to edit another one concerning aesthetic facial surgery. I invited outstanding plastic surgeons from Brazil and other parts of the world for sharing their knowledge by writing useful chapters. Therefore, the publication of this book, besides being a major accomplishment, supports the promotion of rhytidoplasty among our colleagues from all over the world.

Forty-two expert plastic surgeons accepted to participate with me in this publication, which contains new sources of knowledge for the readers.

As our knowledge came from our professors during our period of training, I take this opportunity to pay homage, along with my colleagues who wrote the chapters, to some of our professors who gave us high levels of technical information, besides opening up wide possibilities to publish scientific books. It is with much joy and gratitude that we include our sincere homage to our professors.

Once again, I take this opportunity to express my thanks to all the authors who accepted my invitation to write outstanding chapters in order to promote rhytidoplasty procedures to the readers. I hope that the contents of this book cover all surgical procedures concerning facial rejuvenation. All authors described clearly that rhytidoplasty operations still are the most efficient approach lasting the surgical results for many years and decades as well which will please our patients.

Sao Paulo, Brazil Juarez M. Avelar

Acknowledgments

Publishing this book is an accomplishment of my professional activities; after performing facial rejuvenation surgery throughout my career, I conclude that it is a special procedure that offers lasting results.

Therefore, I am thankful to Profs. Ivo Pitanguy, Ralph Millard, John Converse, Thomas Rees, Paul Tessier, Jonh Mustardé, Fernando Ortiz Monasterio, Mario Gonzalles Ulloa, Jose Guerrerosantos, Ernesto Malbec, and Yves Gerard Illouz. Wherever they are, I express my gratitude to them.

To my parents, Anisio and Maria Ana. Although they are not with me in this world, I continuously feel their warm presence and I am thankful for their constant enthusiasm and spiritual protection.

To my lovely son Thiago and my wife Gloria, who have been constant sources of inspiration for this publication and permanent witnesses to my scientific activities.

Special thanks to Prof. Pitanguy, for all the knowledge he shared with me to work in my profession and also for his encouragement that developed my enthusiasm for scientific publication.

To Dr. Edgar Bolanho, for the very high level of technical illustrations in this book, for all of my chapters as well as of other outstanding authors.

To the young Dr. Mariana Garcia Morais Avelar for her great support in translating some chapters for my colleagues, the authors of this book.

To Prof. Ricardo Cavalcanti Ribeiro, Head of the Plastic Surgery Department at the Federal University of Rio de Janeiro (UNIRIO), for the superb assistance and incentive to elaborate and publish this book.

Juarez M. Avelar, MD

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Part I
Session of Tributes

Chapter 1
Importance of Pitanguy's Surgical Principles on Rhytidoplasty – Direction of Traction of the Skin Flap

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1.1 Introduction

It is well known that aging process is a natural phenomenon that occurs in all human body since on the face it is even more evident. Besides the skin properties of the face, the subcutaneous layer, muscles of the expressions as well as all anatomical structures of the face present deep changes as time goes by. Even gravity exerts mechanical deformation to all anatomical structures which are evident when one sees a photo of the same person two, three, or four decades later. Knowledge of such complex alterations plastic surgeons may suggest some possibilities to reverse them by identifying the corresponding distortional forces. The aim of rhytidoplasty is not to achieve a pattern of surgical result, but to determine anatomical corrections in order to reinstate the facial contour in well balance with the whole body. The most remarkable publication was done by Malbec [8] with meticulous descriptions that are so updated until nowadays. Lipectomy of submandibular and submental regions [9] was a way to solve the local adiposities, with reshaping facial contour. During my period as Prof. Millard's fellow, I had a privilege to see him performing some operations with outstanding results, since I followed some patients afterward at his charmeuse glamour clinic in Miami. He was an outstanding surgeon performing all kinds of operations, but I was so impressed with his hand abilities during facelift reshaping the neck. I performed some operations, but they were quite difficult procedure to incorporate it in my practice. Also, I used to be Prof. Tomas Rees' fellow in 1973 at New York University when I had the privilege to attend several of his facelift operations and even some publications [15]. I was so impressed with his technique and final result at his private activities as well. Later treatment with SMAS was a superb solution on deep anatomic structures [10] and opened a wide field to improve facial contour surgery. Few years later liposuction technique introduced by Illouz [6, 7] with new concepts encourages treatment of submental and submandibular regions [1, 2] with very low rate of complications. So far, new approaches did not change the memorable surgical principles described by Pitanguy [11, 13] concerning systematization for rhytidoplasty to achieve natural surgical appearance. As far as facial aging is a continuous and progressive phenomenon, direction of traction technique became an outstanding approach to remodeling facial contour.

1.2 Technique

Ever since I was Prof. Pitanguy's resident at his clinic, I used to hear from him, all the time during operation, the importance of direction of traction of the skin flap of the face following specific surgical planning for each patient (Fig. 1.1). Besides, an anesthesiologist always takes care of the patient even when the operation is performed under local anesthesia with intravenous sedation. During my long period of practice, that knowledge and surgical organization were always employed in my

Fig. 1.1 Surgical demarcations for facelift surgery. Photo (**a**) schematic drawing shows blue dotted line to delimitate the area for local anesthesia infiltration and tunnelization procedure, and the red continuous line indicates the cutaneous incisions; (**b**) on peroperative photo the surgical planning for local infiltration and skin incision with an arrow indicating the direction of traction of the cervical and facial flaps for cutaneous resection; (**c**) an anesthesiologist is always taking good care of the patient even when the operation is performed under local anesthesia

facelift procedures. Nevertheless, when I developed new concepts for abdominoplasty ([3], [4]), I concluded that similar approach is useful to employ for rhytidoplasty operations in order to reduce the vascular trauma during surgery. My concepts are the opposite of lipectomy previously described and performed. Therefore, according to my publications [5], I created special surgical instruments derived from canula for liposuction, in order to avoid vascular damage during operation (Figs. 1.2, 1.3, 1.4, and 1.5).

So far, I perform my facelift following surgical principles described by Pitanguy [11, 13] since I learned directly from him. As constantly many surgeons from all over the world used to watch his operations, he always explained dedicatedly the concepts regarding those reference surgical points. Therefore, such knowledge was

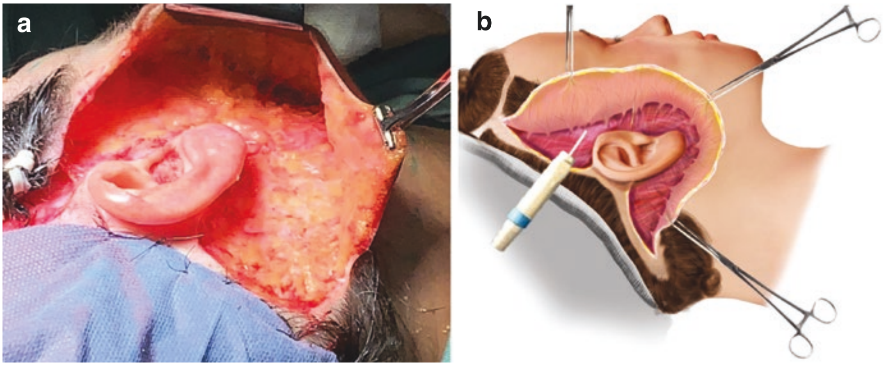

Fig. 1.2 Preoperative photo and drawing show the cutaneous flaps of the face and neck being pulled by forceps after tunnelization procedure performed with my surgical instruments in order to avoid vascular trauma to the subdermal layers. Photo (**a**) during operation one can see that the vascularity is preserved during tunnelization procedure with minimal bleeding preoperatively; (**b**) schematic drawing shows my surgical instrument performing tunnelization procedure

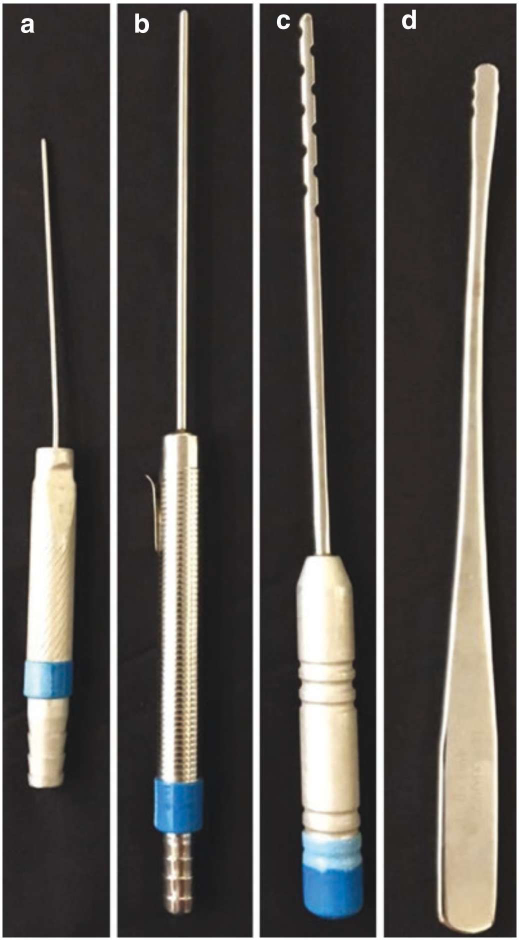

Fig. 1.3 Straight instruments for tunnelization procedure: (**a**) a very thin cylindric instrument; (**b**) a cylindric instrument wider than the first one; (**c**) a flat one with irregular borders on both sides to widen the tunnels; (**d**) a flat one even wider than all of them. The instruments are employed during surgery in sequential from the thinner (**a**) to the wider (**d**) in order to enlarge the tunnels with minimal damage to the connective tissues from deep layers to the skin

Fig. 1.4 Curve instruments for tunnelization procedure in all regions of the neck and temporal region as well: (**a**) a cylindric instrument; (**b**) a lateral and flat one with irregular borders on both sides to widen the tunnels on temporal region; (**c**) a vertical and flat one with irregularities on both sides which is useful for submental region and lateral sides of the neck

so fascinated to hear due to my daily participation during his operations that it was a privilege to have those private lectures besides his useful publications [11, 13]. Consequently, those surgical fundaments became an essential stage that I was naturally convinced regarding to achieve smooth facial surgical results.

The operation must be performed in adequate ambiance at the operating room in a hospital under general anesthesia or even local anesthesia combined with intravenous sedation (Fig. 1.1c). The essential indication of the surgical technique for rhytidoplasty is to achieve natural facial rejuvenation result for female and male as well [16].

Once a patient is in the operating room and already properly prepared, surgical demarcations are done on both sides of the face following the surgical planning (Fig. 1.1a, b). Two areas must be well defined: (a) to determine the areas for

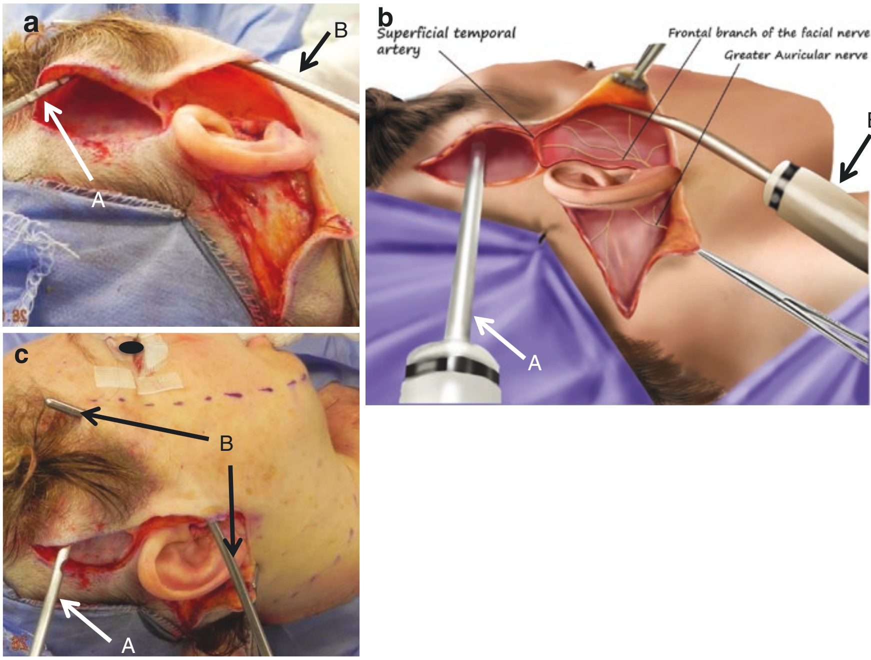

Fig. 1.5 Preservation of the facial frontal branch nerve during my routine rhytidoplasty, according to Pitanguy and Ramos' publication. Photo (**a**) preoperative photo from back view of the right side of a patient with my surgical instrument (A) introduced below the temporal fascia and also below the facial frontal branch nerve and the other instrument (B) introduced subcutaneously and above the facial frontal branch nerve. Photo (**b**) scheme shows the same description; photo (**c**) from the top view, one can see the right side of patient's face with my instrument (A) and (B) with the facial frontal branches nerve between

cutaneous tunnelization and (b) to draw the incisions for surgery. Local infiltration is a routine procedure no matter if the operation undergoes under general or local anesthesia. Complete descriptions about it are described in another chapter of this book concerning of this subject.

After well-prepared 0.5 cm incisions are done following previous demarcations near the auricle, on the base of earlobe, and behind the ear on the mastoid area (Fig. 1.1), cutaneous tunnelization procedure is performed according to my personal approach in order to avoid bleeding during operation and also preserving all thickness of the subdermal layer (Figs. 1.4 and 1.5).

According to Pitanguy's procedure, the main direction of traction of the facial cutaneous flap is pulling from the skin of the tragus in front of the ear to Darwin's tubercle located on the posterior border of the auricular helix (Figs. 1.6, 1.7, 1.8, and 1.9).

According to my personal procedure, the facial and cervical flaps are not undermined by scissors since I employ my special instruments to perform tunnelization approach (Figs. 1.2 and 1.3). The way I perform my personal approach does not change the surgical principles regarding direction of traction of facial and neck skin

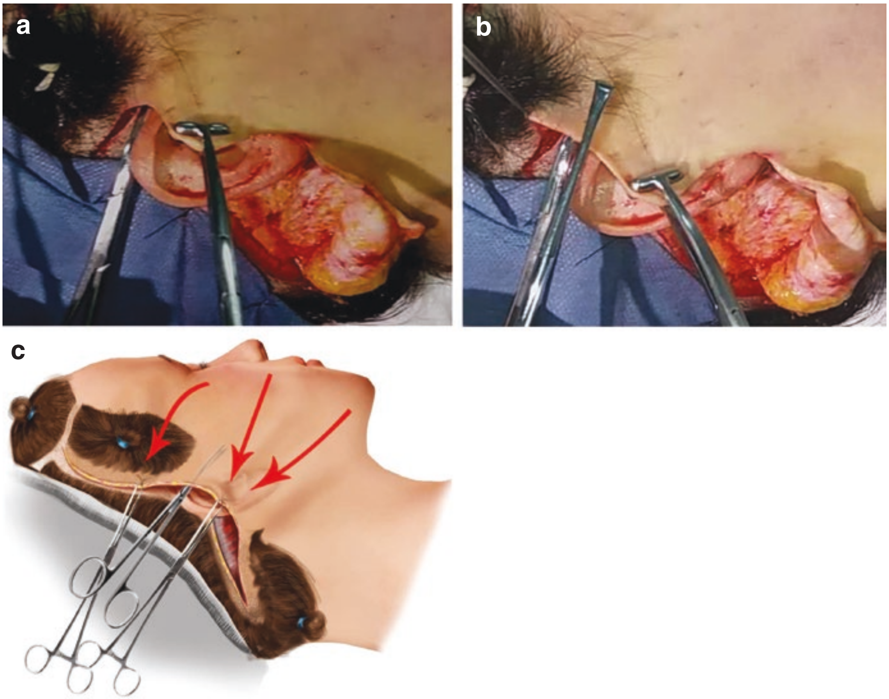

Fig. 1.6 Preoperative photos and scheme showing traction of the facial and temporal cutaneous flaps of the right side of the patient's face according to Pitanguy's technique for traction and resection of the excess of skin. Photo (**a**) a forceps holds the skin flap, and another one is fixed on the upper border of the cutaneous incision next to the auricle; (**b**) using a Pitanguy's marker, a point is drawn on the projection of the anterior border of the auricle; (**c**) schematic drawing showing the Pitanguy's direction of traction with two forceps pulling the facial flap from tragus to Darwin's tubercle

flaps that I learned from Prof. Pitanguy. Therefore, after traction of the facial flap, a temporary suture is done on the upper portion of auricle in order to "block" the direction of traction (Fig. 1.8), as it is well described [13], [12, 14]. Also, the cervical skin flap is pulled slithering upward that another temporary stitch is done on the posterior border of the auricle in order to "block" the direction of traction to preserve the hairline on its natural location (Fig. 1.9). When a frontal lift is planned, those temporary sutures are even more important in order to "block" the facial cutaneous flap preserving the position and level of the sideburn, as well as avoiding excessive upward rotation. Following such direction the final surgical result provides a natural facial expression, without any alteration to facial contour.

Afterward internal suture is done; then the borders of the wounds are closed using absorbable mattress sutures. It is time to identify that there is no tension on the borders (Figs. 1.10 and 1.11).

It is important to emphasize that there is not a precise age for the operation since each patient decides according to personal motivation or possibilities to undergo to

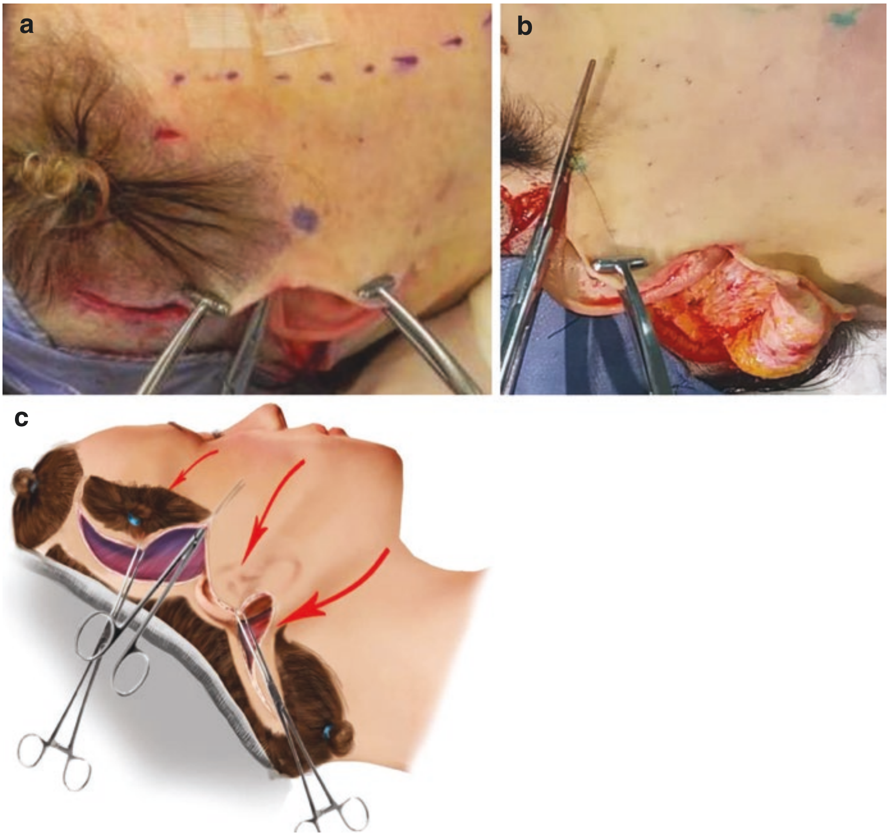

Fig. 1.7 Transoperatory photos showing demarcation and incision of the facial and temporal cutaneous flaps of the right side of the patient's face. Photo (**a**) one can see two hulks holding the borders of the facial-temporal skin flaps with a blue point already marked; (**b**) between both hulks pulling the skin flaps which is incised with a scissor until the blue point previously marked; (**c**) drawing shows the skin flap already sectioned

facial rejuvenation procedure (Fig. 1.12). So far, the final aim of the operation is to confer a well balance between each segment of the face in harmonious result without any distorting anatomical reference points which avoid undesirable surgical stigmas (Figs. 1.13, 1.14, and 1.15).

1.3 Discussion

Aesthetic surgery for treatment of facial aging phenomenon has been growing despite several nonsurgical procedures have been proposed nowadays in our specialty even by other not qualified professionals. For this reason, each surgeon must

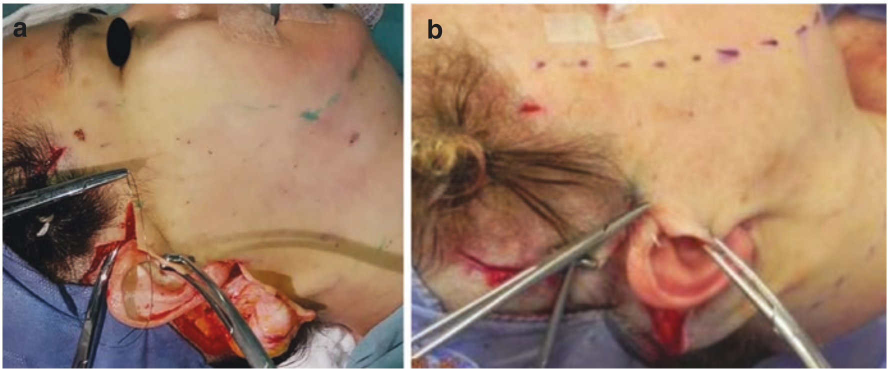

Fig. 1.8 A temporary stitch is done fixing the border of the skin flap already incised to the border of the skin in front of the auricle. Photo (**a**) the needle is passing through the temporal-facial flap to the border of the skin underneath; (**b**) the stich is already done to "block" the temporal and facial flaps in order to avoid elevation of the sideburn, according to Pitanguy's technique

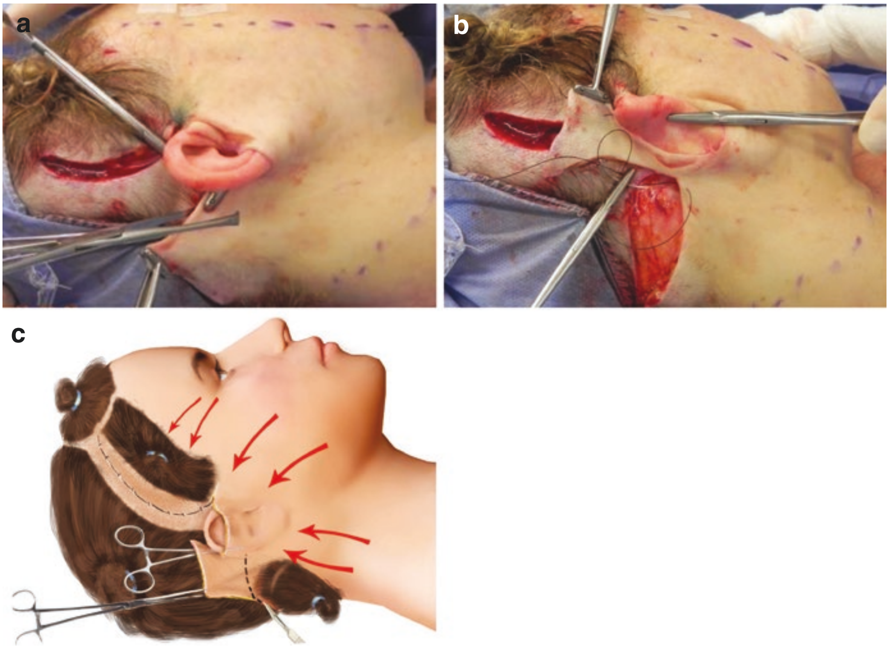

Fig. 1.9 Photos showing traction and resection of the cervical skin flap of the right side of the patient. Photo (**a**) two hulks hold the skin flap pulling upward, and another one is fixed on the upper border of the cutaneous incision behind of the auricle using a Pitanguy's marker; photo (**b**) the skin flap is already incised, and a stich has been done to fix the skin flap to the border of the skin behind the auricle; (**c**) schematic drawing shows the description already done above

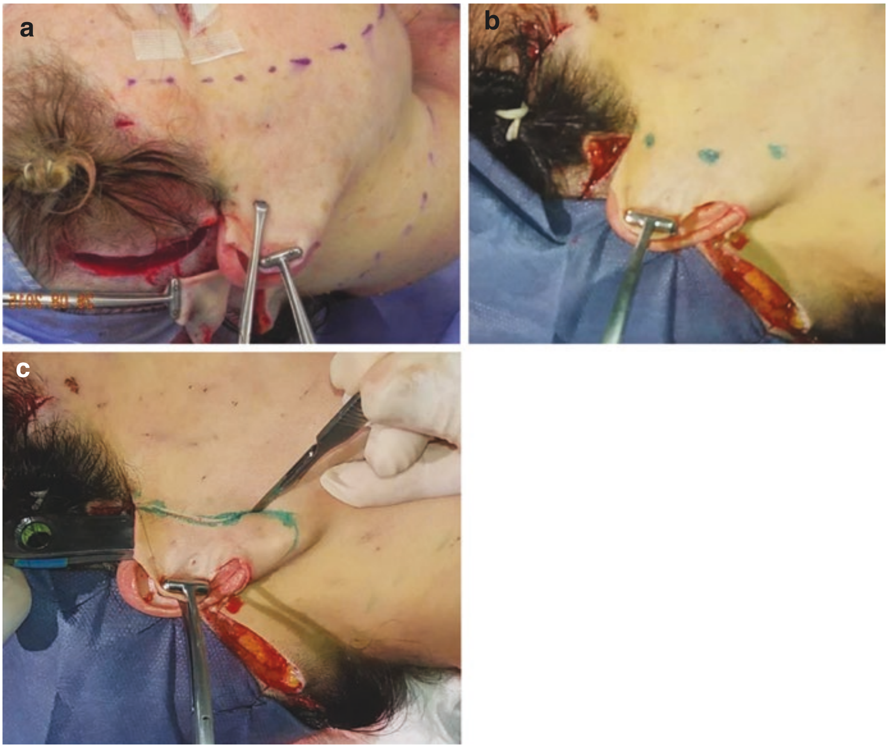

Fig. 1.10 Photos showing traction and resection of the skin flap of the right side in front of the face. Photo (**a**) a hulk is holding and pulling the skin flap in front of the auricle, and Pitanguy's marker determines the incision; (**b**) the excess of skin is already marked; (**c**) using a knife an incision is done to delimitate the excess of skin to be excised

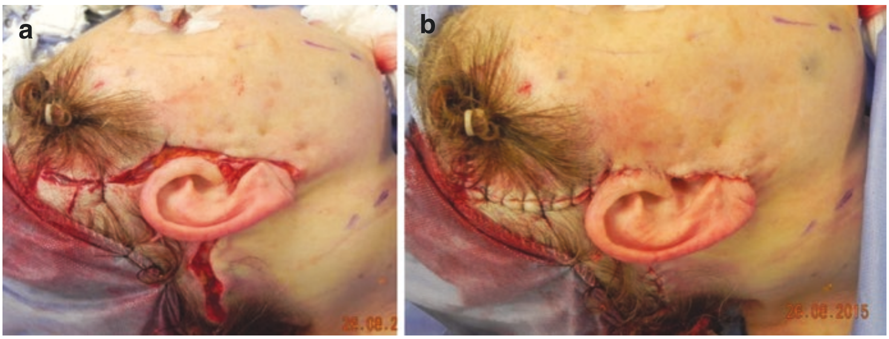

Fig. 1.11 Photos showing resection and suture of the wound on the right side of the face. Photo (**a**) the excess skin is already resected, and internal stitches were done in order to anchor the borders of the skin flap of the temporal, facial, and cervical regions; (**b**) external sutures were performed on the border of the skin flap to the scalp area and the anterior and posterior borders of the skin flap to the skin in front and behind the auricle and mastoid region as well

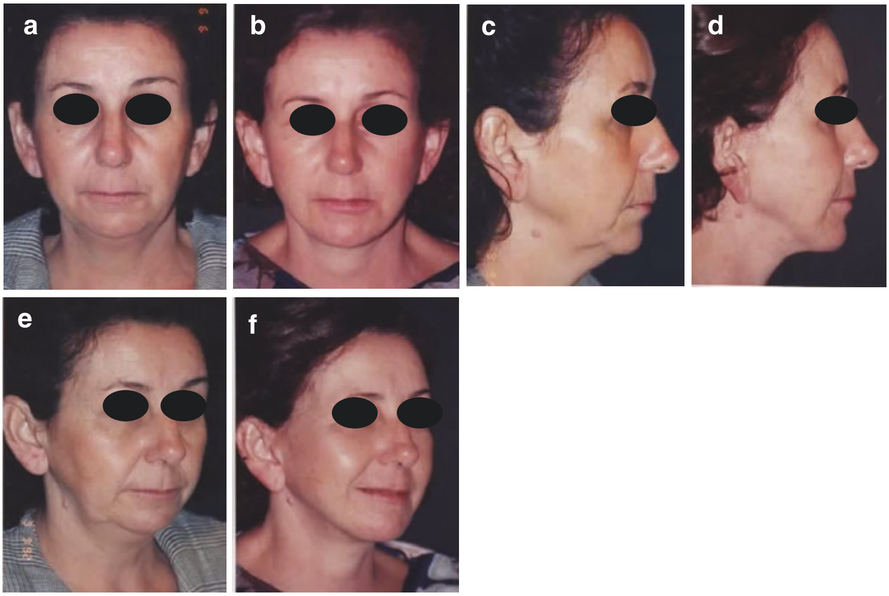

Fig. 1.12 A 53-year-old patient underwent facelifting combined with blepharoplasty and augmentation mentoplasty. Photos (**a**, **c**, **e**) before operation; photos (**b**, **d**, **f**) 1 year after surgery showing improvement of the profile view, the position of sideburn, the inconspicuous scars, the earlobe on adequate and natural position preserving the natural facial expression of the patient

Fig. 1.13 A 49-year-old patient underwent facelifting combined with blepharoplasty and augmentation mentoplasty. Photos (**a**, **c**, **e**) before surgery; photos (**b**, **d**, **f**) 1 year after surgery showing improvement on front, oblique, and profile views, the natural location of sideburn, the suitable scars, the normal position of earlobe and harmonious contour of the face

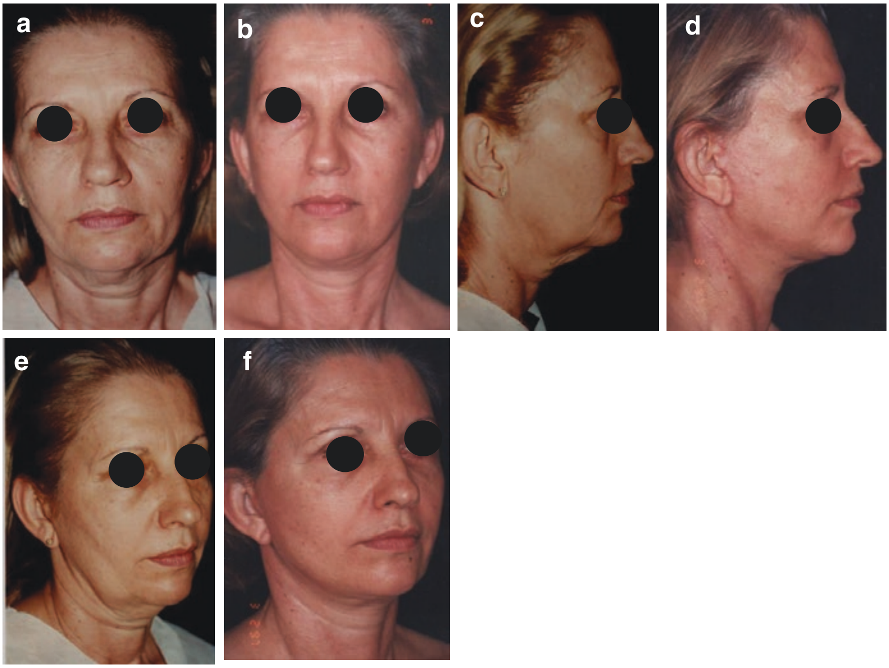

Fig. 1.14 A 57-year-old patient underwent facelifting combined with blepharoplasty and liposuction of the submental and lateral regions of the face with plication of lateral borders of the platysma without any treatment of the structures underneath. Photos (**a**, **c**, **e**) before surgery showing adiposities on submental and facial regions; photos (**b**, **d**, **f**) postoperatory views where one can see graceful facial contour following the direction of traction of facial and neck skin flaps. Also the normal position of sideburn, the nice scar in front of the auricle, and normal position of earlobe

do all effort to achieve smooth and outstanding surgical results which are the best motivation for other potential patients to decide to undergo to a facelift. In fact, our patients look for the necessity to present good appearance among several other motivations.

During this moment that I am writing this chapter, it remains to me the thankful moments in my period of training when I was still a young surgeon-resident at Prof. Pitanguy's clinic observing his fantastic work. Undoubtedly, he used to emphasize about the direction of traction of the facial and cervical cutaneous flaps and the importance to preserve the final patient's facial expression (Figs. 1.7, 1.9, 1.13, 1.14, and 1.15).

To take photographs of all patients before operations is a mandatory step in order to offer adequate possibility for surgeon to analyze all anatomic details of the face, eyelids, position of eyebrows, nasolabial folds, forehead, hairline implantation, both auricles, position of earlobes, as well as all references of the face and neck (Figs. 1.13 and 1.14). Those photographs must be hanged in special equipment inside the operating room which are available for the surgeon to see during surgery. Such sort of organization I learned from Prof. Pitanguy (Fig. 1.1c) during my specialization

Fig. 1.15 A 72-year-old patient presenting aging face with too much wrinkles on her face and all signs of oldness with evident borders of platysma bands. She underwent full facelifting combined with blepharoplasty and liposuction of the submental, lateral, and medial platysma plication, without any treatment of the structures underneath. Photos (**a**, **c**, **e**) preoperative view; photos (**b**, **d**, **f**) postoperatory views where one can see graceful facial contour following the direction of traction of facial and neck skin flaps. Also the normal position of sideburn, the nice scar in front of the auricle, and normal position of earlobe

which is so useful in my practice that I still follow during all kind of my operations. Although I do a meticulous surgical planning, quite often during surgery, I check some anatomic details or deformities of face, forehead, eyelids, and eyebrow, or even some kind of asymmetry that must be again evaluated.

1.4 Conclusions

When facelift operation is planned, it is a fundamental step for all surgeons to take good care about all circumstances concerning the patient before, during, and after surgery as well (Fig. 1.1). I have mentioned that each patient has the right and freedom to choose his or her surgeon. On the other hand, a plastic surgeon must select his or her patients in order to achieve good surgical result which is in accordance with the patient's desire as well as the surgical possibilities. So far, all anatomical consideration of the face and facial expressions must be well evaluated before operations. In this matter direction of traction of the facial and cervical cutaneous flaps is a fundamental approach during rhytidoplasty during surgery. Usually patients do not notice any sort ambulance of the face before operation, but afterward they become much more critic analyzing all details on his or her face.

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Chapter 2
Pitanguy's Technique on Rhytidoplasty

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2.1 Introduction

Human being undergoes an inexorable ageing process. This usual, unkind, complex, process is usually launched over 40 years of age. Fat compartments change their volume, the thickness of the subcutaneous fat decreases, muscles exhibit mass reduction, and the bones undergo a negative mineral balance and loose volume and projection. All these circumstances lead to laxity of the overlying skin, wrinkle formation and fold accentuation.

Extensive research has been made involving minimally invasive procedures such as fillers, suspension threads, stem cell facelifts, growth factors and topical injection of medication with the goal of avoiding the biochemical phenomena related to the ageing tissue modifications. Despite the great effort to postpone a more aggressive approach, some of these treatments are of unproven benefit, which guides plastic surgeons to address facial and cervical senescence alterations through surgical procedures.

Along the last century, facelifting procedures evolved from the small incisions performed by Eugen Holländer and Suzanne Noël to more comprehensive approaches and multiple plane dissections. These techniques have been described under the general heading of “facelifting”. Although cervicofacial flaccidity is the fulcrum for a facelift procedure, submental adiposity, malar fat pad displacement and/or atrophy, alteration of the jawline and increased redundancy of nasolabial and melolabial folds can be addressed by the facelift procedure. Since the late 1990s, efficient SMAS traction, more comprehensive treatment of the neck region, investigation on vectors for tissue repositioning and new endoscopic techniques helped with the improvement of facelifting results. Despite the frequent approach of the cervical region through liposuction, in recent years the direct lipectomy and the controversial submandibular glandular resection have been more frequently applied [1–17].

Another important focus of discussion is the facial volume restoration. Although fillers based on hyaluronic acid have proven to be effective and safe, augmentation of facial volume with fat graft has gained more importance for the adipose tissue and has been linked to the improvement of skin quality.

A satisfactory result is the sum of a precise clinical examination and the surgeon’s ability to analyse and indicate an adequate and customized surgical strategy according to the patient’s necessity. Considerable time must be spared to provide preoperative information with regard to feasible results, to pinpoint the limitations, the pros and cons and the possible complications. It is important to take into account the patient’s motivations and to detect unreasonable expectations. Not all facial wrinkles and soft tissue flaccidity can be repaired through tissue undermining and retensioning of the facial and cervical structures. Although facelifting is a restorative surgery that can improve age-related stigmata, it is essential to emphasize that rhytidoplasty is a palliative treatment for it has not the power of stopping the ageing process. In fact, ideal candidates are healthy individuals with realistic expectancy about the results. Some psychological or psychiatric conditions, namely, body dysmorphic disorder, can be the principal contraindication to the procedure. Patients with acne sequelae, severe asymmetries, dental loss with its consequent bone reabsorption, massive weight loss or *pseudoxanthoma elasticum* are prone to weak results. During the clinical examination, it is essential to identify and indicate the adjuvant procedures that can support the accomplishment of a consonant result. Discussions about the available ancillary procedures and their precise indications as well as the treatment of the upper third of the face are not under the scope of this chapter.

Finally, perfect knowledge of the facial and cervical anatomy is paramount. Preservation of the anatomical elements and landmarks is essential to avoiding sequelae and achieving a natural result. Although a comprehensive anatomy description will not be provided in this chapter, the main facial structures will be referred as they are revealed during the dissection of the flap.

2.2 "Round Lifting"

In 2012, Pitanguy and Machado [11] published their retrospective study regarding 8788 facial rejuvenation cases treated from 1958 until 2010 at the Ivo Pitanguy Clinic. The technique termed "round lifting", which was published by Pitanguy in 1967 [2], was applied to all patients.

Round lifting technique highlights the rotation of the dissected flaps, as opposed to simply pulling the cervicofacial flap [9–11]. The versatile vector of traction connecting the tragus to Darwin's tubercle utilized in this technique has been considered ideal to reposition the facial tissues by a study which established a computerized pattern correspondent to the facial tissue descent and anatomical changes that occur during the ageing process [9].

2.3 Technique Description

Photographs must be available in the operating room. Although our preference is to perform the procedure under general anaesthesia, the final decision includes anaesthesiologist's and patient's opinion.

After hair preparation, a bactericidal solution is applied to the face and scalp (Fig. 2.1). The hair strands are separated with rubber bands in tufts above and below the shaved area that will receive the incisions and sutures. A special adherent towel is fixed to the scalp. Eyes are irrigated and protected with adhesive dressings. Ear plugs are inserted in the external auditory canal to prevent accumulation of blood clots close to the tympanic membrane.

The infiltration of the tissues with local anaesthetic and adrenaline (usually 1:200.000) decreases intraoperative bleeding and creates a cleavage plane to facilitate flap undermining. The plane for infiltration is thinner over the mastoid process

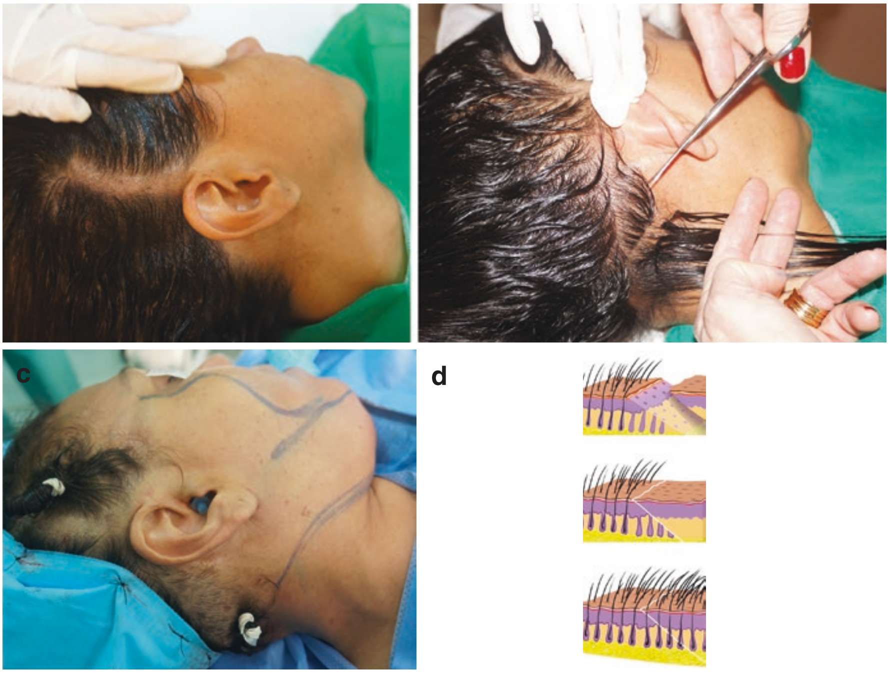

Fig. 2.1 Hair preparation for a facelifting classic incision. (**a**, **b**) Hair removal. (**c**) Hair cleaning and separation. (**d**) Trichophytic incisional approach: the oblique incision permits for hair growth inside the scar tissue

and is thicker on the scalp area. Infiltration in a deeper plane will misguide a less experienced surgeon towards a wrong plane of dissection. Additionally, the volume to be infiltrated might be restricted to 50 ml in each side of the face to avoid an underestimated skin resection or an inadvertent tension in the final suture.

Facelifting is usually performed through a classic incision that begins in a curve at temporal scalp and proceeds following the anatomical pre-auricular landmarks. Routinely, a pre-tragal incision is performed in order to preserve the tragus which may become distorted in facelift surgeries (Fig. 2.2a). However, incision's positioning depends upon being a primary or secondary procedure or, yet, the position of the hairline and the sideburns. Secondary procedures may require different incisions and small advancement flaps so that the hair line can be maintained [19, 20]. Male patients can benefit from an oblique incision at the temporal region to preserve the width and the length of the sideburns (Fig. 2.2b). Nowadays, lasers help to epilate the area close to the incision if the skin resection has brought the hair close to the ear contour.

The incision line circumvents the base of the ear lobe and progresses onto the posterior surface of the concha. Then, the incision raises parallel to the post-auricular crease so that the resultant scar will lay on it. At the level of the auricular ligament, the incision proceeds over the scalp, above the mastoid area, describing a gentle downward curve, similar to an italic "S".

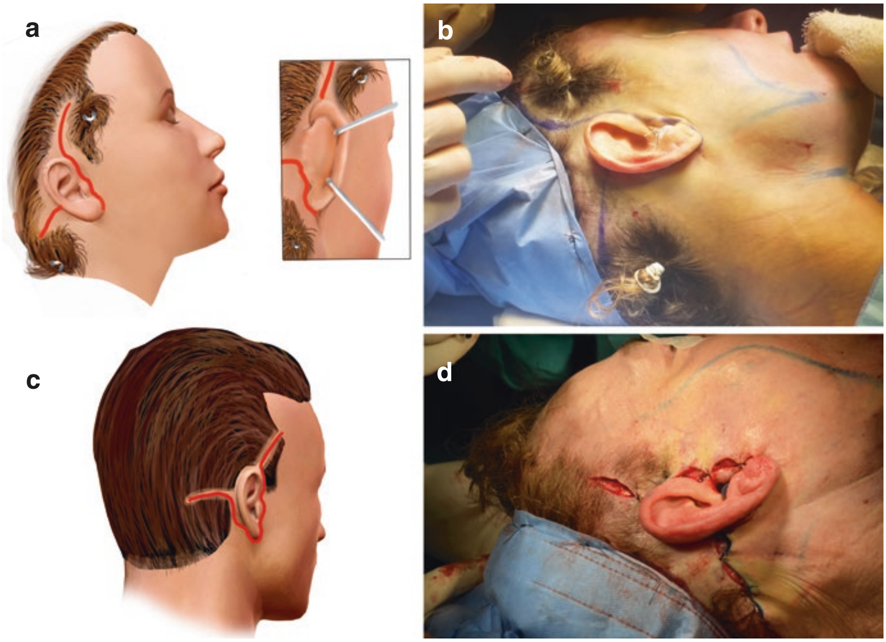

Fig. 2.2 (**a**, **b**) Classic facelift pre-tragal incision. (**c**, **d**) Oblique incision commonly employed for male patients to mantain the sideburn's width

The usual undermining plane at is the sub-areolar layer of the subcutaneous tissue (Fig. 2.3a), and the extent of the dissection varies according to the clinical case. Skin elasticity and the severity of the local problem will be determinant factors in limiting or extending this surgical step.

Facial and cervical dissection can be performed safely if the surgeon bares in mind the local anatomy. The facial nerve (VII cranial pair) innervates the facial muscles on their deep surface except for the muscles *mentalis*, *levator anguli oris* and buccinator, which lie deeper to this nerve. The facial nerve branches are located in a deeper plane in relation to the incision area. However, these branches become more superficial as the dissection continues towards the midline. The temporofrontal branch lies beneath the non-hair-bearing area skin over the temples, and is particularly vulnerable. As an alternative, at this point, the dissection may be performed in a subfascial plane beneath the SMAS and platysma.

The treatment of the cervical region can be a challenge because some patients present accentuated neck flaccidity, submental lipodystrophy, hypomentonism, low position of the hyoid bone [13] and ptosis of submandibular glands. It is important to discuss any possible limitation with the patient before the surgical procedure. The neck is initially addressed by closed neck liposuction. As the *marginalis* branch of the facial nerve can be affected during this procedure [11], protecting the mandible border with one hand and performing the liposuction with the other hand is an effective manoeuvre to prevent from neuropraxia. Frequently, subplatysmal fat excess is

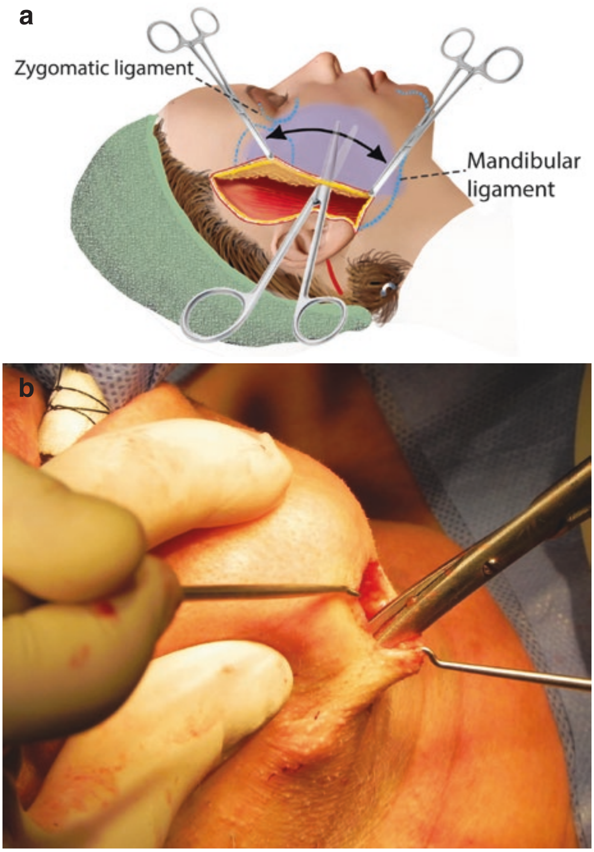

Fig. 2.3 (**a**) Subcutaneous undermining and liberation of the retaining ligaments. (**b**) Liberation of the mandibular retaining ligament through submental incision

encountered and is usually approached by a supplementary direct lipectomy. Facial retaining ligaments, aponeurotic condensations which provide an anchorage of superficial structures to deeper ones, should be released to provide a fully mobile facelift flap.

The incision is prolonged to the cervical area. Undermining at the level of the upper insertion of the sternocleidomastoid muscle must be judicious to avoid damage to underlying structures, particularly the terminal branches of the great auricular nerve which pass superficially to innervate the earlobe. The skin flap dissection is continued along the mandible contour and is extended medially and downwards, beyond the jawline. Extensive submental undermining reuniting the bilateral cervical flaps in the midline may be necessary if prominent deformities of the neck are encountered (Fig. 2.3b).

Platysma medial bands must be inspected and can be reunited through plication via submental incision. Ptosis of the submandibular gland can be more evident when adjacent tissues are repositioned after a facelift. Routinely, the approach is limited to the reinforcement of the platysma that sustains this structure because the submandibular gland resection is a difficult surgery and requires a long learning curve. This procedure will not be described in this chapter.

SMAS treatment and malar fat pad repositioning can now take place. These procedures intend to correct the inferomedial tissue descent and the mandibular contour loss, reduce the depth of the nasolabial folds, reposition the flat, elongated, and narrow malar fat pads and most facial alterations that are consequent to the ageing process.

SMAS treatment recovers the facial angulated contour, augments the bizygomatic distance and reduces the vertical appearance of the ageing face [11, 12]. Although SMAS can be amended through simple SMAS traction and plication, this procedure has been replaced by the high-SMAS technique. The procedure begins with the sub-SMAS dissection and liberation of SMAS over the parotid fascia. Upwards, the dissection promotes the liberation of the zygomatic ligament. The medial vector used to pull up the malar fat pad is usually a vertical one. SMAS is fixed to the temporalis fascia. The resection of SMAS excess (SMASectomy) is performed in those patients that present a prominent malar region. On the other hand, the apparent redundant tissue can be used for volume restoration during the plication through imbrication sutures in cases of facial deflation. The lateral fixation helps with reducing the nasolabial fold depth and can be customized according to each clinical case. Most commonly, SMAS fixation over the temporalis fascia is performed with a permanent suture.

SMAS dissection proceeds downwards in most cases, and the posterior cervical portion of the platysma is fixed to the mastoid periosteum. This procedure permits for better definition of the neck contour. After plication, the undermined surface must be inspected so that any irregularity can be removed.

After treating all deep structures, a second look on the well-vascularized flap is required. The anaesthesiologist is asked to raise the blood pressure so that meticulous haemostasis can be performed before skin resection [1, 11].

Traction vectors are calculated depending on skin status. The cutaneous traction must provide a natural appearance and must be easily replicated on the opposite side, thereby preventing distortions. The direction of the vector that guides the resection of the facial skin excess is from the tragus towards Darwin's tubercle (Fig. 2.4a, b). This vector can be adjusted to reduce the vertical elongation of the aging face. This customization is achieved through gentle forceps rotation so that the best tissue repositioning can be accomplished.

Whilst the pre-auricular flap is held by two forceps, a soft counter-traction is applied with a Pitanguy flap-marking forceps. The desired tension over the facial skin is accomplished. An anchoring stitch called point A is calculated and set at a spot correspondent to the insertion of the auricular helix. The facial flap is then blocked (Fig. 2.4c, d). By pulling the scalp downwards, the small excess skin can be removed. This skin traction must take into account the hairline and preserve the height and width of the sideburn and permits for a non-tension suture.

The cervical flap is pulled in a superior and slightly anterior vector. When appropriate tension is obtained, the flap-marking forceps is placed at the angle of the mastoid incision. Point B is calculated and used to anchor the flap (Fig. 2.5a, b). The inconspicuous cervical incision lies inside the scalp and resembles an italic "S" that creates an advancement flap to avoid a hairline step-off (Fig. 2.5c, d). This technique restrains flap tension to the aforementioned points A and B which permits for the maintenance of the anatomical landmarks, such as the temple hairline, the tragus and the earlobe contour. The ear remains in its position with no traction, while the retroauricular incision stays hidden in the retroauricular fold. Pre-auricular skin excess is resected by trimming the flap in order to mimic the delicate texture of the pre-tragal skin and without tension (Fig. 2.6a).

When the surgery finishes (Fig. 2.6b), the external auditory meatus is carefully cleaned, and moistened cushion pads are wrapped around the auricle and spread over the flaps. A contention dressing is then applied with elastic bandages. It is important to stress that neither flap compression nor drains replace careful haemostasis.

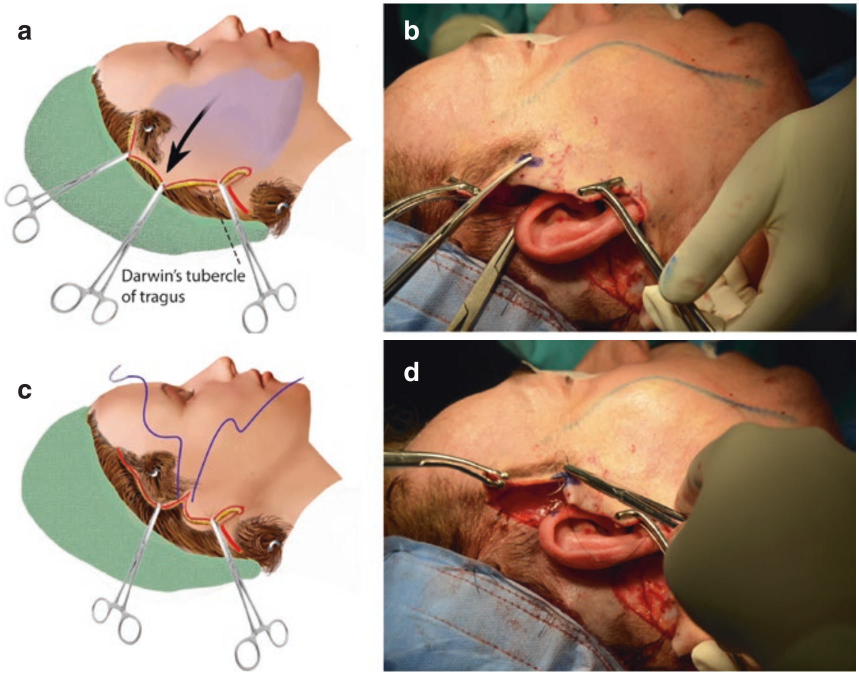

Fig. 2.4 (**a**, **b**) Traction follows a vector that connects the tragus to Darwin's tubercle. (**c**, **d**) Key blocking suture

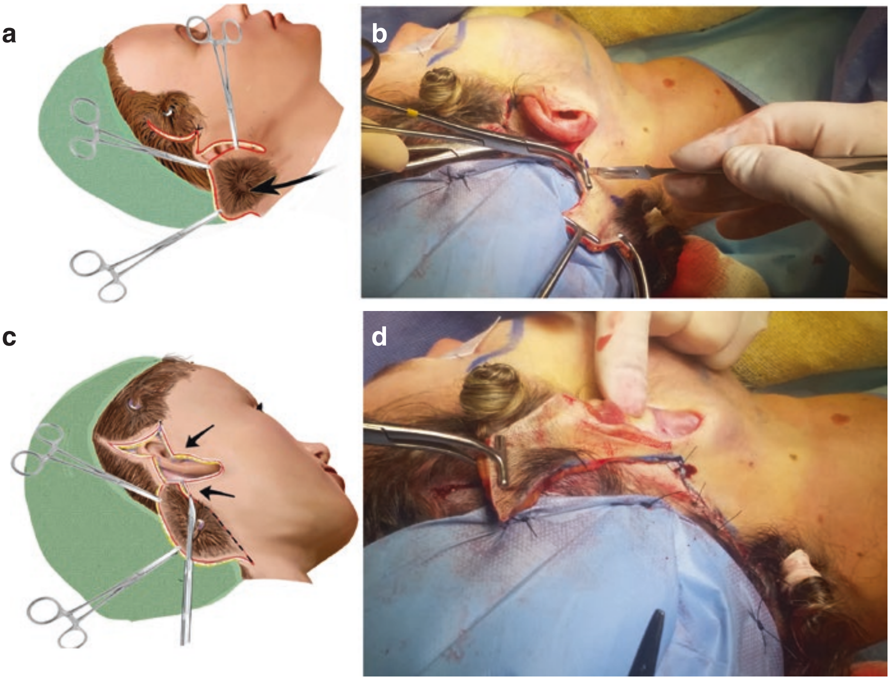

Fig. 2.5 (**a**, **b**) Traction of cervical flap. Resection of excess skin. (**c**, **d**) Flap is pulled forward in order to avoid a step-off in the hairline. Although the drawing shows a precapillary skin resection, in most cases the skin resection is performed inside the scalp, thus preserving the hairline and providing more unconspicuous scars

2.4 Complications

Most frequent postoperative complications are outlined below. Some complications can occur in spite of the surgeon's effort to prevent them whereas others can be foreseen, especially when a clinical history of hypertension, rheumatologic diseases, diabetes, tobacco use or asthma is present. These clinical conditions can be considered as relative contraindications, because they lead to a predisposition to wound healing problems.

Patients are asked to refrain from smoking and to abstain from intaking aspirin or any drug known to interfere with coagulation at least 1 week prior to surgery. Furthermore, special consideration must be given to the use of chemotherapeutic agents and corticosteroids as they can alter wound healing. Surgery must be postponed for at least 15 days after stopping these medications.

Patients with unfavourable evolution must be frequently followed up. This simple procedure can prevent disruptive relationship and legal problems. Surgical complications include hematomas [11], errors of traction [25], infection, cutaneous slough and tissue necrosis. Despite careful handling of facial tissues and proper preoperative preparation, these complications are unavoidable in a small percentage of patients [11, 20–28].

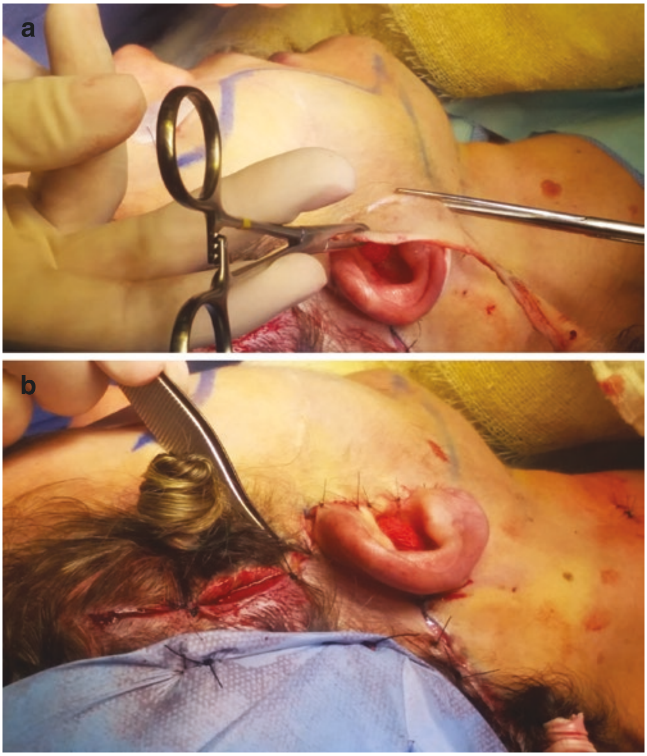

Fig. 2.6 (**a**, **b**) Pre-auricular skin is removed with no tension so that the ear falls into its natural position. (**c**, **d**) Sutures in classic incision

2.4.1 Hematoma

Hematoma is the most frequent complication of facelifting procedures (from 2 to 4% of the cases) [11]. Patient must be closely monitored as soon as large haematomas usually develop during the first postoperative hours. A protocol which includes rigid control of vomiting and blood pressure level is applied in order to diminish hematoma occurrence [1, 11, 26, 27]. Dexamethasone and ondansetron are routinely given to the patients to reduce nausea and vomits. Blood pressure is monitored every hour until the 12th postoperative hour. If systolic level reaches 150 mmHg, captopril is indicated. Clonidine is administered close to the end of the surgical procedure due to the fact that it helps with keeping sedation and low blood pressure in the perioperative period. The bladder must be empty before the end of the anaesthesia to avoid agitation consequent to urinary retention.

Haematomas tend to be unilateral and are characterized by abnormal pain, swelling and ecchymosis. If the swelling is severe, retraction of the labial commissure occurs. It is imperative to promptly detect and properly evacuate haematoma to warrant the safety of the flap (Fig. 2.7a, b). Nonetheless, it is rare to rush the patient back to the operating room. Frequently, the blood collection can be evacuated at the

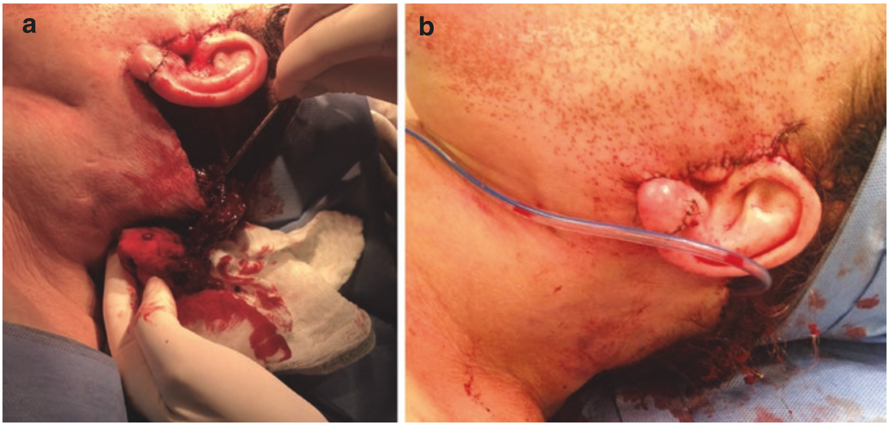

Fig. 2.7 Intraoperative haematoma due to hypertension. (**a**) Clots' removal. (**b**) Aspect of the flap after prompt haematoma evacuation

patient's room, after mild sedation and blood pressure control. For this, one or two stitches are removed, and the majority of the blood clot can be pulled out of the flap under slight pressure. A polyethylene catheter is inserted under the skin, and the smaller residual clots are extracted with saline solution irrigation [1, 11, 26]. It is often necessary to aspirate serosanguineous secretion for 2 or 3 days following this technique. If a residual collection is left untreated, it gives rise to a marked inflammatory reaction which is followed by localized, palpable induration.

2.4.2 Nerve Damage

Patients frequently report some sensory disturbances following rhytidectomy. Numbness of the undermined area is temporary and subsides within the subsequent months [24, 25]. Injury to the greater auricular nerve can be more frequently observed after rhytidectomy (Fig. 2.8a). Lesions of this nerve may cause painful neuromas and varying degrees of auricle numbness. The danger area is situated over the anterior surface of the sternocleidomastoid muscle, 4–8 cm below the ear lobe.

The facial nerve, seventh cranial pair, has two principal branches which divide and subdivide in order to produce a network that will innervate the facial muscles. The parotid plexus or *pes anserinus* is the emerging point of the extracranial portion of the facial nerve. As the major nerve branches rely on deeper layers, true facial paralysis is a rare complication and can be prevented by proper undermining. However, some anomalies can be occasionally found. The area referred to as "no man's land" is a zone that usually contains the temporofrontal branch and can be used as a guide to avoid its damage (Fig. 2.8b). The "no man's land" is delimitated by the temporal branch of superficial temporal artery and an imaginary line that crosses the tragus towards the eyebrow [1, 11, 18].

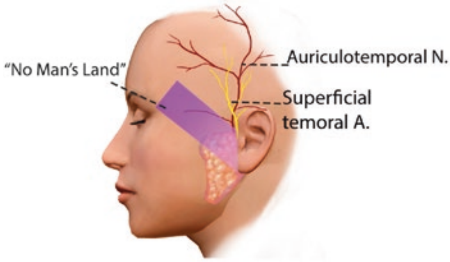

Fig. 2.8 Danger areas: (**a**) The *auricularis magnus* nerve's usual anatomical location. (**b**) Imaginary lines running from the earlobe towards the eyebrow, and from the helix root towards the forehead, delimit the area called "no man's land" which usually contains the frontal branch of the facial nerve

The mandibular branch becomes superficial close to the site at which facial artery crosses the mandibular ramus, at a point level with the angle of the mandible. Therefore, superficial undermining of the chin can damage this branch if carried beyond the nasolabial fold or its caudal extension [1, 11]. Generally, the neuropraxia solves spontaneously after 2 months.

2.4.3 Skin Slough and Necrosis

Skin slough and necrosis are subsequent to the impairment of flap circulation. Most important factors for flap suffering and necrosis are tobacco use (Fig. 2.9) and excessive flap tension caused by ischemia or expanding haematomas or yet occlusive, tied dressings [25–28].

Although cutaneous slough can occur in small areas, major necrosis is rare [11]. Flap slough must be promptly recognized and treated. Whilst necrotic areas can be removed, clean and dry crusts must not be debrided. Pentoxifylline three times a day and vitamin C are usually prescribed to reduce the chances of flap necrosis, and treatment with hyperbaric oxygen therapy may be considered if extensive necrosis is observed. However, its efficacy is not clearly demonstrated. Scar revision is performed whenever necessary, usually 6 months after the facelifting, if necessary [25, 28].

Fig. 2.9 Skin slough in the cervical flap in a smoker patient

2.4.4 Other Complications

Alopecia and hair loss occur most commonly in the temporal area adjacent to the skin incisions. A cause for hair loss is the scalp flap necrosis due to the wound closure under excessive tension. Follicles can also be damaged by injudicious haemostasis at the wound margins [1, 25].

Infection is a rare complication after a facelifting procedure. It can lead to aggressive tissue destruction. Most of the cases occur by bacteria that colonize the skin, auditory canals, mouth and the upper airways. *Staphylococcus* and *Streptococcus* are responsible for most post-facelift infections. Occasionally, pathogens such as *Pseudomonas* can be found. Clinical signs of post-lifting infection include erythema, pain, fever, swelling and flotation [1, 25]. With regard to the treatment, antibiotics are usually recommended. Some patients may undergo hospitalization and wounds may require debridement.

2.5 Conclusion

The round-lifting technique emphasizes the importance of proper flap rotation for a satisfactory result and was described by Pitanguy, in 1967. This technique has been adapted to permit the high-SMAS treatment and different submental approaches. Natural results are easily achievable (Fig. 2.10) in all patients with a low complication rate of 3.8%. The reproducible landmarks provided by this technique provide guidelines for preventing errors and distortions that can result in undesirable stigmata.

Fig. 2.10 (**a**, **c**) A female 53-year-old smoker patient presenting skin flaccidity. (**b**, **d**) Two months after a facelifting by the round-lifting technique, upper blepharoplasty, inferior transconjunctival blepharoplasty and full face skin resurfacing with fractional CO_2 laser. Some residual redness can be observed in the perioral and periorbital areas due to laser skin resurfacing

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Chapter 3
Surgical Planning for Rhytidoplasty: Clinical Analysis Before Operation

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3.1 Introduction

The face is a segment of the human body in which the aging process determines deep alterations bringing unpleasant well-being to patient who took personal decision to undergo aesthetic surgery to remove them. Also it is responsible for significant expression on the harmony of the body contouring. Quite often, female and male care about organic modifications on the face represented by wrinkles, skin flaccidity, and localized adiposities which damage the facial contour bothering special moments in life. The psychological aspects are described in another chapter of this book which is very useful if the reader reads it before performing the operation. Attention has been focused on all anatomic alterations on the face which is a constant challenge for plastic surgeons to reinstate the facial contour in harmony with the body. So far, the individual's sense of beauty, advertising and fashion social media interfere with the patient's desire to seek cosmetic surgery.

When one looks back to fashion some decades ago, it is possible to identify tremendous modifications on the sense of aesthetic judgment, but the aging phenomena is a natural alteration along the life. The models were thin or of an athletic configuration that can bring some well-being, but only after the beginning of the procedure the cutaneous and subcutaneous planes show on the face the need to remove the marks to achieve the success of the surgery. Nowadays, magazines and televisions usually show some people after the rhytidoplasty not as a symbol of beauty, but as a pleasant and healthy facial appearance. So far, there is not a pattern of beauty concerning the external configuration of the face, as it is described in another chapter of this book (see Patient'´s Psychological Approach Towards Rhytidoplasty – Chap. 23). Our patients see themselves on the mirrors and conclude about their physical changes, and they do the indication for the operation. Therefore, they come to our offices with their own decision looking for plastic surgery. In another hands on other specialties, usually the surgeons analyze the health problems, and they do the indication for a surgical procedure. Quite often a patient uses to go to several physicians hoping to find clinical treatment expecting to avoid any operation.

3.2 Psychological Problems of the Patients

Sometimes a plastic surgeon should not perform an operation if he or she concludes that patient's psychological problems must be treated instead of facelift [1–3]. There are several circumstances regarding psychological problems of patients which demonstrate that they are not go candidate for rhytidoplasty procedure. So far, I have already described that there are two types of patients that a surgeon must be careful before to perform an operation:

(a) Those who do not know anything about the surgery
(b) Patients who know too much about the operation

(a) When a male or female patient comes to a surgeon's office asking what operation he or she should undergo in order to become more beautiful, that is a meaning that he or she doesn't know nothing concerning the operation he or she is looking for or even she or he thinks that there are no scars afterward and several other circumstances during and after intervention.

(b) Those patients who believe that they know too much about facelift procedure that the surgeon is obliged to do what they want. These persons are so used to hear about plastic surgery on media, Internet, as well as conversation with friends that they think that they know all surgical details.

Both groups of patients require special attention of the surgeon before planning the operation in order to analyze their complaints concerning the physical problems but also psychological point of view either. All members of the staff must be cautious about the reaction of the patients before consultation and inform the plastic surgeon to be prepared and be careful about all situations [3–6].

Even if there is a patient with marital problems unrelated to physical appearance, he/she thinks that if he/she has a facial rejuvenation surgery, the whole situation can be resolved. Of course it is not a matter of conversation between surgeon and patients about their relationship with family. But sometimes someone of the staff, by the way, may hear about that and must inform the surgeon in order to be aware before planning the operation.

I have already mentioned that each patient has the opportunity to choose her or his surgeon to perform an operation following some physicians' indication, some friends, other patients, as well as through other ways. But also each surgeon may be cautious to select his or her patients analyzing their complaints, through dialogue during consultation or according to the natural reactions while she or he stays in the ambiance of the office. Such selection is a matter of surgeons' experience during long time of practice as well as his or her sensibility.

Psychological problems caused by physical alterations on the face must be well identified preoperatively. If patient's expectations are much more than the operation can provide, it is a good sign that she or he is not a good candidate for facelift, and the surgeon may refuse to perform the operation.

In addition, any abnormalities of the face may be responsible for unsatisfaction of the patient with great psychological repercussion which motivates to aesthetic surgery to improve her facial contouring.

3.2.1 Patient's Evaluation

When a patient comes to our office, she or he should be an ideal candidate for operation complaining about specific problems concerning facial contour. Also, it is important to analyze about well balance on weight, stature, and height. Obese patients with excessive fat on the face and neck should be required to lose weight preoperatively since they may expect to solve all the abnormalities which is incongruous that may not be achieved.

3.2.2 Surgical Planning

During physical examination it is adequate moment for plastic surgeon to explain to patient the operation may be performed. My preference is to do surgical planning with the patient in stand or sitting position in front of a mirror combined with another two vertical ones well articulated in front of each other in the examiner's room (Fig. 3.1). Thus, a patient can see the face once more in frontal and profile view simultaneously. Often, patients with facial, eyelid and cervical asymmetry have not yet been identified. So it's time to show all the abnormalities and explain about the surgical possibilities for repairing them (Fig. 3.2).

3.2.3 Pre-demarcations

As I had the privilege to be trained by Prof. Pitanguy, he used to do some pre-demarcations, so I follow his surgical guideline before operation [14–16]. Once the operation is scheduled, I prefer to see my patients again at my clinic 1 day prior the date. It is another opportunity to check all preoperative examinees as well as to re-evaluate all problems. At this time pre-demarcation is done on the face, neck, and eyelids as well (Figs. 3.2 and 3.3).

Fig. 3.1 My three vertical mirrors articulated between them to facilitate my patients to see in frontal view and profile simultaneously. Photo (**a**) drawing demonstrating the three vertical mirrors; (**b**) photo of a patient sitted in front of the mirrors showing that she can see in front and profile view

Fig. 3.2 Surgical planning of a patient before facelift, liposuction on lower regions of the neck, and correction of a round scar in her frontal region. Photo (**a**, **b**) before surgery; (**c**, **d**) after rhytidoplasty combined with liposuction on lower regions of the neck and partial resection of the unaesthetic scar on her frontal region; (**e**, **f**) demarcations of the accumulation of adiposities on lower segments of the neck and platysma bands bilaterally

Each surgeon must be well trained with the technique he or she is used to perform. I am convinced that it is useful to show to the patient the location and to estimate the extension of the scars around the auricles and hair lines and on submental region as well and other important surgical details [7–9]. The reference points for operation are done according to the technique that will be employed (Figs. 3.1, 3.2, and 3.3). Once again I check the eyelids in order to evaluate the bags to be removed which were marked in my surgical planning during the first consultation. Particularly when reverse lower blepharoplasty will be done, I draw the lines for cutaneous incisions, and some photos are checked again which will be very useful during surgery in the operating room (Figs. 3.1, 3.2, and 3.4). Therefore my patient will know the size and location of the final scars after surgery. Preoperative photos are again done, and blood tests and heart and clinical evaluation which were previously requested during the first consultation now are checked. All these steps are my routine before all operations.

Surgical planning is a fundamental step before all operations in plastic surgery as I have described in all my books: ear reconstruction [10, 12], abdominoplasty [11–13], and breast surgery [13].

In conclusion, the pre-demarcations are done in order to determine the reference points, since the final surgical demarcations are definitely performed when patient is in the operating room (Figs. 3.1, 3.2, and 3.3). The patient goes home with

Fig. 3.3 Surgical planning on a patient before facelift with demarcation of incisions on preauricular regions and platysma band. Photos (**a**, **c**, **e**) before surgery. Photos (**b**, **d**, **f**) after rhytidoplasty with suture of the platysma laterally on each side without any treatment underneath the platysma

pre-demarcations, and on the next day, those reference points are very useful to perform the final surgical demarcations during facelift procedure. Quite often some asymmetry of the face must be well identified and shown to the patient [4, 5].

Once the patient is at the hospital, the pre-medication is done before she or he goes to operating room where the final surgical demarcations are done.

3.3 Discussion

Rhytidoplasty is the most complex procedure to be performed for treatment of facial aging phenomenon. Patients may complain about several problems on the face, since the surgeon must check all physical details and even a careful psychological evaluation before scheduling and performing the operation [14]. During examination are evident several alterations on the face (Fig. 3.1). Some patient may present facial asymmetry which must be well evaluated and shown to the patient as well (Fig. 3.3). Patients are examined in the examiner's room in front of a vertical mirror that has two other well-articulated vertical walls to see the patient from the front and

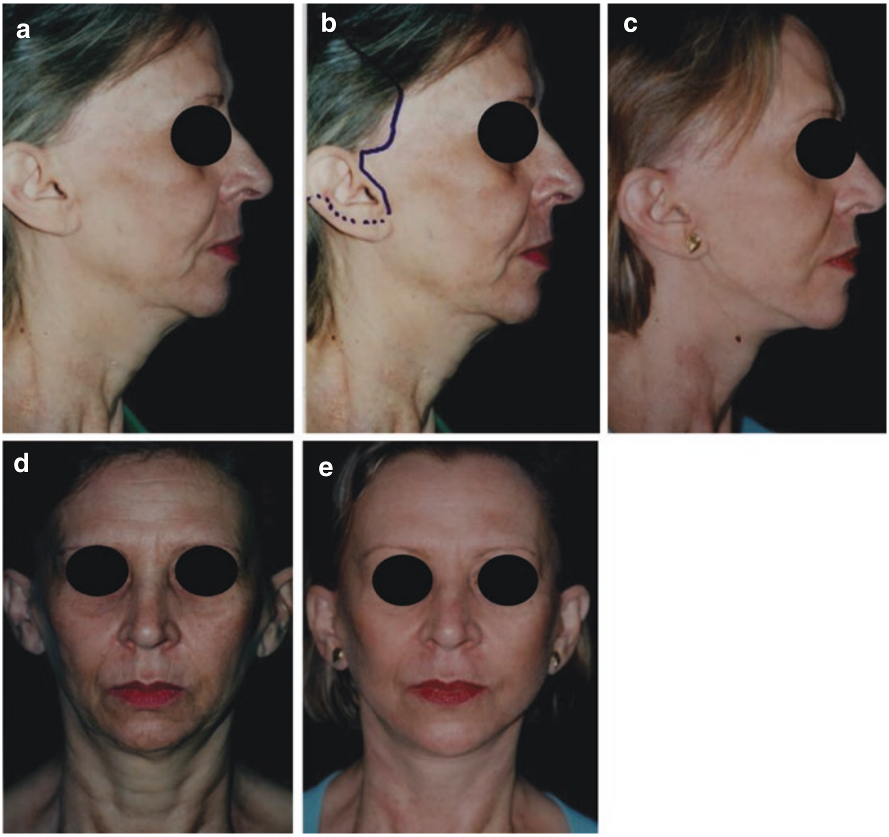

Fig. 3.4 Surgical planning on a patient before facelift with demarcation of precapilar incisions and on preauricular regions. Photos (**a**, **d**) before surgery. Photo (**b**) before surgery with demarcation of the incisions; photo (**c**, **e**) after rhytidoplasty with suture of the platysma laterally on each side without any treatment underneath the platysma

in profile at the same time. Also patients may present psychological problems caused by physical alterations of face, and his or her expectations may be more than the operation can provide, and then she or he is not a good candidate for facial rejuvenation surgery.

During physical examination it is adequate moment to explain to patient about surgical planning and the operation. Each surgeon must be well trained with the technique he or she is used to perform. It is useful to show to patient the location and to estimate the extension of the scars after surgery (Figs. 3.1, 3.2, 3.3, 3.5, and 3.6). When the operation is scheduled, I prefer to do pre-demarcation on the day before the operation. Some reference points are marked on the face. With patient at hospital, the pre-medication is done before she or he goes to operating room where the final surgical demarcations are done (Figs. 3.7, 3.8, and 3.9) [7, 8].

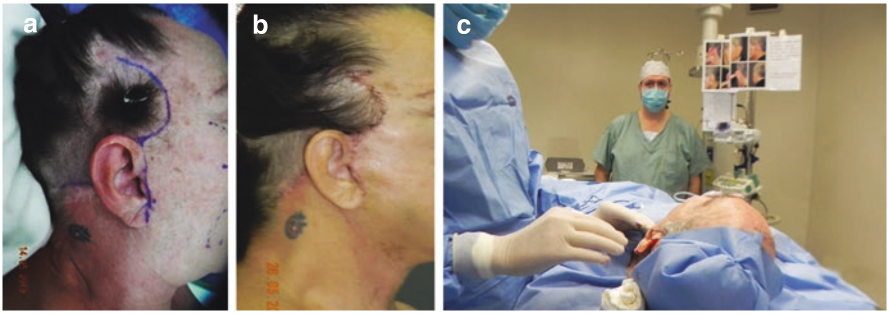

Fig. 3.5 Surgical planning for rhytidoplasty. Photo (**a**) demarcation of the cutaneous incisions on preauricular region, all around the sideburn and inside the hair as Pontes' Peninsula; (**b**) same patient 2 weeks after surgery showing the suture on the lines demarcated before surgery; (**c**) anesthesiologist is always taking good care of the patient during operation, and the surgical planning and patient's photos are hanged with all information about

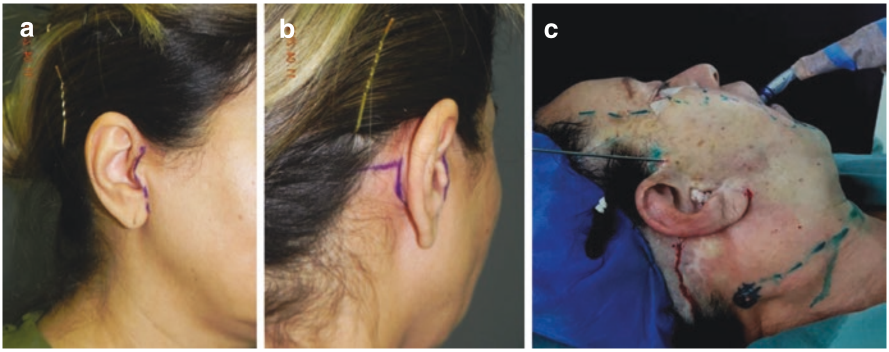

Fig. 3.6 Surgical planning of incisions on pre- and retroauricular regions for rhytidoplasty. Photo (**a**) anterior oblique view; (**b**) posterior oblique view; (**c**) a patient already prepared for a secondary rhytidoplasty operation: dotted lines delimitate the area for local anesthesia and cutaneous scars are visible due to previous surgery

I already mentioned that I was trained by Prof. Pitanguy who was used to begin the operation by rhytidoplasty and afterward he performed blepharoplasty. However just after I started my practice, I changed the sequence of the procedures. When blepharoplasty operation is scheduled to be performed in combination with facelift, I start the operation doing first eyelid surgery. My preference to do first blepharoplasty operation is because it is a very delicate procedure which is done in the beginning of the operation. Another reason is the when facelift is concluded, the facial dressing is done immediately making a slight compression on the face. On the other hand, as blepharoplasty procedure is done in very soft anatomical tissues, to me it is more convenient to perform it first.

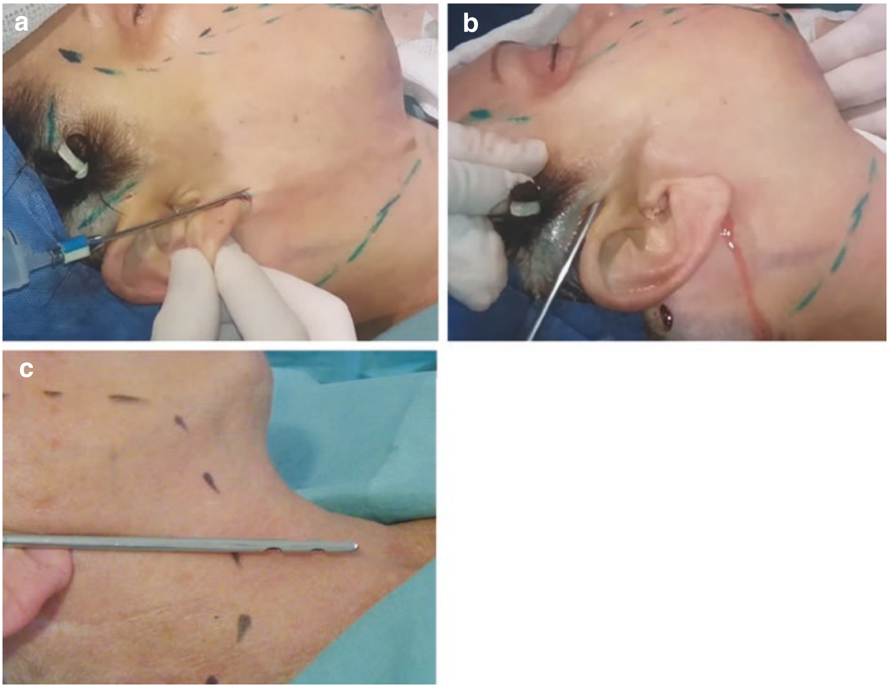

Fig. 3.7 Preparation of the facelift following surgical planning. Photo (**a**) demarcation of the limits for infiltration on face and neck and long needle performing local infiltration through 3 mm incision on earlobule; photo (**b**) tunnelization procedure through 3 mm incision on preauricular incision; (**c**) my surgical instrument above the lateral region of the neck with demarcation of the area of infiltration

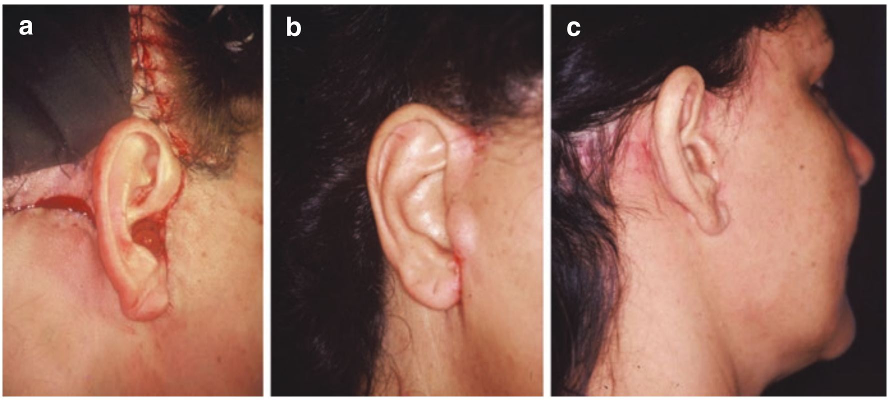

Fig. 3.8 Surgical results followed preoperative planning. Photo (**a**) right side of a face showing the incisions with internal suture on pre- and retroauricular regions and external suture on temporal region; (**b**) same patient 2 weeks after operation; (**c**) after 6 months

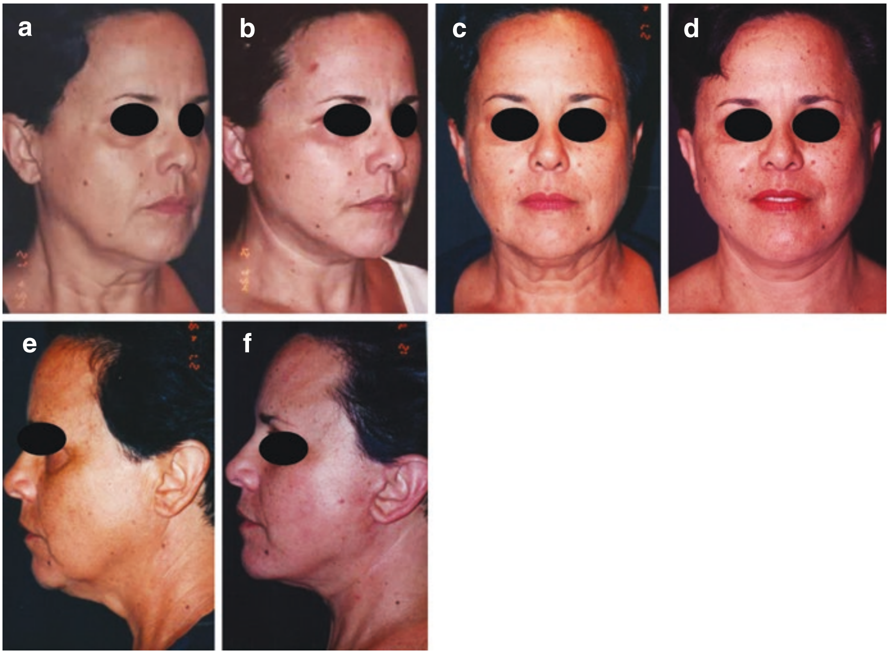

Fig. 3.9 A 65-year-old patient before and after rhytidoplasty following surgical planning. Photos (**a**, **c**, **e**) before surgery; photos (**b**, **d**, **f**) postoperative view of the same patient 1 year after rhytidoplasty

3.4 Conclusions

Usually patients come to plastic surgeon's office looking for solution of their physical deformities since they see themselves on the mirrors and conclude about their problems. In fact, they do the diagnosis as well as indication for operation; also they come with the decision looking for plastic surgery. However, we must evaluate the deformities, to check if patient is really concern about the problem. Afterward it is essential to make the surgical planning and finally to indicate the operation. Therefore during physical examination, it is adequate moment for plastic surgeon to explain to patient the operation may be performed. Surgical planning may be done with the patient in stand or sitting position in order to evaluate the face and relationship with all body (Figs. 3.1, 3.2, and 3.6). Very often patients with some facial asymmetry must be well evaluated before operation and to show to him or her about those severe physical alterations which sometimes they did not yet noticed before. Finally surgical demarcations must be done following the physical alterations during examination.

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Chapter 4
Importance of the Superficial Musculo-aponeurotic System (SMAS) in Rhytidoplasty: 42 Years Evolution

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4.1 Introduction

The importance of the SMAS in rhytidoplasty – or facial smoothing – is closely linked to the surgical desire of the unhappy patient, a desire which stays mysterious and imperative, lunging toward the success of a well-accomplished rejuvenation of the face and neck, which would appear both effective, natural, and long-lasting.

The mystery of a success story about a surgical procedure as complex as a face-lift, including treatment of several anatomical components, is depending on both the surgical technique employed and also of what occurs in the post-operative course, for patients who are all different one from the other; their biological structures and, in particular, their collagen and elastic networks differ considerably from one individual to the other, in terms of structure, resistance, and changes with aging.

4.2 History

Facial lifting procedures did not change a lot until the 1970s: after the Hollander description, in 1901, then J. Joseph described a very elaborate technique in 1916.

That's why a return to the basic anatomy of the face has been critically important for the discovery of the SMAS.

In the book *Gray's Anatomy* [1], illustrated by Henry Vandyke Carter and first published in 1931, a fibrous layer under the facial skin is already mentioned, in the form of a wavy fascia superficialis, without no more details.

The European surgeon J.P. Bourguet was doing in 1929 some deep dissection and sutures below the skin.

The return to basic anatomy of the genio-parotid area that we have undertaken in 1973, together with M. Peyronie, and under the stimulating supervision of P. Tessier, has opened a window of new knowledge about subcutaneous structures, which were adjacent to the parotid gland and facial nerves, thus considered as potential danger zones.

> The creation of the concept of SMAS resulted in numerous facial dissections on fresh cadavers that we had undertaken previously with B. Ricbourg, in the laboratory of anatomy of the Holy fathers in Paris, during the years 1970–1973, when we were studying the anatomy of the arteries and veins of the face [2]; these dissections led me to discover the fibrous structure lying below the skin and the fat compartments of the face. At this moment, I named the strange structure as "the Fibrous Facial Skeleton of the Face" or *SFIF* in French.

The breakthrough of the *SMAS* concept is the result of teamwork under the leadership and with the refreshing ideas, but also critical point of view, of Professor Paul Tessier (inventor of the craniofacial surgery) which I watched, dazzled, as his resident in Hospital Foch of Suresnes in 1973.

Probably, in some way, P. Tessier was aware of the innovations of Tord Skoog [3], who started to mobilize the platysma muscle in neck tightening, a beloved muscle for Tessier who used the skin platysma flap (the Barron Tessier flap) for the surgical correction of congenital malformations of the face and neck areas.

More precisely, it was in 1973 that Prof Paul Tessier, who desired some rejuvenating "return to anatomy," for his future presidential year of the French Society of

Plastic, Reconstructive and Aesthetic Surgery in 1974, and knowing my interest in anatomy and faculty position in teaching it, asked me to perform a giant anatomical work and coordinate a team including others of his pupils; I divided among them the facial areas to study, keeping for me to better understand the most promising and intriguing area (the lateral face). Discussing regularly the anatomical details, we shared all our findings and confronted the observations; the denomination of SMAS came from the discovery, in histologic samples, of muscular fibers inside the fibrous structure; furthermore, the relations of this new structure with the included risorius muscle, the platysma, and the frontal muscles could be successfully best described by the title "the Superficial Musculo-aponeurotic System" of the face, better than the SFIF; the acronym SMAS could be easily understood both in French and English, without changing the terms.

This report entitled "return to anatomical basics," who made date, presented a new anatomy of the soft tissues of the head, with the discovery of the newly appointed SMAS; contributors were:

- In the lateral face area: V. Mitz, with the help of M. Peyronie
- In the neck-chin area: A. Thion
- In the nasal area: F. Firmin and J. Lepesteur [9]
- In the orbital region: H. Quilichini
- Fine radiology of sliced heads: CH Raybaut, radiologist, and A. Thion
- Histology and observation of sliced samples: F. Vilde and V. Mitz

  We did present our results during the traditional annual report; each of us described the findings in his area of study; I did explain the anatomy of the new-born SMAS and its function as a dynamic and networking transmitter of emotions and opened the perspective of surgical usefulness, starting by correcting unilateral facial palsy cases – Tessier being happy and a proud President of the French Society of Plastic, Reconstructive and Aesthetic Surgery in 1974, with *Tord Skoog* sitting in front of us in the audience. He did not ask any question, though.

Thus, the return to the anatomy could be achieved only through the energic association of several young people, gathered in a group under my leadership (Fig. 4.1).

Fig. 4.1 Initial SMAS penetration

All of us worked in a specific anatomical area; I think that I was the only one who did perceive the implications of SMAS in the future of facelifts, as the other perceived improvements in their own area of interest. We met in debriefing sessions a bit as ministers meet with their president, represented by *Paul Tessier*; he managed to remain critical to the progress of our work, but also very involved by the mass of startling anatomical discoveries that grew out of our work: Paul Tessier was not only rigorous scientifically but perfectionist as to the methodology, demanding and inspiring, innovative in thinking, and critical of my enthusiasm, because he was already on the road of *subperiosteal facelifts* that he started to practice in that time, following his huge craniofacial practice; he had the idea that this was the new facelift of the next century, and not some subcutaneous fizzling that he never favored; for him, the bone elevator was more fun and quick than knife and scissors.

These subperiosteal facelifts have been described first by Psillakis [17] in the United States (Psillakis did come to see operate Tessier in Paris) and by Darina Krastinova [12] in France under the name of *mask-lift*. This beautiful procedure not only rejuvenates the face but allows impressive changes in facial deep structure relationships; P. Tessier did not practice nor believe in SMAS relevance; he never published anything about it, because that was not at the center of its hypermodern facelift that he has invented. Besides, for several years, he refused any proposal from me to publish articles about this SMAS discovery, which I considered nevertheless, and in frontal opposition with him, very important for the future of beneficial facelifts.

4.3 SMAS Functional Meaning

I understood that the SMAS formed a regulatory net of transmitting movement and energy in the subcutaneous plane, from the mimic muscles (which emitted fibrous and muscular components toward the deep dermis, by crossing the SMAS) and also following its parallel plane to skin plane; histologically, it seemed strong, and it could be separated from the parotid by a gentle dissection. Therefore, SMAS could be surgically exploited where he was solid, IE in the lateral region of the face [4].

The concept of a SMAS, *more surgical than anatomical*, certainly, was born, first contested in mocking disbelief of many colleagues, but nevertheless based on the large number of dissections made (Fig. 4.1).

The concept of SMAS was later confirmed by other researchers, after having been fiercely denied by the ENT colleagues, such as G. Jost and his pupil Y. Levet: they stood totally reluctant in front of the concept of SMAS in the beginning; I remember a session of the French Society of Plastic, Reconstructive and Aesthetic Surgery in 1975, initiated by G.JOST, said “the SMAS does not exist!”; but they fired dashboard to 180 ° and then worked hard to describe another SMAS [10, 11], slightly different from ours!

4.4 The Anatomical Adventure of the SMAS

When we introduced the SMAS in 1974 at the annual meeting of the French Society of Plastic, Reconstructive and Aesthetic Surgery, the reception was rather mixed: because the majority of listeners (Fig. 4.2), experienced and good anatomists and excellent and already practicing facelift surgeons, had doubts about the reality of this structure, doubted his surgical interest, and doubted his involvement to the function of the elementary layers of facial structures. SMAS became a “trick,” fabricated for anatomical purposes, without any surgical future, because of the risks in injuring the facial nerve branches. Subcutaneous elevation alone did still remain the gold standard for many more years.

It happened during my stay in the United States in 1975 that I could speak for the first time abroad of the SMAS, even before it was published in the PRS in 1976.

Ralph Millard [13], who was my teacher in Miami, gave no interest in the discussion of the SMAS I tried to expose to him, even so when we were performing two facelifts per day in Jackson Memorial Hospital, in Miami.

However, in San Francisco, it has been my joy that a surgeon, colleague and friend of Harry Buncke, my teacher in microsurgery, Owsley [14, 15], who worked in the same hospital (Ralph K Davies), opened me a friendly ear. He listened to me carefully and, almost without superfluous words, understood the “trick”; he was the first to publish an article of surgical technique and outcome of facelift, in 1983, including a gesture on the SMAS for a biplane facelift.

Fig. 4.2 Incision skin and SMAS

4.5 Why Is the SMAS an Anatomical and Surgical Structure of Importance?

4.5.1 Biodynamics of the SMAS

The SMAS is a big net, a structure of mutual relationship between facial dermis and mimic muscle expansions which reach the deep layer of recovering facial integuments; this interconnection concerns not only one side of the face but also transversely, from one side to the other, through the adhesions and the connections between the perioral muscles, and also the neck net, incorporating platysma muscles inter-related; because of being docked in depth by the ligaments of Furnas, the face is mobilized as a whole when we smile, or grin, or express emotions.

Thus the effect of actions powered by the mimic muscles is transmitted and harmonized, all around our face; this phenomenon allows a subtle harmony in mimic movements; this is why it is very difficult to express two times the same looking face, a part maybe for trained actors!

The SMAS acts as a net dispatcher of the tensions in the subcutaneous plane and by interposition with mimics muscles; its elastic structure and its resistance have been much studied; given the value of a heterogeneous layer of a kind of composite fascia superficialis (because it includes parts of the muscle fibers, which could be remnants of a subcutaneous layer of muscle which disappeared in *Homo sapiens*), the SMAS may be used as a reliable tissue to stretch and help to relocate sagging tissues when aging; for a better understanding of SMAS capabilities, we studied the viscoelastic properties of the SMAS; this viscoelastic resistance of the SMAS has been extensively approached by an Israeli team led by Y. Harshai [8], to which we regularly sent fragments of SMAS for biomechanical studies.

4.6 The SMAS, Surgical Structure or Pure Anatomical Entity?

In fact we had shown through our dissections in 1973 on fresh corpses that a subcutaneous surgical plan existed; we could easily undermine it without hurting the facial nerve intra and extra the parotid gland; when this SMAS is freed from the parotid adhesions, it allows a tensioning of the medio-facial area in a much smoother and stronger way than a simple pull of the cutaneous planes; the resulting pull was effective on the jowl area, the peri-malar area, and the neck. The freeing had to reach the pre-parotid border to give its more efficient pull.

This fundamental discovery leading *to practice biplane facelifts* led to revolutionize surgery of rejuvenation of the face, but also made fear of new complications, related to the fact that localized nerve damage could occur in case of a bad technique without good surgical skills, as well as other lesions such a wound to the channel of Sténon or parotid gland injuries.

4.7 Anatomical Limits of the SMAS and Surgical Exploitation

4.7.1 The Upper Limits and the North Pole of the SMAS

The main point on which anatomists and surgeons do not agree concerns the north pole of the SMAS, i.e., its reports with the zygomatic process and temporal structures.

In the study that we had practiced, it seemed to us that the SMAS extended into the head, to join the lateral border of frontal muscle and mesh sideways a few superficial muscle bundles of the lateral orbicular muscle; it remained, however, relatively independent of this last deeper located muscle.

However the surgical dissection of SMAS in the temporal region seemed extremely uneasy, due to adhesions that exist at the level of the superficial temporal fascia and also at the level of the overcoming of the zygomatic arch; at this level an important deep and dangerous structure was the superficial branch of the frontal nerve, outing from the facial nerve, whose variability in every case was endangering the manipulation of local SMAS, with no evidence to easily avoid it, if we recklessly cut deep in this region of a potential nervous wounding.

The result of this anatomical situation has an important practical consequence:

4.7.1.1 For a Safe Facelifting, The Best Is to Separate the Upper SMAS Below the Zygomatic Arch!

The anterior safe limit seems to be the rear edge the muscle zygomatic major, which is the safe limit to preserve. Often, we discover it when we dissect horizontally the SMAS below the zygomatic arch

That is why, in the surgical technique we used from the beginning of the application of the concept of SMAS in facelift techniques, we used a biplane dissection of the skin and the SMAS, with extended under zygomatic section of the SMAS, combined with another pretragal vertical perpendicular incision, to address the rear edge of the platysma; the conservation of the temporal SMAS, left deep in the temporal gap, allowed to avoid injury to the frontal nervous branch but imposed a change of plan between temporal and jugal area! This was not so clear in the beginning but became easy with gained experience.

4.7.2 The Junction of Lower SMAS with the Platysma, the South Pole

The side edge of the platysma is included in the SMAS, down to the level of the south pole of the SMAS; it is a structure of cervical stowage of the SMAS, which is established anatomically and surgically; this corroborates the revolutionary ideas of Tord Skoog, who had made his new workhorse for cervical lifting already. But never did Skoog any surgical action on the jugal SMAS, in the beginning of his first attempts to treat the global aging of the face (Fig. 4.3).

This relationship between the SMAS and platysma allows to tighten in a monobloc way the genio-parotid subcutaneous tissues and the cervical ones; the SMAS is pulled in selected and divergent vectors by an elegant and spectacular dissection; the SMAS thus dissected on the surface and in depth, released his parotid ties, and

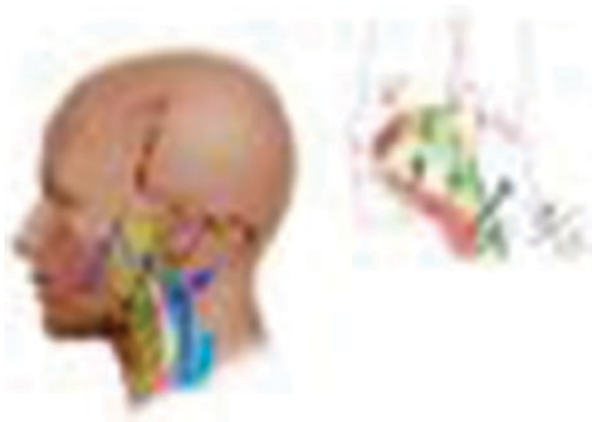

Fig. 4.3 The SMAS rotation and elevation flaps

Fig. 4.4 The skin and SMAS vectors are slightly different

gives rise to a more or less thick slip; thin and transparent as a butterfly wing in skinny patients, it may be very thick and solid, as an impressive fascia in other patients, having their face round and fatty.

This extended dissection in the SMAS biplane technique appeared to us as very important to be used into the 2000s; it allowed – by the action of an important re-stretching performed on skin and on the SMAS – a good and harmonious pull, according to vectors that were different at the level of the skin and the SMAS, obtaining remarkable lifts in the face and the neck (Fig. 4.4) [5–7].

4.7.2.1 The New Volumizing Techniques

In the late 2000 years, it became useful to associate, in association with the dissection of biplane face lifting, new maneuvers, such as the LipoLift of neck by liposuction, and facial volume augmentation, when needed: by addition of bands of fascia, SMAS, or even better lipofillings (through the work of Illouz, Fournier and Coleman), the roundness and youthfulness of the aging face could be better restored.

These volumizing techniques, in conjunction with targeted liposuction, gave still more quality and durability in the goal of rejuvenating face and neck surgery.

4.7.2.2 What's the Point of Techniques with Action on the SMAS?

This raises the questions of durability and better quality of the facelift. The answer to these questions is not easy!

It seems that two layers of tensioning of the face are more stable over time than a single skin relocation. In addition the tensioning of the SMAS greatly improves the jowls, restores the mandibular arch, laterally tightens the platysmal complex which emphasizes the vertical portion of the neck, and makes reappear the Adam's apple in operated men.

Many surgeons perform routinely this procedure, nowadays; other make purses or use plication of the SMAS, a very old procedure already described by Bourguet in 1930.

4.7.2.3 Cut Out the SMAS in Tatters?

To design the different vectors of tensioning, some colleagues have used cuttings of the SMAS in various shreds, wanting to create very customized rotation vectors; thus B. Connell [16] and colleagues have cut the SMAS in a trefoil flap to pull the SMAS as a distended sail of a ship;

J. Little [19, 20] dissected the SMAS to nail it and tighten to the maximum the peri-malar region.

4.7.2.4 SMASectomy or SMAS Sutures Without SMASectomy?

Daniel Baker [22] rather preferred to make oblique or vertical pre-auricular SMASectomy; his published results testify to the excellence of its very minimal but effective approach.

There are countless authors who imagined the kinks of the SMAS to any nervous risk; whether threads pulling and embedded in the SMAS or the creation of purses with threads of traction moored in the temporal gap, there is a multiplicity of innovative ideas and rather conservative attitude toward the SMAS; the biplane techniques with extended SMAS dissection leads fear in the heart of many colleagues, reluctant to cut the SMAS, one way or another; nervous respect requires a lot of attention…

All of these techniques that limit the repositioning of the SMAS without releasing it have the disadvantage of causing bulges under the skin.

It seems to me that a good SMASectomy technique avoids these disadvantages; a biplane technique allows to stitch together, in a very strong way, the elements displaced by aging; it brings ease to create the proper vectors – *vertical in the face and retro-auricular for the neck* – sought to bring back a good tissues' coalescence and a perfect rotation and elevation of the sagging face.

I wilI recall, in another chapter on my biplane facelift technique, how a SMAS elevation from the parotid area allows a rotation and upward pull in the lateral face allows a homogeneous facelift; it is associated to a very powerful posterior pull of the platysma, which is reinserted on the mastoid eminence, close to the sternocleidomastoid muscle inset.

4.8 SMAS and Lipofilling

Because of the incessant development of facial volumetric lipofilling, the question arises of where is the best level to place the fat cells, in which compartment, above or below the SMAS?

The recent work of R. Rohrich [18] and his team (who divided the face into different fat compartments differentiated and separated from each other by vascularized membranes or perforators) is a useful complement to better determine where to remove and where to add fatty volumes, doing so to return to a satisfactory state of fullness of the face; logically, the best level seems to be between the SMAS and skin; but sometimes, a deeper location is mandatory, such as at a supraperiosteal level for bone enhancement: malar, zygomatic, mandibular, or chin areas mostly.

Thus, we can distinguish two levels of lipofilling, which are different depending on the deformations and aging observed:

1. Level 1: between the skin and the SMAS
2. Level 2: subperiosteal and under the SMAS

For example, the increase of the cheekbones can be performed by a lipofilling in contact of the periosteum or subcutaneous pre-SMAS, either by combining the two techniques; the point of entry is hidden in the temporal fossa, above the zygomatic arch.

4.9 SMAS and Lipolifting

Lipolifting is a liposuction of the jowls, the mandibular line, and the neck; a thorough liposuction well performed in these areas leads to a skin retraction, depending on each case; lipolifting is generally performed between the SMAS and skin; in fatty necks, the superficial lipolifting can be associated with a liposuction below the platysma muscle (so retro-SMAS), in order to remove the deep fat compartment, located in front of the hyoid structures.

4.10 The Use of SMAS in Reconstructive Surgery

The SMAS has been used quite widely by the facial surgeons and the ENT surgeons, for side gaps after total parotidectomy; also shreds of SMAS were used in the form of thin strips to flesh out insufficient lips, losses of substances after trauma, or to serve as a fibrous seat to reconstitute a nasal ridge in addition to inclusion of cartilaginous grafts.

4.11 Conclusion

The existence of a fibrous layer under the facial skin is not so new; we could find a mention of a sub-skin facial layer in the anatomy book of Henry Gray and Henry Vandyke Carter first published in 1858.

But the dynamic concept of SMAS, a musculo-fibrous layer acting in the harmonization of mimic facial movements, has been an innovative concept that allowed a tremendous evolution of facelift procedures, allowing the dissection to be performed not only purely under the skin but in a biplane way, with diverse vectors of tissue repositioning, according to each patient and also depending on the surgeon's own perception of biplane facelifts.

These concepts were then superseded by the subperiosteal facelifts invented by Paul Tessier and then a bit later by the endoscopic facelifts, first developed by Nicanor Isse and O. Ramirez [24].

The introduction of facelifting through barbed threads without removing skin, by Sulamanidze, renewed the market of easy facelifts; but remaining a purely medical operation, the thread procedure must now be compared to the results of the biplane microlift, without total section of the ligaments of Furnas: this new procedure allows to remove the skin under local anesthesia and on an outpatient basis.

The discovery of the SMAS in surgery of rejuvenation of the face could be validated only after the 1970s, thanks to the work of the Tessier team, which I had the honor to lead. I was able to publish the SMAS in the genio-parotid area, despite a strong opposition of Tessier himself who wanted to focus instead on his technique of subperiosteal facelift which unfortunately Psillakis [21] published before him!

There are still a lot of new discoveries to consider in regard to the anatomy of the face, such as facial fat compartments, bone resorption, natural and accelerated aging, as well as their sustainable correction and without prohibitive risks.

The history of the SMAS discovery was an anatomical adventure: exciting and significant of an era (the one from the 1970s to 2000s), during which facelifts of different kinds and of variable depth were hotly discussed and compared; different techniques were practiced on real twins in order to compare results and published by several teams, Alpert, Antell… [24, 25]; but scientifically, this may be not totally convincing because even identical twins may slightly differ in their biological structures.

The biplane facelift skin + SMAS stood up well, because many colleagues still practice it routinely; this now well-accepted procedure has also to stand with underperiosteal limited or extensive approach, deep composite facelifts like *S. Hamra composite facelifts*, and endoscopic facelifts.

More recently, in the years 2010–2020 has aroused a pure *medical facelift* done by threads of different brand, without skin resection, mostly under the leadership of Sulamanidze [23].

We will see further the possibility of exploiting the SMAS otherwise than in the large biplane facelifts: *the biplane microlift* is a quick procedure that does not sever most of the retaining ligaments of the face; it responds to the need for a light facelift on an outpatient basis, with little risk of postoperative complications, and becomes capable of competing effectively with the techniques of medical rejuvenation by threads!

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Chapter 5
Male Rhytidoplasty: Refinements in Surgical Technique

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5.1 Introduction

The face is the most anatomical complex segment of the body concerning the entrance and exit of information from in- to outside of the external world to the inner aspect of everyone. The presence of the nose, mouse, lips, eyes, and auricles is responsible for the most important functional aspects for human body. Besides all those veracity of anatomical and functional aspects, there are also the physiognomic considerations that give to the face peculiar characteristics for everybody. In fact, through the face it is possible to recognize the expressions of happiness, suffering, wondering, and sadness among several other intimate reactions of the inner well-being of a person.

Regarding that the male's activities are in constant demanding from their interior world, the face is the segment of the body that expresses all good and bad reactions. The male expression are in constant demand from our world, the face is the segment of the body that needs facial mimic to demonstrate your reactions.

The effects of aging phenomenon cause severe and deep changes to the face. This natural alteration is noticeable on the face although the entire body presents significant metabolic disturbances during the life. Such observations are not peculiar to men, but also for women and young people as well. To perform face lift on female is much more frequent since they are much more concern about their exterior expressions on the face [9]. Nevertheless, more and more men look for aesthetic procedures on the face in order to achieve an ideal balance between the inner and exterior world according to their judgment.

The effects of aging, as well as other circumstances of life such as sun, pollution, and general stress, are shown on individual's face and neckline, and self-esteem may damage the skin. Creation of wrinkles, sagging, folds, and fat deposits on eyelids and under the jaw line on submandibular and submental regions may be evident that change the effect on everyone's expressions which may bring dramatically deep alterations on the appearance and identity [18, 19].

A rhytidoplasty or rhytidectomy or commonly known as a facelift can improve the natural appearance that time changes throughout life with aging. Everyone has its own o'clock in life and considerably reduces these undesirable changes by removing excess fat, tightening the underlying muscles, and re-draping the skin on neck and face. Quite often face lifts are performed alone, but it is more frequent in combination with other procedures such as the following: brow lift must be well indicated and done since it always leaves a scar, eyelid surgery which in most cases I carry out under my personal approach for lower lids as reverse blepharoplasty [1], chin augmentation (Fig. 5.1), or rhinoplasty. Outstanding surgical results achieved by plastic surgeons are the most important motivation to encourage other patients to look for facial rejuvenation surgery. Basically, good results are achieved by experienced surgeons due to the preservation of a robust and strong facial structure, providing natural goals (Fig. 5.2) (Gonzalez-Ulloa [7, 8]).

Fig. 5.1 A 57-year-old patient underwent face lift with liposuction of neck combined with chin augmentation with silastic implant through submental approach. Photos (**a**, **c**, **e**) before surgery with excess of localized adiposities on the face and neck. It is evident in facial asymmetry that the left side presented much more adiposity on the hemiface than on right side. Photos (**b**, **d**, **f**)1 year after face lift with improvement of facial contour due to liposuction on the neck above the platysma without any procedure below it. The sideburn is maintained on its natural position with invisible scars around it. The asymmetry was repaired

5.2 Method

The operation for treatment of aging face on male is quite different than employed in female, since the hair follicles make the skin very thick which may bleed much more. Also, the incisions may be well analyzed in order to leave suitable scars in front and behind the sideburn. For didactic description it is necessary to discuss two topics: surgical planning and the technique.

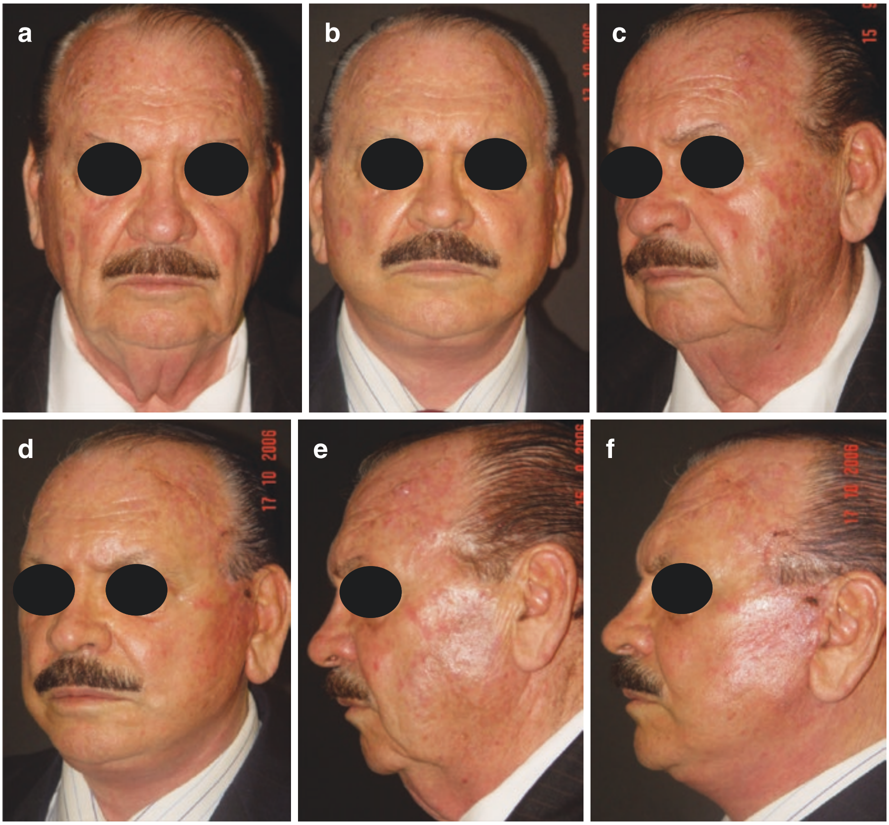

Fig. 5.2 A 69-year-old male patient with evident signs of aging face and submental adiposity as a good candidate for face lift combined with liposuction on submental and submandibular regions. Photos (**a**, **c**, **e**) before surgery with skin flaccidity on the face and neck. Photos (**b**, **d**, **f**) 6 months after face lift with improvement of facial contour and plication of the anterior borders of the platysma muscles without any treatment of anatomical structures underneath the muscles. The sideburn is maintained on its natural position

5.3 Surgical Planning

I have already mentioned in other chapters in this book, even in all my previous publications, that surgical planning is an essential step before surgery [2, 3, 12]. Regarding face lift in male, such observation is even more important since each patient must be well evaluated according to all anatomical disturbances. Therefore, it is mandatory to analyze the alterations that have occurred in the face, neck, eyelids, and forehead; particularly hairline implantation is even more important to observe specially the side burns. It is quite common asymmetric alterations that patient frequently still did not notice yet, then that must be evaluate and to show them to patient preoperatively (Fig. 5.1a, b). As far as the operation will remodel the

Fig. 5.3 Three vertical mirrors articulated between them to facilitate a patient to see himself in front view and profile one simultaneously

entire face, forehead, neck, and eyelids before surgery, it is the adequate moment to inform each one all anatomical details. Concerning the scars, it is useful to define the incisions in front and behind the auricles and also in front of the sideburn in order to preserve it in proper location. It is very important always to ask about the position, size, and location of sideburn and be well informed about the incisions all around it in order to achieve a natural result (Fig. 5.2). I do surgical demarcations 1 day prior the operation when once again all surgical details are explained. The incision places are drawed in consulting with the patient in front of three well-articulated vertical flat mirrors so that the patient can see his face from the front and in profile simultaneously (Fig. 5.3). In case of evident borders of the platysma, it is useful to draw with ink and to show the surgical procedure to treat them in order to remodel the neck afterward (Fig. 5.2). So far, localized adiposities must be also carefully analyzed preoperatively to achieve harmonious remodeling of face and neck (Fig. 5.2).

Regarding eyelid operation which is the most frequent associated procedure with rhytidoplasty, it is necessary to examine the upper and lower lids. Generally male

Fig. 5.4 Photo taken in the operating room showing the surgical planning hanged with the patient's photos beside him which is a routine in all my operations, while patient is still on the surgical table. It is quite useful since sometimes during surgery it is necessary to observe some details in patient's photos

patients have excess orbicular muscle in the upper eyelids, which is indicated to remove it (excess only). So far, on the lower one, the excess of orbicularis muscle makes it very heavy which is good indication for reverse lower blepharoplasty as I already described [1, 3]. In all my patients, I perform my personal technique for treatment of lower lids through which it leaves suitable and inconspicuous scars.

When a patient presents hypogene, it may be treated by chin augmentation which may be performed in combination with rhytidoplasty (Fig. 5.1). My preference is a prosthesis of silastic implant which I sculpture it for each patient during operation.

Any other imperfection of the face must be adequately evaluated and shown to patient always in front of a mirror. All the surgical details in surgical planning are described and are well positioned inside the operating room during the surgery (Fig. 5.4). I prefer to hang the patient's photos in strategic position so that it is possible to observe during operation.

5.4 Technique

Once the operation is adequately planned preoperatively, a face lift can be an excellent option for men looking to achieve a natural appearance of aging face. Through well-done procedure, it may recapture a well balance to facial contour and reshaping with more youthful aspect after surgery. Undergoing to a rhytidoplasty procedure may not change the shape of the eyes, nose, or forehead in order to obtain well balance between all segments and in harmony to the face. Surgical demarcation is done 1 day prior of the operation at my clinic following surgical planning elaborated during consultation (Fig. 5.5).

The operation is performed at the hospital under general anesthesia or local anesthesia combined with intravenous sedation under the care of an anesthesiologist. I do not even recommend to do this kind of operation at a clinic without adequate support as usually offered in a well-qualified hospital. Premedication must be prescribed and administrated as well, sometime before taking the patient to operating room in order to offer adequate prior sedation.

At the operating room, all adequate preparations must be taken by all members of the surgeon's team as it is described in other chapters of this book. No matter if the surgery is done under general or local anesthesia, I routinely do two kinds of infiltration: (a) The first one is done with lidocaine (0.4 mg) with epinephrine (1–1000.000 mg) with saline solution in a total volume of 200 mL. In the use of

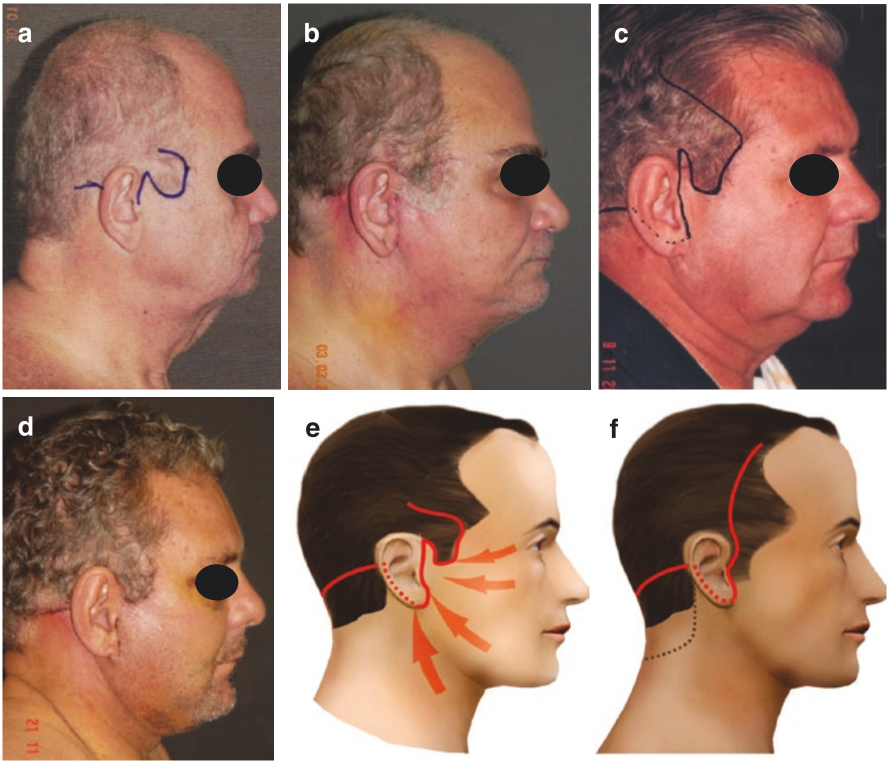

Fig. 5.5 Surgical demarcation according to surgical planning. Photos (**a**, **c**) two types of incisions in two patients of surgical demarcations were done in order to preserve sideburn; (**b**, **d**) same patients few weeks after rhytidoplasty showing scars around the sideburn; (**e**) drawing showing my favorable incision; (**f**) another option less frequent for incision in male patient

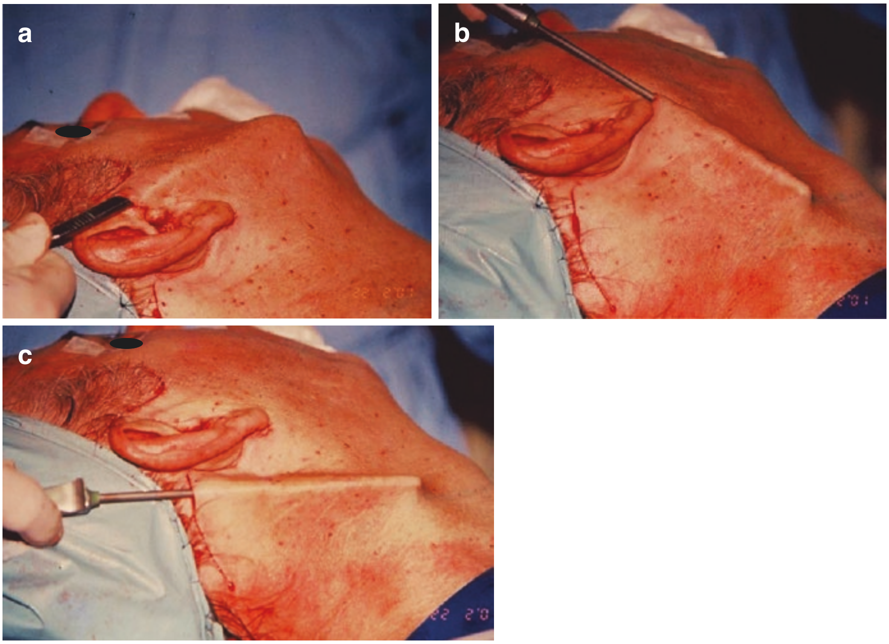

Fig. 5.6 Preoperatory photos demonstrating tunnelization procedure during male rhytidoplasty. Photo (**a**) through a 0.5 cm incision on preauricular region, tunnelization procedure is done on all face; (**b**) through an incision on implantation of the earlobe and the lateral and anterior side of the neck, subcutaneous tunnelization is performed; (**c**) through an 0.5 cm cutaneous incision on retro-auricular region, tunnelization is done all over the neck

such solution, local infiltration provides adequate anesthesia on both sides of the face and neck. (b) The second is hyperhydratation using another saline solution with epinephrine (1–1.000.000).

In the use of both solutions, adequate plan for tunnelization is achieved (Fig. 5.6) all over the face and neck which is a non-vascular traumatic procedure, even with minimal bleeding during such maneuver.

Liposuction procedure is initially done using number 3 Illouz cannula [10, 11], followed by my personal surgical instrument which I have developed specially for such procedure (Fig. 5.7) in order to achieve smooth facial contour. After tunnelization procedure all over the face and neck, cutaneous incisions are done following surgical planning particularly in front of the auricles in order to preserve the sideburn according to each patient (Fig. 5.5). After incisions skin flaps are carefully carried out preserving most of vessels coming from the muscular plan to it which provides normal vascularization (Fig. 5.8). Although there is minimal bleeding due to tunnelization procedure, careful hemostasis must be done all over the face and neck. Afterward the facial and cervical skin flaps are pulled by traction following Pitanguy's technique as it is described in other chapters of this book [13–17]. After

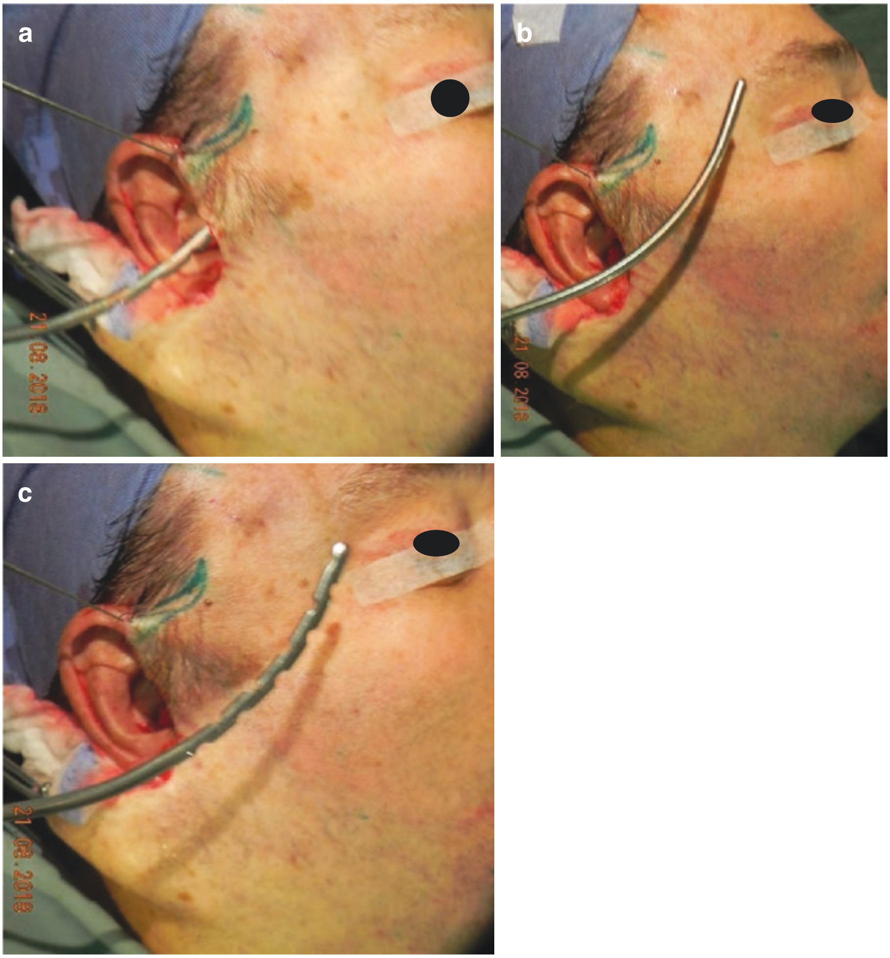

Fig. 5.7 Tunnelization procedure on the face and temporal region using my surgical instruments which do not damage any vessels and nerves as well. Photo (**a**) my instrument is introduced through preauricular cutaneous incision in order to work above the frontal branch of the facial nerve; (**b**) a curve and cylindric instrument is showing outside of the facial skin; (**c**) another flat instrument with smooth irregularities on the borders is showing

concluding all technical steps of one hemiface and neck, the same procedure is performed on the opposite side.

When blepharoplasty is performed as a combined procedure, I do it before face lift. So far, when chin augmentation is planned, normally it is done immediately after the completion of the facelift.

Suitable dressing using adhesive tapes is applied on the face and neck to provide light compression over the skin. I do not use any kind of drains, since there is not

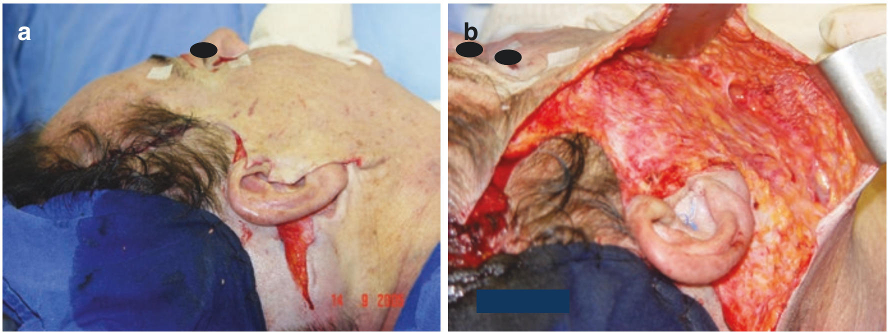

Fig. 5.8 Preoperative views of the right side of the face after tunnelization procedure using my surgical instruments which do not damage any vessels and no bleeding during and after operation. Photo (**a**) external view after tunnelization with the cutaneous flap lying on the face; (**b**) the cutaneous flap is pulled upward showing the inner aspect of raw area

vascular trauma during surgery. The patient goes out from the hospital 2 days after the operation, and the first bandaging is removed 2 days later at my clinic; when it is removed, the head is carefully washed. If it is necessary, another dressing may be applied using adhesive tapes. While the patient is in the hospital and after going home, it is useful to recommend that his head must be elevated 30 ° up to facilitate the venous circulation return from up to down. The surgeon's team may be careful all the time and check about any undesirable circumstances.

5.5 Complications

The most dangerous complication after face lift procedure is hematoma formation which may happen since few hours after operation until 2–4 or 5 days postoperatively. I recommend to my patients to stay peacefully at home with his head up which is helpful postoperatively. While patient is in the hospital in case of hematoma formation, it is obliged to evacuate him in the operating room under intravenous sedation under care of anesthesiologist. I have found very convenient to employ my tunnelization procedure which is very useful in avoiding bleeding during operation and postoperatively as well.

Nerve injuries may happen, but it is a complication related to imprecise technique and caused by surgeon's inability. When tunnelization approach is employed, it avoids any trauma to the nerves since in the use of my surgical instruments, such undesirable complication does not happen.

Skin necrosis used to occur if a hematoma formation is not identified and even is not adequately treated. In case of some sort of cutaneous sloughing of a segment of flap, it is convenient to remove some stitches avoiding other consequences. Once tunnelization approach is employed, the rate of complications is minimum and well acceptable, since no major one has happened in my practice.

5.6 Discussion and Conclusions

The effects of aging phenomenon occur in the whole body, but it causes severe and deep changes to the face. Although it is a natural and progressive alterations to everyone, it is normal for some people to care about it and look for some resource to feel better physical conditions. Such observations are more frequent in women, since they are much more concern about their exterior expressions on the face, but men have also the right to look young in accordance with self-psychological behavior.

Nowadays, more and more men go to plastic surgeon's office asking for aesthetic procedures on face and other regions in order to reach well balance between the external appearance in accordance with their judgment.

Aesthetic surgery among male patients has become increasingly popular. The face lift technique is quite different in male patients, specifically regarding preservation of sideburn and hair follicles, restoration of a youthful and well masculine appearance, and reduction of the risk of hematoma.

The facelift is a procedure that brings man a substantial boost to his self-esteem and for which he becomes grateful. Careful preoperative evaluation is necessary in order to find out about physical alterations on the face which may be treated through a rhytidoplasty. Even some other segments of the face require accurate analyses such as the nose, eyelids, and chin, adiposities on face and neck, flaccidity of the skin, platysma bands, and some asymmetry are important to evaluate. On top of these circumstances, it is mandatory to ask everyone to do blood tests, clinical evaluation which is done by a cardiologist, and to take photos among all preparations for operation following the surgeon's routine.

All surgical details must be well identified and written on the surgical planning which are useful for the surgeon during operation which should be performed at a hospital under care of an anesthesiologist (Fig. 5.4). It is advisable previously to demarcate the cutaneous incisions in order to show to patient the final scars afterward. The position, size, and location of sideburn are essential references which require special attention before surgery. I find it very important to make incisions in front and behind of sideburn in order to achieve a natural position after operation (Figs. 5.9, 5.10, and 5.11). To remove a narrow cutaneous segment behind the sideburn and in front of the auricle is quite useful procedure in order to keep it in its normal position postoperatively; otherwise it will move forward by traction of the facial skin flap, giving an ungraceful appearance (Fig. 5.10).

Fig. 5.9 A 57-year-old patient after face lift. Photos (**a**, **c**, **e**) before surgery with excess of laxity on the neck and dehiscent platysmal musculature with evident borders of both sides on submentonean region. Photos (**b**, **d**, **f**) 3 months after face lift with improvement of facial contour and plication of the anterior borders of the platysma muscles on midline through submentonean approach

I perform rhytidoplasty through subdermal tunnelization which avoids any damage to the vessels and hair follicles as well, in order to preserve excellent vascularization to the cutaneous covering [4–6]. The hair follicles become the skin much thicker than in female. For this reason, the operation may cause more bleeding if the cutaneous undermining is performed with scissor, as currently is done.

The final surgical result must show a very natural facial expression (Figs. 5.1, 5.2, 5.10, and 5.11). The location of the scars must be well informed preoperatively. It is convenient for the patient to shave after operation with a machine instead of blades, since they may injure the skin due to temporarily less sensibility.

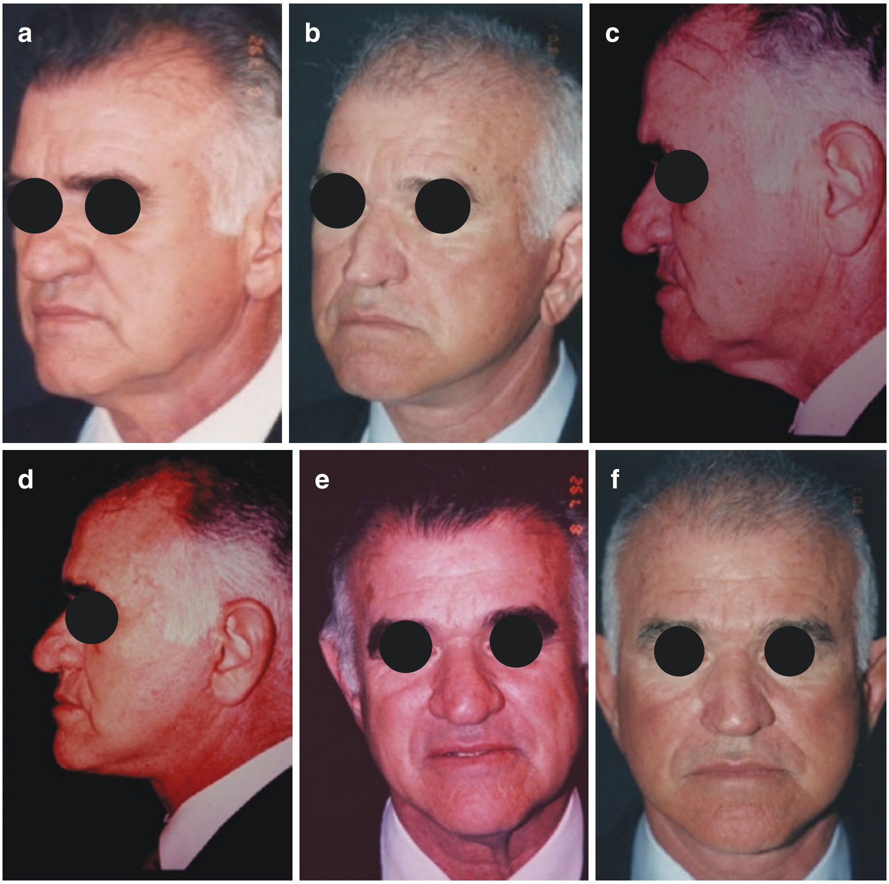

Fig. 5.10 A 62-year-old patient before and after face lift with improvement of the nasolabial sulcus which were treated by subcutaneous tunnelization during rhytidoplasty. Photos (**a**, **c**, **e**) before surgery with flaccidity on cervical regions with sulcus on submento- and severe nasolabial folds. The platysma muscle on left side is much more evident due to asymmetry. Photos (**b**, **d**, **f**) after rhytidoplasty with improvement of facial contour and nasolabial sulcus as well. Plication of the anterior borders of the platysma muscles on midline through submental incision

For men, understand the differences in male facial structure, and perform the procedure specifically to maintain masculine appearance.

When tunnelization procedure is employed, the hair follicles are not damaged since there is no dissection with scissors that may destroy the subdermal layer and the follicles as well.

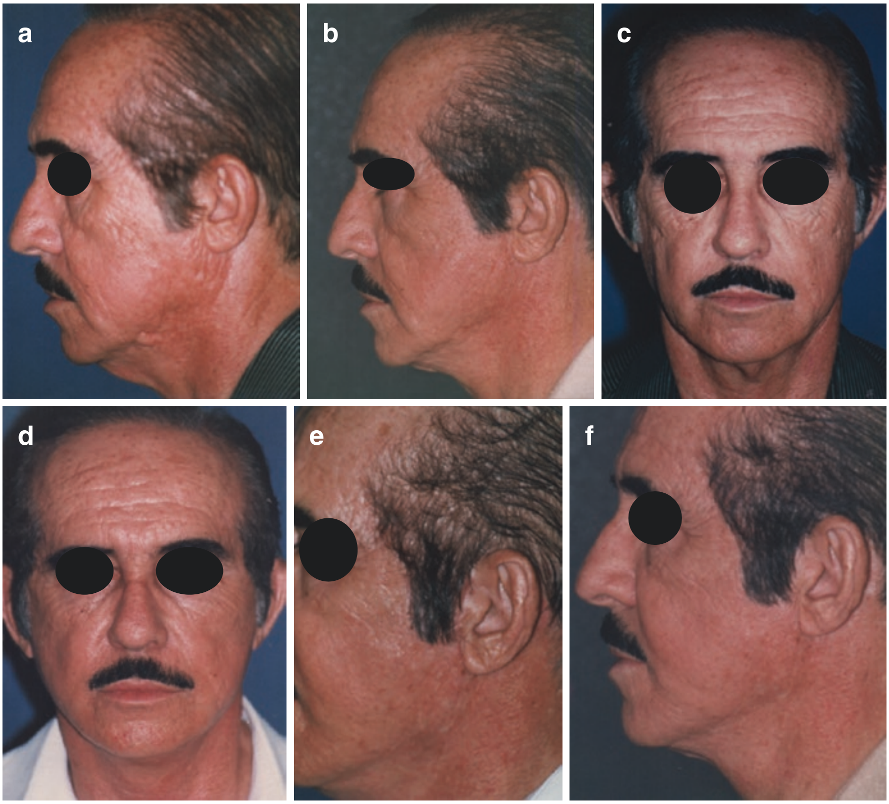

Fig. 5.11 A 69-year-old patient before and after face lift combined with suture of the anterior borders of the platysma muscles without any treatment of deep structures below it. Photos (**a**, **c**, **e**) before surgery with excess of laxity on neck and dehiscent platysmal musculature with evident borders of both sides. Photos (**b**, **d**, **f**) postoperatory 1 year after face lift with improvement of facial contour and plication of the anterior borders of the platysma muscles on midline through submentonean approach. The sideburns are preserved on adequate place with invisible scars

Outstanding surgeons may present successfully the results to patients with less stigma of surgery and more natural look by using an updated advanced techniques with special care regarding the final scars. Facelift procedure should be personalized to every individual patient as every patient has a unique anatomy and goals. the good surgeon can reduce the signs of aging process while preserving a natural appearance.

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Chapter 6
Treatment of Medial Platysma Through Lateral Approach

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6.1 Introduction

The lower third of the face, due to the anatomical peculiarities, is one of the areas that deserve greater attention in rhytidectomy surgery. Special anatomical structures such as platysma muscle and the submandibular gland may require a special surgical approach.

The aged neck shows alterations in the skin elasticity, flaccidity in the retention ligaments that lead to the formation of the platysmal medial bands, increase of the cervical fat deposits, and pre and sometimes sub-platysmal muscular hypertrophies. The most common hyperthrophie being the anterior belly of the digastrics muscle, as well as occasionally hypertrophy of the submandibular gland. We may also find, more rarely, cases of microgenia and hypertrophy of cricoid cartilage, which is more common in male.

In the beginning of consultation, it is important that the surgeon identify these changes and discuss them with the patient perspectives the best form of treatment. In some cases the surgeon may require special surgical accesses; these must be discussed and properly planned to achieve satisfactory results and reach the pacient's expectations. As for example, the submandibular gland's partial resection, placement of silicone prosthesis, etc. However, the most important anatomical structure in the neck, from the surgical point of view, is undoubtedly the platysma muscle. Particular attention should be given to it, if the intention is achieving good results in the aesthetic correction of the aged neck.

Based on this assertion, a surgical approach was developed for treatment of the medial platysmal bands, by lateral, without the submental incision, previously required in other techniques.

6.2 Material and Methods

From January 2010 to January 2019, 144 patients underwent rhytidectomy with special attention to the treatment of the platysma muscle, using a different idea in the section as well as plicature of this muscle.

Surgical technique: Preliminary markings with methylene blue obeying a traditional routine of the senior surgeon (JE) (Figs. 6.3e and 6.4c). The medial borders (anterior platysmal bands) are also marked, with the patient doing muscle traction in order to delineate well these lines, which deserve special attention and treatment (Figs. 6.3e and 6.4c). The patient under anesthetic sedation with the anesthesiologist and local anesthesia, with a solution composed by 2 bottles of xylocaine at 2%, plus 160 ml of saline solution and 1 ampoule of adrenaline. We infiltrate in each hemi-face and neck 50–60 ml, according to each case. The surgery begins with preauricular and postauricular incisions, according to prior marking. There follows the face and neck's extensive detachment, without connecting the two sides of the neck. After rigorous hemostasis, the SMAS-platysma system is dissected to be drawn according to the need of each patient. SMASectomy or single plication of SMAS is done on each hemiface. In relation to muscle dissection, it is done by lateral approach to approximately half of the muscle with dissection scissors, and from this area and following the cervical line, and transverse to the level, toward the cricoid cartilage, previously marked in the skin (Fig. 6.1). The muscle is cut through its thickness by a transverse incision with scissors until it reaches the medial platysmal bands and feels that they were completely sectioned. At this same surgical time, the sectioned parts are detached from the skin. Then a lateral and superior traction is made, and the lateral edges of the platysma are sutured to the deep muscular fascia of the sternocleidomastoid muscle with two or three separate stitches using 3 × 0 colorless mononylon, giving continuity with the SMAS suture (Fig. 6.2). When cut and pulled in this way, the muscle's upper and lower portions cross section open and recede away the anterior cervical skinfolds, without the need for submental incisions, and no further details are required, such as plicture and reduction of the anterior belly of digastric muscle.

Submental liposuction is performed in almost all cases, as well as treatment of SMAS with plication of this or SMASectomy according to the indication in each case.

After revision of the hemostasis, the excess skin is withdrawn, and the suture of the skin by planes is made. The surgical dressing is done with gauzes and elastic band for 24 or 48 hours.

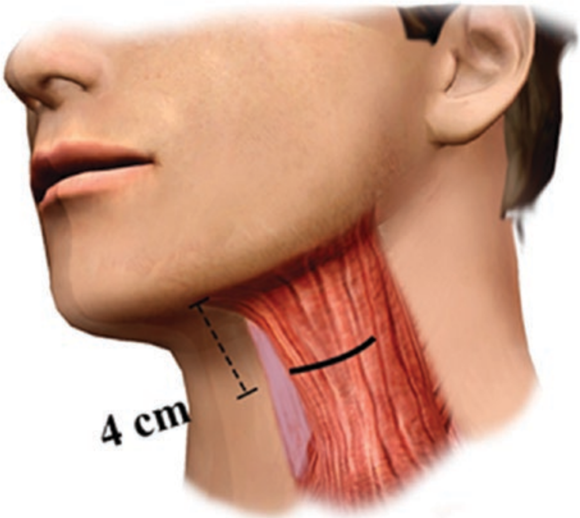

Fig. 6.1 Anatomy of the platysma muscle showing the incision in the medial border

Fig. 6.2 Suture of the platysma laterally showing the separation of the cut medial bands

6.3 Discussion

For three decades, from 1980s to 2000s, we used radical techniques in the treatment of the anterior cervical region, in rhytidectomies. Resections of the anterior belly of digastric muscle, submandibular gland, sub-platysmal fat, and sub-chin incision were performed by us, with major postoperative morbidity and large facial edema. However, in the last decade, we have rationalized the aggressiveness of our surgical approach in rhytidoplasty. Now with less cutaneous dissection and reduced indication of SMASectomy, and wide dissection of SMAS, sometimes only doing SMAS plication, reducing the submental approach of the anterior neck, we no longer resect the digastric muscle as well as the submandibular gland.

For Liu (2012) the results of rhytidoplasties are much better in patients undergoing this surgery before the age of 50, provided that adequate treatment of SMAS-platysma is well conducted [8].

Souza Pinto (1981) recommends lateral traction, from the medial edges of platysma muscle, with stitches that are passed from the lateral edges to the medialis, using a Reverdin needle [12].

De Castro (2012) opens the submento, in the majority of the patients, for treatment of fat and platysma muscle. But it does not even treat digastric muscle or the submandibular gland [5].

Feldman (2014) recommends individualized treatment and opens the submento in 93% of the cases and prefers submental lipectomy instead of liposuction, since it reduces the risk of taking too much fat [6].

Guyuron (2010) recommends suture of the platysma's medial edges "vest-over-pants," in addition to removing the anterior part of the digastric muscle in 61.4% of cases and submandibular gland exeresis in 5.7% of the patients [7].

Narasimham (2016) refers to the necessity of submental incision in secondary surgeries after 10 years of the first surgery, in 87% of cases, with replicate of the medial borders of platysma muscle [9].

Baker (2006) draws attention to the risks and complications that arise from very radical surgeries for the aged neck's treatment, such as removing the anterior belly of the digastric muscle, subplatysmal fat, and submandibular gland, with results that do not correspond to the surgical aggressiveness, sometimes resulting in true cadaveric necks. It also points out that the results obtained with such surgeries do not reflect the advantages described by authors who defend them [2].

Pelle-Ceravolo (2016) describes three types of anterior platysmal bands: hypertonic, hypotonic, and pseudobandas. It also states that relapse in 35% of patients, after 1 year, even with super-invasive treatment is disappointing. It advises that treatments more appropriate for the anterior cervical region should be considered [10].

Rohrich (2016) warns that patients with heavy necks have more relapses and recommends platysma's medial plicature, to reduce these relapses. It also states that the results are the same in both genders. It also recommends a good resolution of the platysmal bands, extensive cutaneous dissection, subcutaneous' excision fat, and lateral platismoplasty [11].

Yousif (2016) recommends to achieve young neck: remove excess skin and fat as well as control the platysma muscle, suturing it to the hyoid fascia and allowing a rearrangement of the supraspinous skin to the muscle [13].

Auersvald and Graziosi (2018) evaluated that in heavier necks, the resection of the anterior belly of the digastric muscle as well as the treatment of the submandibular gland are important steps to avoid early relapses [1].

Campiglio (2018) uses submental incision, removes the subplatysmal fat, and sutures the medial edges of the platysma muscle doing one or two z-plasties [3].

Daher (2015) recommends a new closed technique, using a device called a platismotomo, to cut the anterior platysmal bands, with results that he called "excellent," "satisfactory," and "unsatisfactory," with a low complication rate, so it can also be used in secondary cases [4].

For three decades the senior author (JE) was extremely radical in the treatment of the anterior neck. Submental incision was used in 82% of cases, with anterior plication of the medial edges of platysma muscle and lateral section of the same half with strong suture to the sternocleidomastoid, as well as resection of the anterior belly of digastric muscle in 12% and resection of the submandibular gland in 2% of the patients. However, in the last decade, a less aggressive alternative has been used, reducing the risks of complications as well as postoperative edema. It involves the lateral approach of platysma, submuscular dissection to about half of this muscle and total section of the medial half, including the anteromedial platysmal bands, and then lateral traction, plus the suture with 3 × 0 colorless mononylon at the sternocleidomastoid muscle's fascia at three separate stitches. When the lateral traction is made with the medial half of the cut muscle and the suprajacent skin detached by shearing, the cut edges move away, undoing the platysmal medial bands and maintaining adequate cutaneous accommodation. Avoiding use the submental incision in 98% of cases. Only very heavy necks are opened by the submental approach.

The medial half of the platysma muscle's section, going to the complete section of the anterior medial bands, detachment of the suprajacent skin, and a strong lateral traction of this muscle with suture to the sternocleidomastoid muscle's fascia, proved to be more effective in solving the problems and good aesthetic result of the anterior neck (Figs. 6.3e and 6.4). There was a significant improvement in the reduction of edema and complications, as well as re-interventions due to rhytidectomy, like recurrence of anterior cervical flaccidity and the anteromedial borders of platysma, with formation of vertical cervical folds. No treatment of the digastric muscle or resection of the submandibular gland was required to obtain better and more durable results than those obtained in the three decades prior to the latter with the use of this simpler technique.

6.4 Complications

Specific complications such as bruising in the area of muscle section and facial nerve injury were not observed, but temporary paresis of the mandibular branch of this nerve may occur, as well as suprajascente skin ecchymosis. Cervical anatomy's deep knowledge is necessary to avoid this type of complication.

We had two cases (1.38%) of temporary paresis of the mandibular branch of facial nerve, which required postoperative physiotherapy and resolved in less than a month.

Fig. 6.3 (**a**, **c**, **e**, **g**) Pre-op of patient undergoing rhytidectomy and previous marking. (**b**, **d**, **f**, **h**) Post-op 6 months later

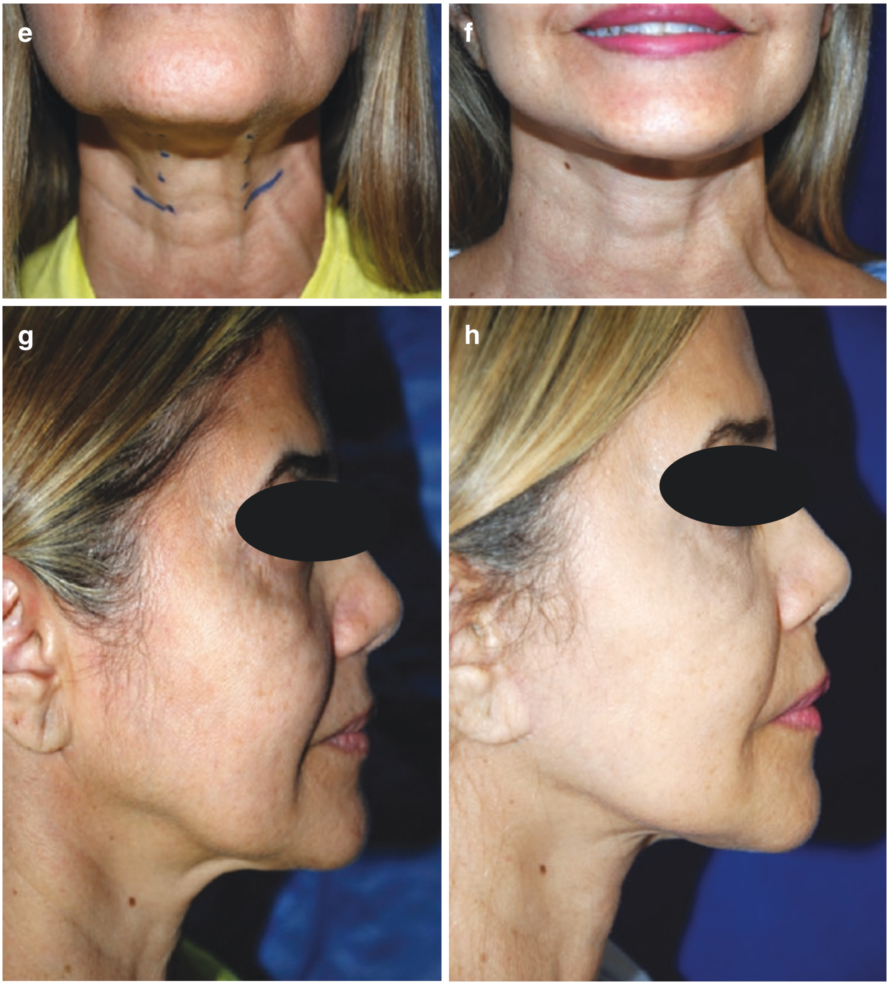

Fig. 6.3 (continued)

Recurrence of cutaneous wrinkles and platysma medial bands' flaccidity after 6 months occurred in 12 patients (8.33%) of the cases operated with this technique.

6.5 Conclusions

With the technique presented in this chapter, the authors obtained in the last decade better results and fewer recurrences than when they used more radical techniques, in three previous decades.

Fig. 6.4 (**a**, **c**, **d**) Pre-op of patient undergoing rhytidectomy and previous marking. (**b**, **e**) Post-op 6 months later

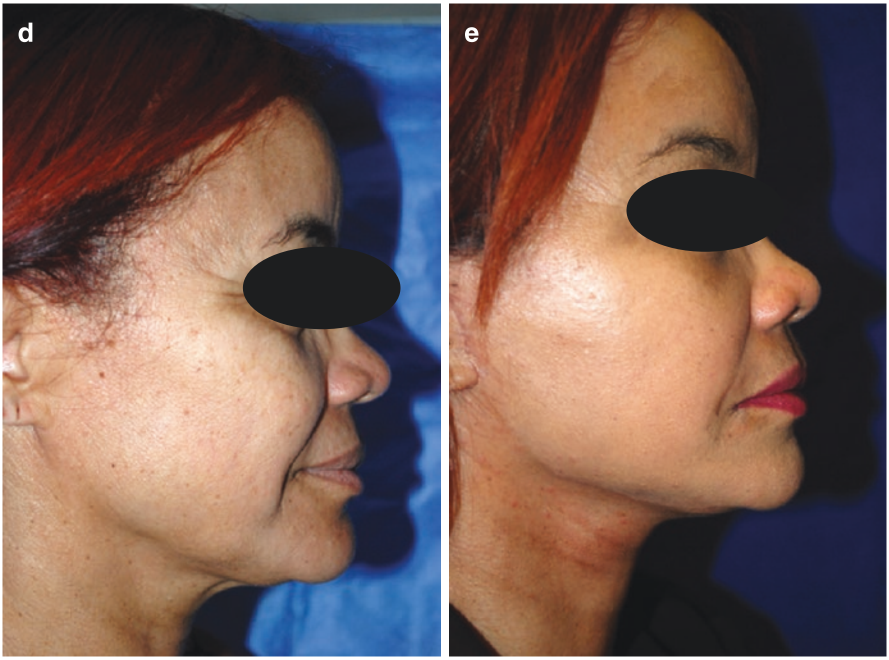

Fig. 6.4 (continued)

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Chapter 7
Rhytidoplasty Associated with Ear Reconstruction

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7.1 Introduction

When a person presents normal auricles, another one may not see them on each side of the head. However, if some deformity changes the aesthetic appearance of one or both auricles, it is easy to notice small or large anatomic alteration, even from a distance. No matter if the deformities are small or involve all auricles, they present deep repercussion on patient's psychological point of view (Fig. 7.1).

The normal auricles present sophisticated, suitable, and peculiar anatomical structures for their support on the lateral sides of the head. For this reason, when ear reconstruction is done, I was deeply concerned that it is mandatory to create a main pedicle for the new auricle [1, 4, 15–17, 28].

When I started my professional activities, the fascinated field of ear reconstruction was a constant challenge in plastic surgery. To solve several problems, it needs more and more surgeons presenting scientific contribution to minimize patient's sufferings and their families as well. In the mean time I identified narrow technical knowledge in the creation of a new auricle, which stimulated me to be devoted and apply my effort in finding new procedures, improving surgical results, in order to achieve a well balanced facial contour [6, 29] (Figs. 7.1 and 7.2). Even creation of the temporoparietal fascial flaps [2, 3, 5] is a useful step which was employed with enough success on ear reconstruction [7].

Ever since I developed new concepts on abdominoplasty [9–11], I found them very important knowledge in improving rhytidoplasty procedures as well as on ear reconstruction on congenital and acquired deformities (Fig. 7.1). As my anatomical research performing dissections on cadavers, looking for new surgical operations for safety abdominoplasty, it was evident to me that those surgical principles were also correlated with ear reconstruction procedures and rhytidoplasty as well. Therefore, once upon a time, during a long time (more than 10 years), in one of my brainstorms, I finally concluded that for reconstruction of a new pinna, which was a fundamental approach, I described new ones in 1999 regarding abdominoplasty and consequently for face-lift as well as for ear reconstruction [9–13]. At the same time, I identified that a vascular pedicle providing an adequate blood supply to the reconstructed ear is similar to the preservation of perforator vessels on new concepts on abdominolipoplasty. Based on this goal, I was looking for with obsessive pursuit to perform safety abdominoplasty technique with reduced rate of complications, which is very important to employ on ear reconstruction procedures.

It is quite rare to perform both procedures in the same patient, but as I have been used to do frequently reconstruction of the auricles, I have done simultaneously on congenital anomalies and also repairing traumatic amputations (Figs. 7.1 and 7.2). For this reason both procedures are described in this chapter demonstrating the possibility of recovering the auricles destroyed by trauma or congenital anomalies as well as reinstating facial contour through rhytidoplasty – repairing aging face as

Fig. 7.1 A 64-year-old female patient with microtia on right side underwent total reconstruction of the ear combined with rhytidoplasty. Photos (**a**, **g**, and **i**), before operation; (**b**, **h**, and **j**), after total reconstruction of the auricle and rhytidoplasty; photo (**c**), during the second stage of ear reconstruction showing the new frame already embedded in previous stage, since the arrows indicate the direction of traction of skin flaps; (**d**), cutaneous incisions for rhytidoplasty; photo (**e**), the skin flaps are pulled in order to be rotated to cover the posterior aspect of the new auricle, and the excess will be resected; (**f**), final view of the reconstructed ear and the rhytidoplasty concluded, since the posterior aspect of the new ear is covered with skin flap of the face

Fig. 7.1 (continued)

well as severe sequelae of facial deformities caused by trauma. Therefore such combined operations are useful one to harmonized facial contour achieving smooth and aesthetic appearance to the patients (Figs. 7.1, 7.2, and 7.3).

There are several causes to amputate the auricle associated which may destroy soft tissue of the face as well, such as car accidents (Fig. 7.2) amputation by avulsion of the scalp (Fig. 7.4), burns (Fig. 7.2), animal bites caused by horses cows, dogs (Fig. 7.6), human bites during fighting, or lovemaking.

7.2 Technique

When ear reconstruction is done in association with rhytidoplasty, I started performing the first stage of the auricle removing the ninth rib cartilage to excavate the new framework of the future organ (Fig. 7.1). During this stage I follow the surgical principle of my technique as it is described in my previous publications [4, 9–11, 14–19]. All technical details are important to employ such as surgical planning, removal of the costal cartilage, and excavation of the new auricular framework and to embed it on its adequate place (Figs. 7.1, 7.2, 7.4, 7.5, and 7.6).

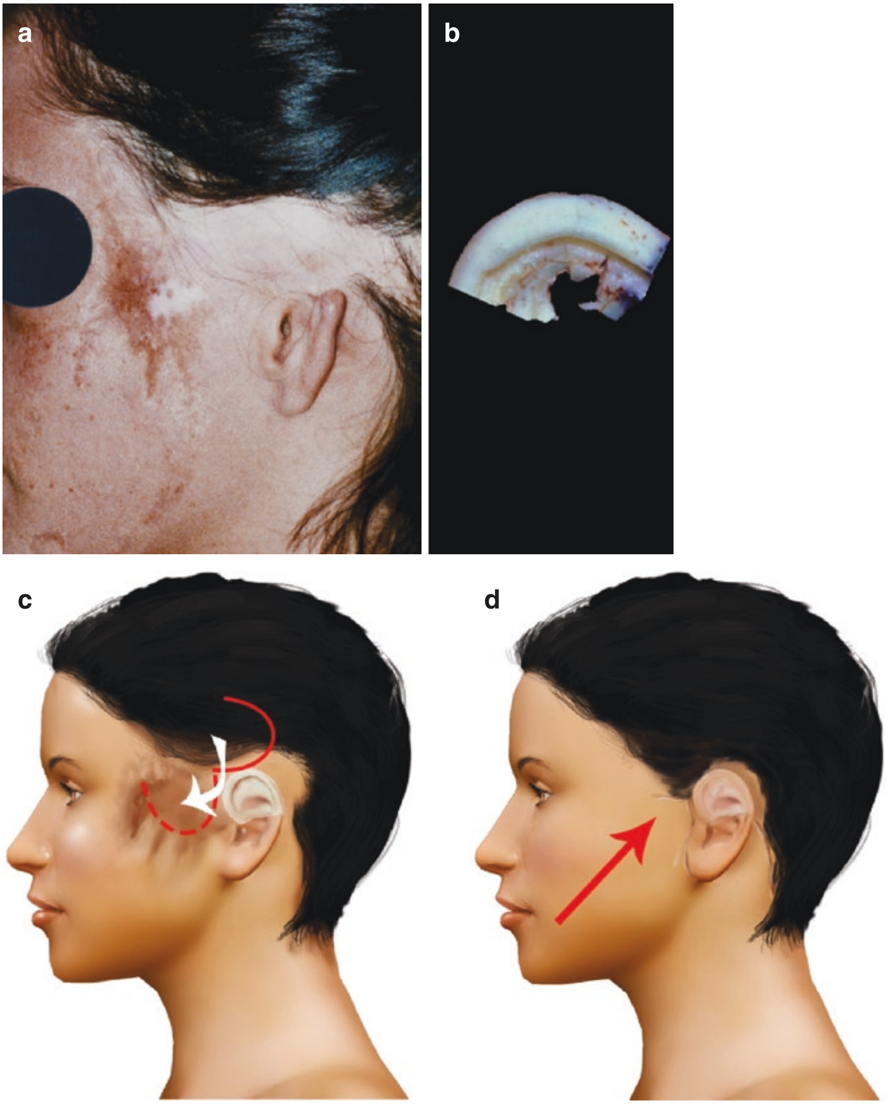

Fig. 7.2 Partial reconstruction of the upper half of the ear combined with rhytidoplasty to improve facial contour in a 22-year-old female patient with unaesthetic scars and with severe damage on the face caused by car accident. Photo (**a**), unaesthetic aspect of the patient presenting extensive scars on temporal, zygomatic, and genian regions on left side; (**b**), photo of the new auricular skeleton already sculptured to reconstrut the upper segment of the ear; (**c**), drawing shows the surgical planning for the second stage of reconstruction, while the white arrow demonstrates rotation forward of scalp to repair the sideburn; (**d**), drawing shows the final aspect of the reconstructed ear, and the red arrow shows the direction of traction of skin flap of the face with reparation of the scars; photo (**e**), after the first stage of ear reconstruction showing the new framework previously embedded underneath the unaesthetic scars. The dotted line shows the surgical planning for rotation of scalp flap to reconstruct the sideburn; photos (**f**, **g**), final aspect of the reconstructed ear with partial reparation of the scars of the face

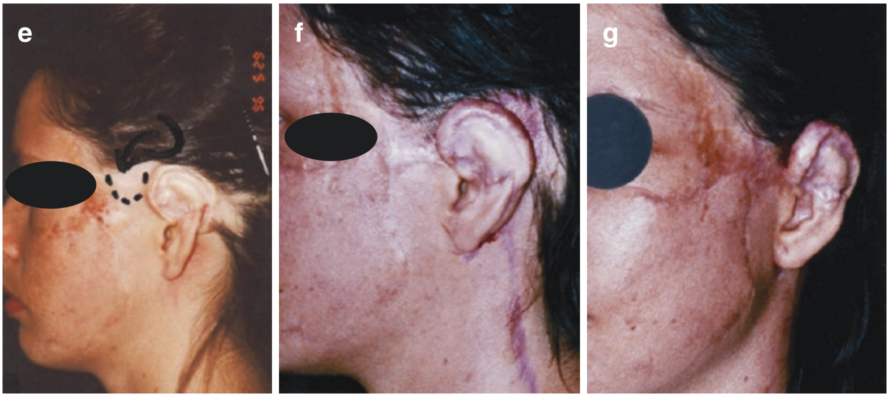

Fig. 7.2 (continued)

Fig. 7.3 Rhytidoplasty performed in association to ear reconstruction in a 49-year-old female who previously underwent unsuccessful ear reconstruction elsewhere. Photos (**a**, **d**, and **g**), patient at age of 16 years old after three unsatisfactory operations performed elsewhere; photos (**b**, **e**, and **h**), same patient at the age of 48 years old after two stages of ear reconstruction; photos (**c**, **f**, **h**, **i**), same patient after rhytidoplasty association

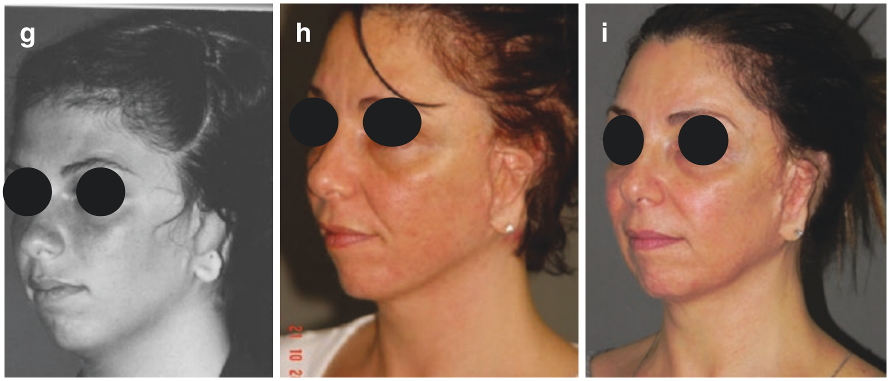

Fig. 7.3 (continued)

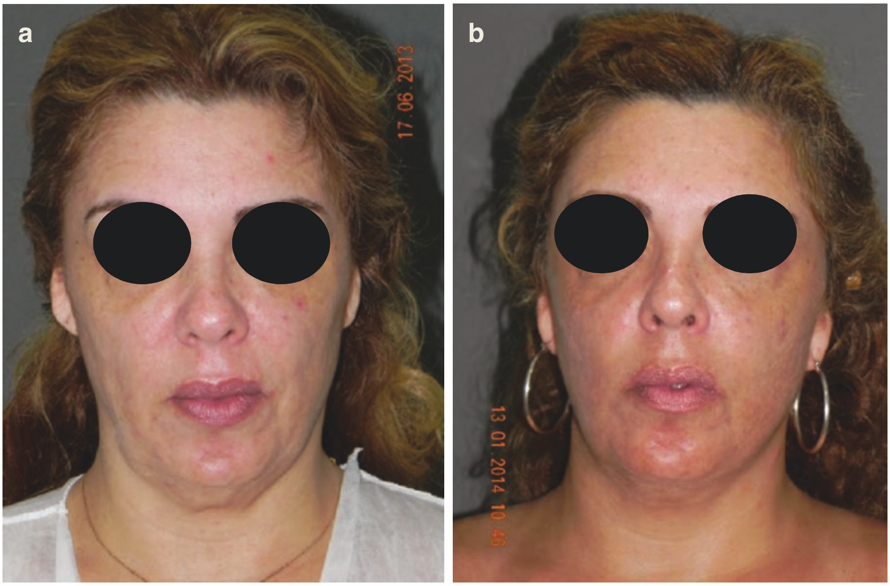

Fig. 7.4 A 48-year-old female patient presenting bilateral microtia came for rhytidoplasty, since she did not care about absence of the both auricles. Although I explained to her that she may will miss the chance in the future to undergo ear reconstruction after rhytidoplasty due to damage of the skin of the area for operation, but she definitely asked for a face-lift operation. I made a surgical plan trying to be conservative in order to give her some chance for future ear reconstruction. Photos (**a**, **c**, **e**, and **f**), preoperative; (**b**, **d**, and **g**), postoperative; (**h**, **i**), preoperative photos on the right side; (**j**), during operation on the left side

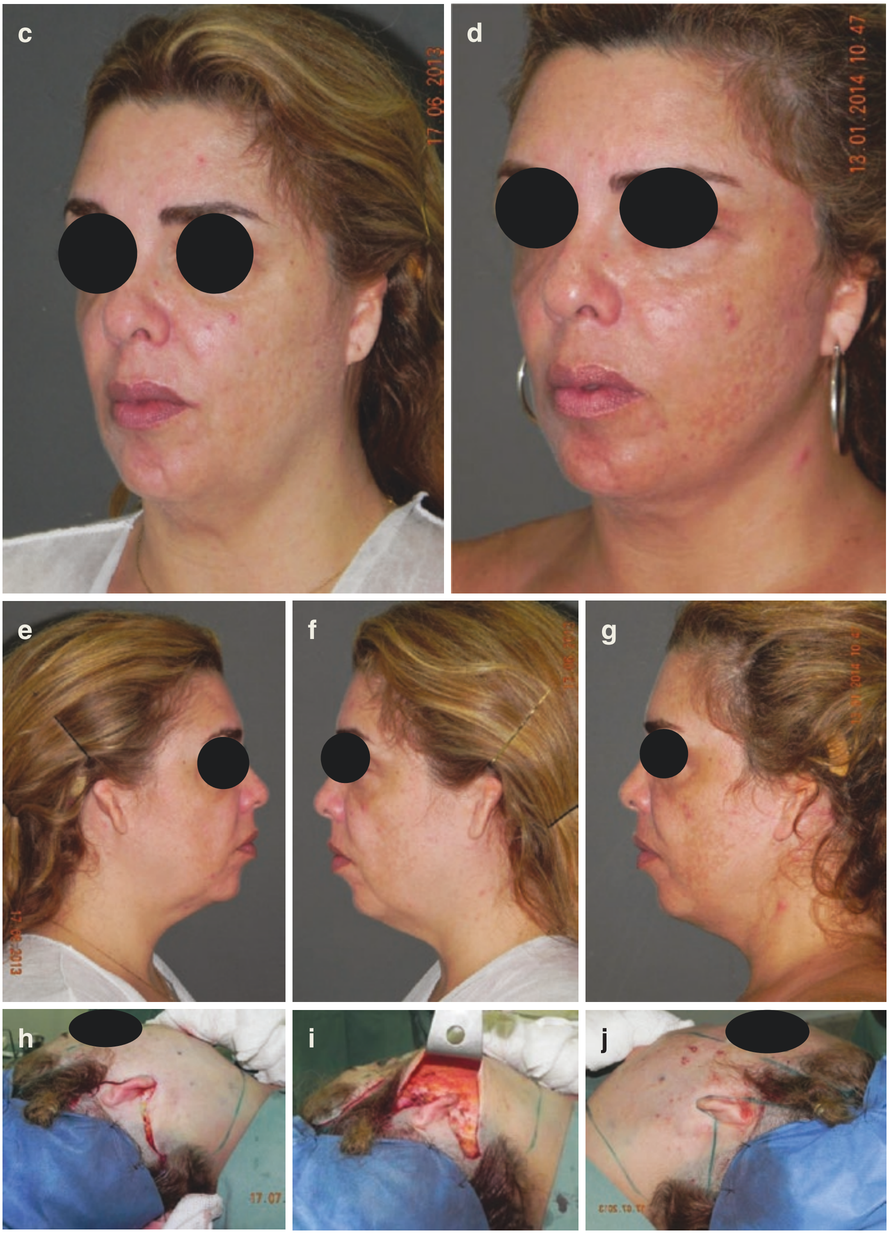

Fig. 7.4 (continued)

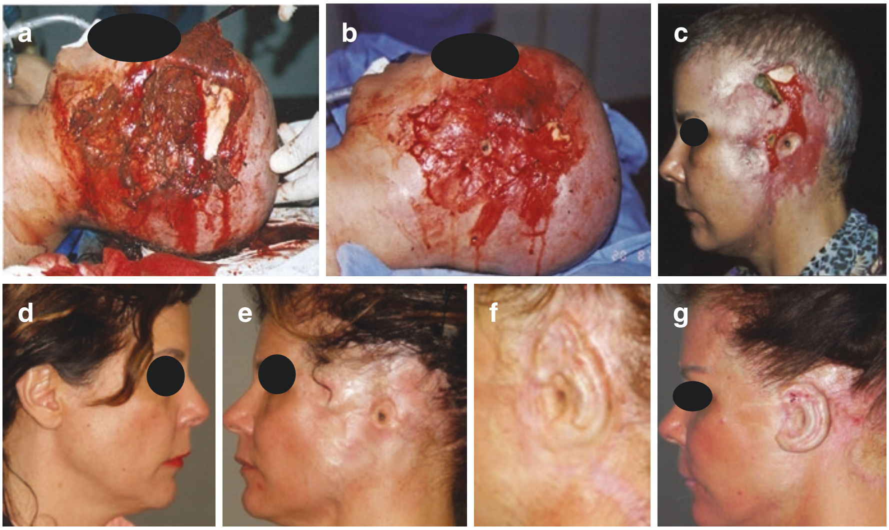

Fig. 7.5 A 42-year-old female patient with total amputation of the left ear associated with avulsion of the skin of the face and temporal and parietal regions caused by a car accident and burnt with hot oil. Photo (**a**), taken at the time she arrived at the emergency room presenting with total amputation of the left ear and avulsion of the skin with the bone of the temporoparietal area exposed. Photo (**b**), showing the wide raw area a few days later; (**c**), the same patient 1 month later under medical care with clinical treatment. The wide raw area was healing secondarily without any skin graft; (**d**), her photo of the right side showing the normal auricle and face making a great unbalance with the other side; photo (**e**), the left side was mostly destroyed caused by severe traumatic amputation of the ear and cutaneous covering of the face after the raw area was completely healed. She wished for reconstruction of the ear and repair of the skin of the face and temporal and parietal regions. It is visible the contrast on her face and that was caused by a suddenly accident. Such situation changed her life, and she made all effort to reinstate the facial contour in order to feel intimate well-being and to be well accepted in her social group. Photo (**f**), the surgical result after the first stage of ear reconstruction, using costal cartilage to sculpt the whole auricular framework with the auricular lobule on the same block, with tissue expander to extend the scar tissue on the auricular area; (**g**), final result of the reconstructed ear combined with hair transplantation on the temporal and mastoid regions. Two face-lift were performed in order to bring cutaneous covering to the reconstructed auricle

7.3 Surgical Planning

Surgical planning is a fundamental step before any procedure in plastic surgery, but when ear reconstruction will be performed associated with rhytidoplasty, it is even more important due to complex procedures. Firstly the projection of the future ear is determined taking the opposite side as a useful reference, but when both auricles are missing to achieve adequate spatial location for reconstruction, it is even more difficult, and it depends essentially from surgeon's ability and creativity as well. The well-balance surgical planning may be based on anatomic references according to Gillies knowledge [24, 25] which is to project the new ear on its normal position. Later, similar sense of imagination was suggested by Converse [21–23], Tanzer [34,

Fig. 7.6 A 49-year-old female missing partial segment of the left auricle caused by dog bite underwent ear reconstruction associated with face-lift. Photo (**a**), unaesthetic aspect of the posterior border of the auricle; (**b**), same patient after first stage of reconstruction with costal cartilage graft; (**c**), final result after second stage of reconstruction when face-lift was performed in order to create a cutaneous flap to cover the posterior side of the auricle. Photos of the same patient in front view – (**d**), before operations; (**e**), postoperative 1 year after face and neck lift combined with the second stage of ear reconstruction

35], and Pitanguy [30] and advocated its importance which I denominated spatial projection [3, 8, 14]. The size and shape of the future auricle are determined using an X-ray film which is created during the first consultation in front of the patient. However, location and position are not achieved routinely making transposition of the references points from the other side since it may present some sort of asymmetry of the face. When patient presents microtia, it is clear facial unbalance due to hypotrophy of bone development which makes very difficult to determine the location and position of the future organ (Figs. 7.1, 7.3, and 7.4). So far to achieve those references points on patients after traumatic amputation are also very difficult because the presence of scar tissues formation caused by avulsion of the ear leaves severe fibrosis which are difficult to evaluate during consultation (Figs. 7.2, 7.5, and

7.6). Besides local damage on the auricular region, scars on face represent another difficult step for surgical planning caused by destruction of the soft tissue and asymmetry between both sides (Figs. 7.1, 7.3, and 7.4).

Finally, the projection and location of the future auricle are essential to achieve during first consultation with patient standing in front of the surgeon. The size and shape are created and fixed to the surgical program in order to be in the operating room during surgery (Fig. 7.1).

7.4 The Operation

The operation is performed at the hospital under general anesthesia after all preparation at my clinic. It is a matter of routine to all my patients to do blood tests, hearing evaluation, and clinical examination under care of a cardiologist in children and adults as well, since it is quite a common association of heart anomalies (Figs. 7.1, 7.3, and 7.4).

Following surgical planning as it is previously described above, the projection of the future ear is an essential step during the operation (Fig. 7.4).

7.4.1 First Stage of Reconstruction

I have previously described [4, 9–11, 14–19] that the success of ear reconstruction on congenital abnormalities and after traumatic amputation is mandatory to create two anatomical elements: (A), cutaneous covering (Figs. 7.1 and 7.2); (B), new auricular framework which is performed in two surgical stages [6, 26, 27].

(A) – According to the surgical planning during the first stage, the cutaneous covering is created on mastoid region since it is the closest one, even presenting hairless skin. I have mentioned that the skin of mastoid region is not the ideal one for reconstruction of the ear, but it is the best one due to its location [15–19]. Usually on congenital anomalies, the skin is smooth, presenting good conditions for tunnelization procedure also to extend without tissue expander (Figs. 7.1, 7.3, and 7.4). However during the first stage after traumatic amputation, the skin of the mastoid region may present some scars caused by the accident, so tissue expander is a useful procedure (Figs. 7.2, 7.5, and 7.6). Such situation may happen in several circumstances: after car accident with severe laceration of the auricular region (Fig. 7.5), after burnt (Fig. 7.2), and due to scalp amputation which requires skin graft to cover the raw area just after accident which is very difficult procedure (Fig. 7.2).

(B) – On the other hands, the future auricular skeleton is provided by sculpture with meticulous excavation on rib cartilage removed from the chest of the same patient as described by Pitanguy et al. [31]. Converse [23], Tanzer [33], all my previous publications [2, 4, 14–19].

A. *Creation of the Cutaneous Covering*

It doesn't matter if the reconstruction is on congenital abnormalities or acquired deformities; I have described that the skin of the mastoid region must be undermined only on the area of the future helix and antihelix creating a subcutaneous tunnel [4, 6, 14–19]. Thus the future conchal cavity will be the fundamental pedicle of the ear which presents same surgical principles as preserving the perforator vessels during my new concepts of abdominoplasty (Figs. 7.1 and 7.3). Also cutaneous dissection of the future helix and antihelix is performed under the same surgical principle of the abdominoplasty since the vessels come from the depth passing close to the anterior border of the mastoid bone which must be entirely preserved [15–19]. Even this pedicle is also a neurovascular one (similar with perforator vessels with sensitive nerve) since there is a branch of sensitive one which will provide sensibility to the reconstructed auricle.

B. *Modeling of the Future Auricular Framework*

The ninth rib cartilage is removed where the new auricular framework is sculptured by meticulous excavation (Fig. 7.1). All anatomical and aesthetical details of the future auricle depend on the new skeleton. For this reason all effort must be dedicated to create the anatomical elements of the future auricle (Figs. 7.1 and 7.3).

Following the operation the new auricular frame is then introduced subcutaneously through the tunnel already created on the mastoid area (Figs. 7.1 and 7.3). On congenital abnormalities the lobule is created by rotation back and downward of the lower segment of the cutaneous fold of the deformity. The remnant cartilage tissue always present on all patients with severe microtia must be removed in order to create the new auditory canal and conchal cavity as well (Fig. 7.1).

On another hand, to embed the new frame on acquired deformities, it is mandatory to use tissue expander in order to extend the subcutaneous tunnel (Figs. 7.2, 7.5, and 7.6). Usually scar tissue formation after traumatic amputation creates very severe fibrosis on the skin and subcutaneous layers as well. Therefore the subcutaneous tunnel is then enlarged in order to be able to introduce the new auricular skeleton (Figs. 7.2, 7.5, and 7.6).

I developed a new surgical instrument to facilitate to imbed the new frame. It is similar to a "C" which is introduced through the subcutaneous tunnel from one side to another and the new auricular skeleton slides inside. Afterwards the cutaneous wounds are sutured. Special dressing is then applied on the auricular region with the new frame underneath.

7.4.2 Second Stage of Reconstruction

The second operation is done 6 months later, following surgical planning according to my previous descriptions [2, 6, 8, 14–19]. It means that rhytidoplasty is performed simultaneously with the second stage of ear reconstruction on congenital and acquired deformities (Figs. 7.1, 7.2, 7.4, 7.5, and 7.6). It is so fascinating since the second stage of ear reconstruction will receive a significant help coming from the cutaneous flaps originating from face-lifting operation. Therefore a cutaneous incision is done following the margin of the external auricular framework introduced during the first surgical stage (Figs. 7.1, 7.2, 7.4, 7.5, and 7.6).

The new auricle is lifted from the bone level below the *fascia superficialis* which covers the posterior aspect of the future organ. Once again it is important to emphasize that the pedicle of the new ear is supplied by the vessels coming from the depth on similar anatomical description on my new concepts for abdominoplasty [4, 9–11, 14–19].

Reconstruction of the auricle after acquired deformities follows the same surgical principles as it is described in my publications [6, 8, 14, 19].

7.5 Complications

Few complications may happen after the first stage of auricle reconstruction in acquired deformities, as well as on microtia (Spina et al. [32]). So far, after the second surgical stage in association with rhytidoplasty procedure, some complications may happen due to wide cutaneous undermining necessary to be performed, particularly when the amputation of the auricle was caused by severe avulsion which brings deep anatomical disturbances (Figs. 7.2, 7.5, and 7.6). The skin of the face and neck requires wide undermining as it is performed during rhytidoplasty procedure in order to provide adequate cutaneous covering on the posterior aspect of the new auricle (Fig. 7.1) [6, 8, 14, 19].

7.6 Discussion and Conclusions

Ever since I started my private practice in 1974, I devoted much attention and research on the field of ear reconstruction. From the beginning I felt the necessity to bring more blood supply to the reconstructed ear in order to avoid severe complications and even to reduce the number of surgical stages which used to be six or eight surgical stages [23, 30–33]. Following my goal I described the temporoparietal fascial flaps [2, 3] which was a major improvement in ear reconstruction.

The normal auricles on each side of the face and head are important anatomical elements which may not be noticed. However when a person presents some alteration on the size, shape location, and position of one or both organs, it changes the well balance of the facial contour.

When a patient presents missing auricle such as in microtia (Figs. 7.1 and 7.3) or after traumatic amputation, it requires a combined procedure (Figs. 7.4, 7.5, and 7.6). In fact, in my practice I brought some knowledge from aesthetic facial procedures improving ear reconstruction. Even in children of 7 or 8 years old, I use to perform some sort of rhytidoplasty operation to facilitate ear reconstruction. So far, rhytidoplasty procedure is not a rare one, when I usually perform reconstruction of the auricle. Besides my major contribution creating fascial flaps in 1977 [2, 3] when

I developed new concepts on abdominoplasty [9–11], I found them very important to employ some surgical principles to improve rhytidoplasty procedures and also ear reconstruction on congenital and acquired deformities. In fact, in my practice I brought some knowledge from facial aesthetic surgical technique, improving ear reconstruction. As I use to perform all aesthetic procedures, it became clear to me to bring such knowledge to employ on reconstruction of the auricles and also to rhytidoplasty operations. When there is adequate indication for simultaneous operation, the surgical planning must be done as a matter of routine since the first stage of reconstruction of the auricles is performed according to my techniques described in my publications [6, 8, 14, 19]. I have done simultaneously approaches in some selected cases of congenital anomalies (severe microtia), with rhytidoplasty and ear reconstruction, and also after traumatic amputations of manny different etiologies (Figs. 7.1 and 7.3) and also after traumatic amputations caused by several origins (Figs. 7.4, 7.5, and 7.6). Both procedures are described in details demonstrating the possibility to reconstruct the auricle and at the same time to perform rhytidoplasty to repair aging face as well as for reparation of severe sequelae of facial deformities caused by trauma. Sometimes rhytidoplasty operations are performed two or even three times in order to bring more cutaneous flaps to cover the reconstructed auricle avoiding skin graft (Figs. 7.4, 7.5, and 7.6). Therefore such combined operations are very useful in order to improve ear reconstruction achieving aesthetic facial contour.

In my practice, ear reconstruction procedure means to perform some sort of cutaneous undermining close to future auricle that rhytidoplasty operations are a constant one in order to reduce the necessity to do skin graft. I found that such surgical procedure is an improvement since skin flap rotation is a good surgical solution and skin graft frequently develop scar tissue formation and scar retraction as well.

No matter if the auricle was missing during car accident (Figs. 7.2 and 7.5) or human or animal bite (Fig. 7.6), it is possible to perform rhytidoplasty associated with ear reconstruction. In all cases surgical planning is a fundamental procedure before surgery in order to perform in sequential steps the first and the second surgical reconstruction. The postoperative care is a fundamental behavior after the first as well as the second operatory reconstruction. If a patient lives in another town, other state, or even in another country, he or she must come to my clinic or should stay to attend regularly to change dressings according to the routinely schedule.

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Chapter 8
Periauricular Rhytidectomy

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8.1 Introduction

Short scar rhytidectomy has gained remarkable popularity over the last two decades, especially among patients who understand the need to treat facial aging earlier. For such patients periauricular rhytidectomy seems to be the option since there are hardly any visible scars especially in the mastoid and occipital regions. Unaesthetic scars and changes of the hair implantation line are easily identified especially in cases where women wear ponytails. This leads to dissatisfaction with results and thus an increasing demand for the short scar rhytidectomy technique. The mastery of this technique is essential. Plastic surgeons should indicate the advantages and limitations in the treatment of facial aging. Postoperative results will positively be more natural with smaller and fewer scars.

Periauricular rhytidectomy is therefore an excellent option for the treatment of facial aging, since the procedure allows for the use of most of the surgical methods in the treatment of deep face structures, there is less comorbity, and there are fewer scars.

8.2 History

Baker published his lateral SMASectomy technique in 1997 and, with the studies evolution, applied it to the short scar face-lift surgery in 2001 [2].

In 1999, Saylan proposed pre-auricular excision in an "S" format with reduced facial undermining and two suture loops, known as S-lift [14].

Tonnard, Verpaele et al., in Belgium, described the MACS lift, a technique known as minimal access cranial suspension lift, in 2002. In the same year, they published a book about it [15].

Marchac, in Paris, developed the U-shaped vertical incision rhytidectomy and presented his experience, based on the results of 100 surgeries in 2002 [13].

Marssilha reported short scar rhytidectomies with extended SMAS underming and limited resection of cutaneous excesses in 2003.

Mario Galvão, in 2004, presented a surgical technique which resembles Marchac's, due to the fact that there are no incisions in the mastoid region and the hair implantation line of the neck but differed in the union of the two "U legs," thus creating a circumferential periauricular scar and allowing for better accommodation of excess tissues, especially in the retroauricular region [7].

Many other studies referring to short scar rhytidectomy were published in this period. These studies will continue as the concern over the quality and location of scars gain increasing importance nowadays [4–6, 8–10, 12].

8.3 Indications

Periauricular rhytidectomy, as in most short scar rhytidectomy techniques, is indicated in younger patients, with mild to moderate cervical flaccidity, but not severe, because in these patients, we can achieve a natural result without requiring great cervical traction, which would require extended incisions to accommodate excess tissues. Darrick Antell shows results that reinforce the idea that this type of surgical tactic is indicated for patients without severe cervical flacidity, presenting in short and long term, similar results to conventional rhytidoplasty in the treatment of accentuated nasolabial folds and mandibular contour loss [1].

Daniel Baker [2] classified his patients regarding the indication of short scar rhytidectomy in:

- *Type I: The ideal candidate*. This patient is usually in her early to late 40s with aging primarily in the face. They may have slight cervical laxity, but elasticity is still good. There are early jowls and often submental and submandibular fat. Microgenia may be present (Fig. 8.1).
- *Type II: The good candidate*. These patients are usually in their late 40s to late 50s with moderate jowls and moderate cervical skin laxity. Submandibular and submental fat is usually present, and they may have microgenia. Medial platysma bands are not present on normal animation (Fig. 8.2).
- *Type III: The fair candidate (does not have full benefit from periauricular rhytidectomy)*. These patients are usually in their late 50s, 60s, or early 70s. They have significant jowls, moderate cervical laxity, and submental and submandibular fat. They may have significant medial platysma bands active on natural animation (Fig. 8.3).
- *Type IV: The poor candidate (not good candidates for periauricular rhytidectomy)*. These patients are usually in their 60s and 70s with significant jowls and

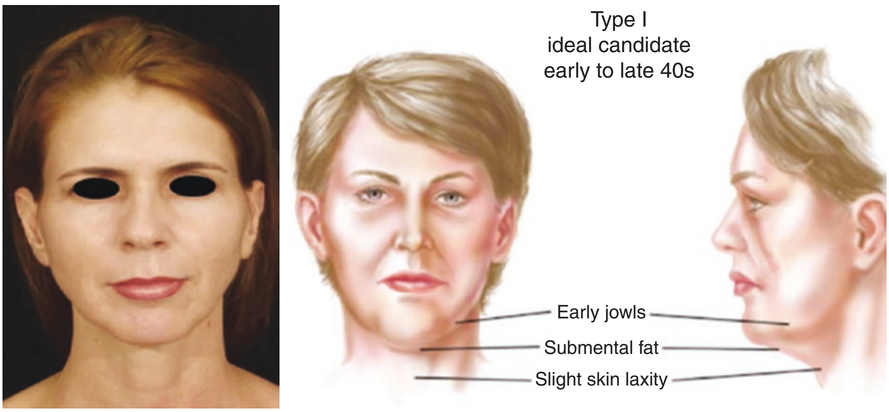


Fig. 8.1 Patient type I photo and illustration

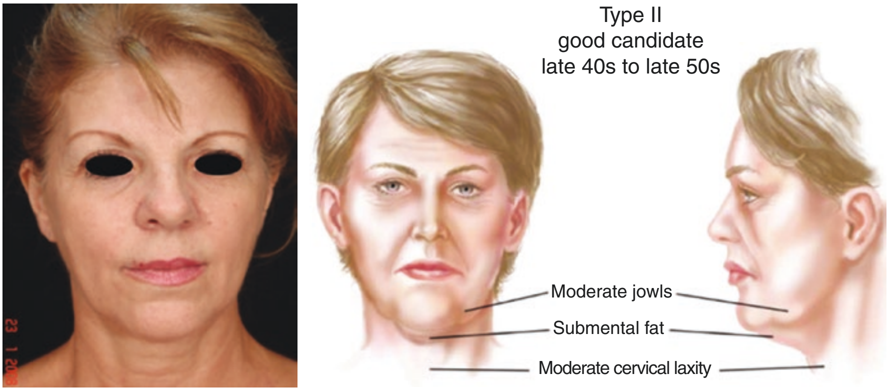


Fig. 8.2 Patient type II photo and illustration

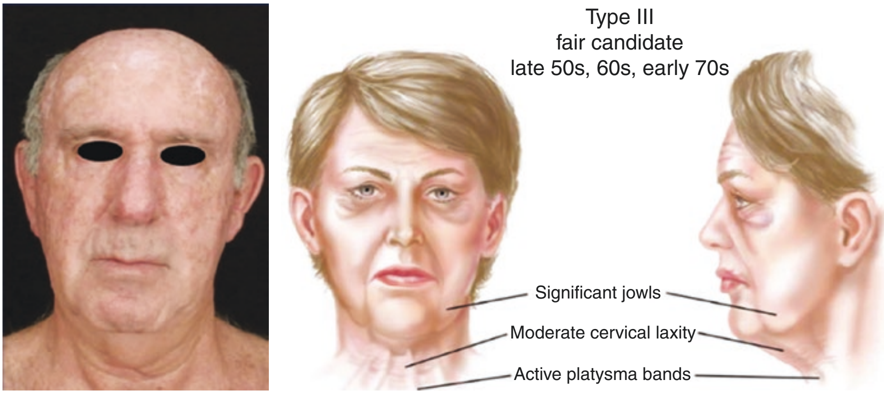


Fig. 8.3 Patient type III photo and illustration

active lax platysma bands. Cervical skin elasticity is poor, and skin folds and deep creases below the cricoid are often present. It can be presented to the patient as limited result solution, keeping opened the option of extending the retroauricular incision if necessary (Fig.8.4).

8.4 Surgical Technique

8.4.1 Anesthesia

In most cases, we prefer to perform periauricular rhytidectomy under general anesthesia, but it is also possible to perform it with venous sedation and infiltration with local anesthetics. The face and neck are infiltrated with local anesthetic solution

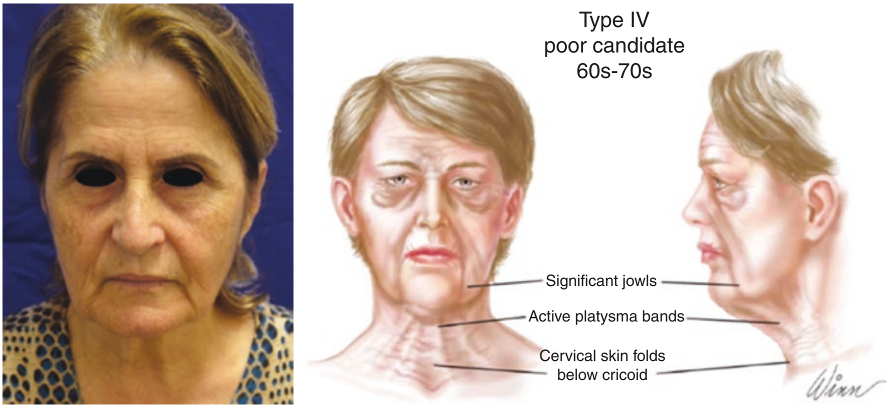


Fig. 8.4 Patient type IV photo and illustration

Fig. 8.5 After marking the undermining areas, we perform solution infiltration and wait about 15 minutes to begin the surgery

containing 20 ml of 2% lidocaine without vasoconstrictor, 20 ml of 0.5% levobupivacaine without vasoconstrictor, and one ampoule of adrenaline diluted in 260 ml of saline solution (Fig. 8.5).

8.4.2 Incisions

The accesses to perform the periauricular ritidoplastias vary from patient to patient; we always aim to preserve sideburn height. When minimal change on the temple hair implantation line is predicted, the preferred incision will be into the temple hair.

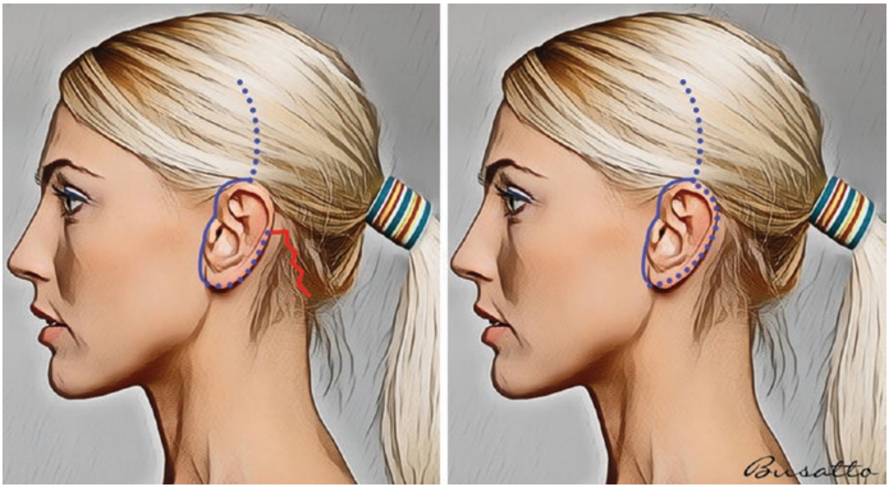


Fig. 8.6 On the left, classic rhytidectomy incisions extending to mastoid region and the neck hairline implantation area are highlighted in red. On the right, the incisions of the periauricular rhytidectomies, in a circular shape, with temple hair incision

In cases of patients with naturally higher temple hair implantation, an incision along the temple hairline associated with a compensation triangle will be performed, in order to avoid the ascending of the hair in this region.

The choice of periauricular incision (pre-, intra-, or retro-tragal) will be performed by the surgeon, and when performed properly, it will be well accommodated and almost imperceptible. The closure of the skin should always be tension-free performed and the tragus flap degreased.

In periauricular rhytidectomies, we perform the technique described by Mário Sérgio Lomba Galvão, in which the incision surrounds the auricular pavilion with a single scar ending in the temple region (Figs. 8.6 and 8.7) [6].

8.5 Deep Facial Structures Treatment

After facial skin undermining, in periauricular rhytidectomies, it is possible to treat the deep facial structures through most available tactics, such as SMASectomy, SMAS-platysma, MACS lift, high-SMAS, SMAS plicature, etc. (Fig. 8.8) [3, 7, 11].

Numerous techniques and their variations have been described for the deep facial structure treatment, and it is up to the surgeon to perform what he deems necessary in each patient. In those with thin faces, we use the plicature by folding the SMAS over itself, providing malar region volumetric increase. Similarly, in patients with a more rounded face, we perform both SMAS-platysma and SMASectomy, in order to smooth this area's contour (Fig. 8.9).

Fig. 8.7 In (**a**), the hair preparation before the surgical procedure. In (**b**, **c**), the surgical planning markings. In (**d**), the facial infiltration with vasoconstrictor solution. In (**e**, **f**), suture's positioning and aspect after surgery end

8.6 Submental Treatment

In most cases, we obtain excellent results by performing only cervical closed liposuction, below the mandible line, always alert to maintain the cannula superficial in order to avoid lesions of the mandibular branch of the facial nerve that passes in these region. In patients presenting apparent platysmal bands, the treatment is the same as in classic rhytidectomies, where the submental incision is performed near the sulcus or immediately anterior to it, and the subcutaneous dissection is performed with the neck in hyperextension. Usually, this procedure is preceded by closed liposuction. The undermining usually extends to the thyroid cartilage level. Platysma muscle medial borders are identified and resected if they are in excess, and after that, the plication is performed with separate sutures (Fig. 8.10).

8.7 Skin Traction and Tissue Accommodation

The traction of the cutaneous excess can be performed both vertically and obliquely, always looking for a good jawline definition and adequate skin accommodation. The retroauricular cutaneous accommodation routinely results in a curtain-like scar, but in most cases, its appearance improves over time. In cases where there is a

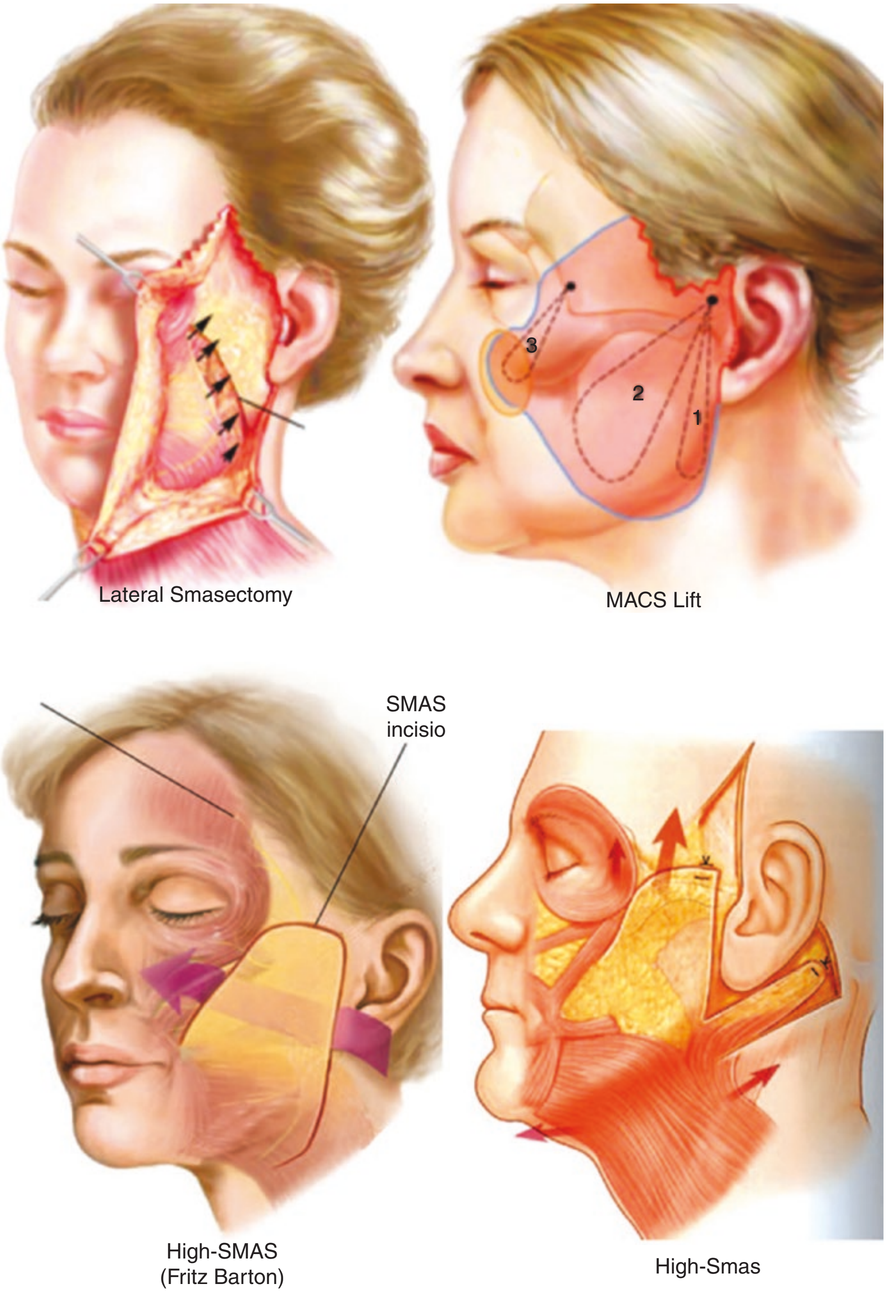


Fig. 8.8 Some of the available techniques for deep structures treatment

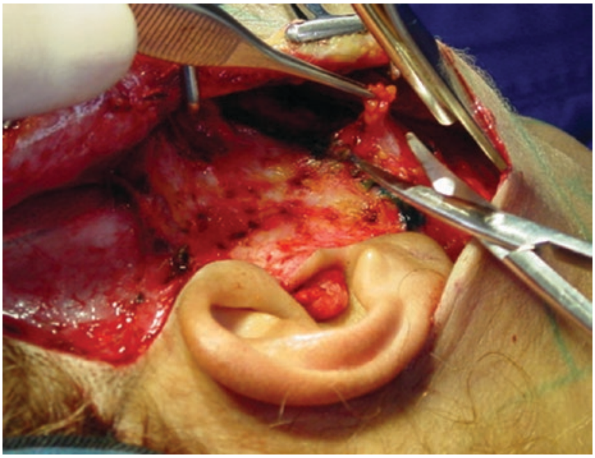
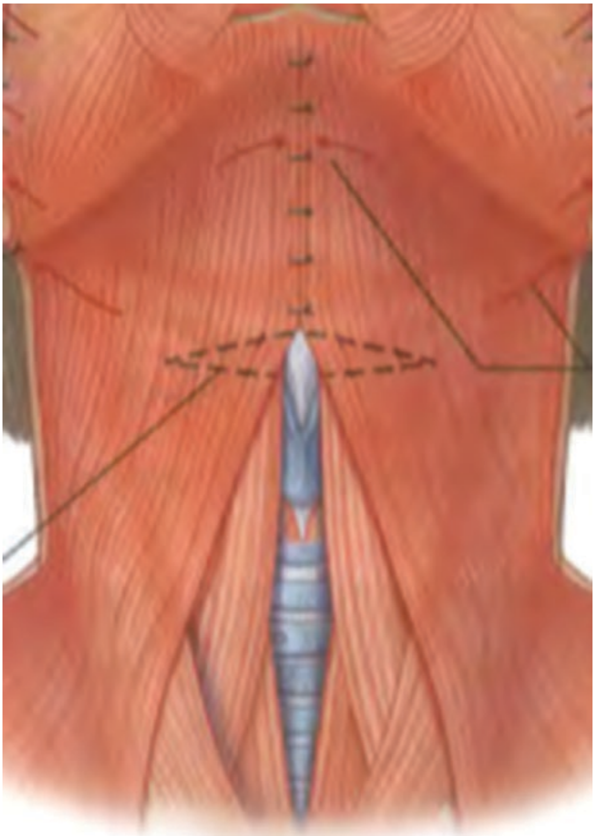


Fig. 8.9 In this patient, SMASectomy was performed in order to soften the facial contour

Fig. 8.10 Platismoplasty



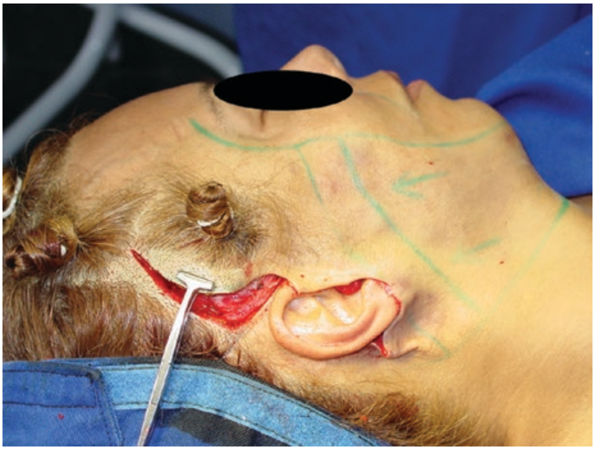


Fig. 8.11 Skin traction in periauricular rhytidectomy

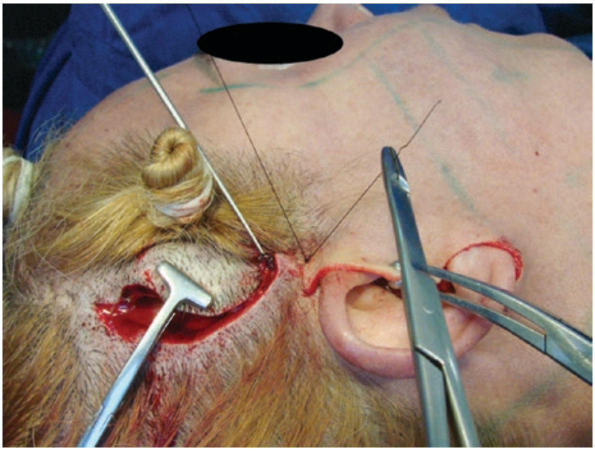


Fig. 8.12 Suture that causes the sideburn's hair blockage, preventing its ascent

patient's complaint about this retroauricular scar, surgical revision can be performed, taking advantage of the benefit of keeping it practically imperceptible in the retroauricular groove.

The sutures should always be tension-free, and the tragus degreased, to have a better definition, preventing their erasure (Figs. 8.11, 8.12, and 8.13).

8.8 Results

Advantages and disadvantages
As any surgical procedure, it has its benefits and limitations (Table 8.1).

Fig. 8.13 Aspect of retroauricular region sutures at the end of periauricular rhytidectomy

Table 8.1 Advantages and disadvantages of periauricular rhytidectomy

Advantages	Disadvantages
Less invasive procedure	Greater difficulty for flap accommodation
It does not cause distortions on neck-hair implantation line	Does not allow great cervical tractions
Smaller scar	

8.9 Complications

Complications described on periauricular rhytidectomies are:

- Bruises
- Temporary paralysis of facial nerve branches
- Skin suffering
- Earlobe deformities
- Retroauricular folds (curtain-like scar)
- Hypertrophic scars

8.10 Conclusion

It is extremely important that surgeons have the versatility as well as the ability to individualize surgical techniques from patient to patient. We conclude that patients with facial aging complaints, with mild to moderate cervical flaccidity, were satisfied with the long-term results when this technique was employed. Deep structures are preserved, mandibular line definition is maintained, besides volumetric repositioning, and there are fewer scars. In addition there are fewer complications in the mastoid region and neck-hair implantation line, which usually lead to discontent or even the need for a new surgical procedure. As a result we obtained more natural results with fewer stigmas (Figs. 8.14, 8.15, and 8.16).

Fig. 8.14 47-year-old patient submitted to periauricular rhytidectomy, five postoperative days

Fig. 8.15 52-year-old female submitted to periauricular rhytidectomy 2 months postoperatively

Fig. 8.16 Male patient submitted to periauricular rhytidectomy 35 days postoperatively

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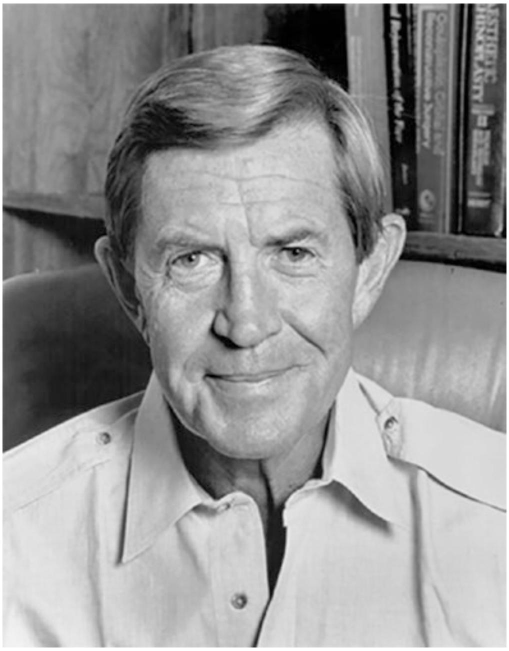
Chapter 9
The Future of Facial Rejuvenation Surgery

Juarez M. Avelar



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9.1 Introduction

Nowadays for a young surgeon, after graduating in medical school, to become a specialist in Plastic Surgery in Brazil, it is mandatory to study in General Surgery for a period of 2 years in a well-qualified service followed by 3 years of specialization. Even after graduation in Plastic Surgery Services, to become a plastic surgeon, it is convenient to dedicate another useful period of training in a subspecialty in order to achieve more qualifications in a specific area. Long time ago, I did such an important period of training of my specialization in Plastic Surgery in 1972 in Prof. Pitanguy's postgraduation course. During almost 1 year, after my graduation in Plastic Surgery, thanks to Prof. Pitanguy's presentation, I had the privilege to be a fellow of renowned professors: Millard, Converse, and Rees (USA); Tessier, Dufourmentel, Mouly, and Tubiana (France); Mathews (England); and Mustardé (Scotland). It was an extremely useful period for me, adding much knowledge and incentive to start my practice, and they encourage me to dedicate to scientific publications.

It is important to emphasize that during the period of qualification, a young surgeon must follow several rhytidoplasty procedures performed by his or her professor in order to absorb valuable knowledge under a systematic orientation. That is an adequate way to learn how to perform facelifting operation which is a natural period of training.

The readers who have followed all steps of qualification may think that this is an obvious way to learn how to do such complex operation. Nevertheless, besides learning the technique, it is useful to emphasize that the final surgical results depend also on several circumstances before and after operation (Fig. 9.1).

I consider that the future of rhytidoplasty depends on the surgical results achieved by previous and especially current generations of plastic surgeons. Each surgeon must do always the best thinking that good surgical results mean natural facial appearance giving patients smooth recovering of the aging phenomenon.

It is natural that each surgeon unconsciously absorbs substantial sort of knowledge and also the routine of organization from his or her boss. It happens due to a voluble experience accumulated during a long period of practice, which gradually led him or her to consider surgery as a sequential steps that cannot be represented only by the surgical procedure itself. I express that since it occurred to me during my period of training with Prof. Pitanguy, until today, I follow similar systematization of operation as well as organization: from the preparation of patients preoperatively and during operation to postoperative care (Fig. 9.2). Several topics were aided in my background knowledge due to the fascinated and useful evolution of the technique, but the main structures of my practice are based on his teaching [12, 14, 15, 17–19].

Fig. 9.1 Analysis about the effects of facelift lasting during several years after surgery means that patient is happy with the result. Photos (**a**) and (**d**), a female patient at age 51 before rhytidoplasty; (**b**) and (**e**), the same patient 1 year after facelift; (**c**) and (**f**), the same patient at 61 years old with evidence of lasting result 10 years later after the operation

9.2 Technique

There are several techniques described in this book as well as many other ones which may be employed. Nevertheless, the essential in this chapter is not to describe any specific operation, but to emphasize that usually in the beginning of practice, a young plastic surgeon should control his or her anxiety before starting the specialty. Due to such reason, he or she may not have enough attention employing basic surgical principles that are essential to achieve good aesthetical results on facelift rejuvenation which may represent good or not good for the future of rhytidoplasty surgery (Fig. 9.3). Once again, it is necessary to mention that for young plastic surgeon, it is fundamental to follow the routine and organization of his or her professor during the period of training. Afterward, each one must have his or her own organization in

Fig. 9.2 Photo taken inside the operating room showing patient already prepared for facelift surgery. One can see patient's photographs as well as surgical planning hanged on a special support that are necessary so I can keep an eye to some details during operation. I learned that during an orientation with Prof. Pitanguy which I follow until today. This is a routine in my practice in every procedure

order to develop a new way in professional activities. I can say so since it happened to me in the beginning of my career. As I used to be Prof. Pitanguy's surgeon-resident at his worldly known clinic, it was a useful period of my life to learn all about the operation itself as well as all systematization of the rhytidoplasty procedure that he used to perform according to his previous publications [17, 18] (Fig. 9.2). Therefore, for my first patients who underwent facelifting, I started in another town without any connection with my previous one, but the organization of the operation was similar to that I used to follow, having my professor beside me. So far, those important knowledge were essential for me to perform my first rhytidoplasty operations, even as I do today (Fig. 9.2).

Repositioning of the volume of the face is a useful approach since each person loses some amount of adiposities, weakness of the muscles, and cutaneous modification along the life. Due to the advent of liposuction technique developed and popularized by Illouz (1978, 1982, [13, 14]), aesthetic reparation of the volume of the face is an excellent resources to improve facial contouring operations (Fig. 9.3).

Fig. 9.3 Some considerations regarding the effects of facelift lasting long period postoperatively. Photos (**a**) and (**d**), a female patient at age 57 before rhytidoplasty; (**b**) and (**e**), the same patient 1 year after facelift; (**c**) and (**f**), the same patient at 69 years old showing the smooth surgical result 8 years after facial rejuvenation surgery

Such procedure may be performed in combination with facelifting surgery or as isolated one, as well [1–3].

A great improvement concerning reshaping the facial contour during facelift came up using SMAS approach which is a remarkable technical development [15]. These concepts opened a new era in rhytidoplasty which became a basic and fundamental procedure (Figs. 9.1, 9.2, and 9.4). Afterward, several procedures were described such as mastectomy and other types of operations improving facial rejuvenation operations [10, 11].

All surgical evolution during the last decades may represent excellent support for the future of rhytidoplasty if plastic surgeons employ the new techniques with obsessive pursuit of achieving good aesthetic result for surgeon and patients as well [16].

So far, nowadays, nonsurgical procedures have been employed for facial rejuvenation surgery which is important opposition to facelift operations. On the other

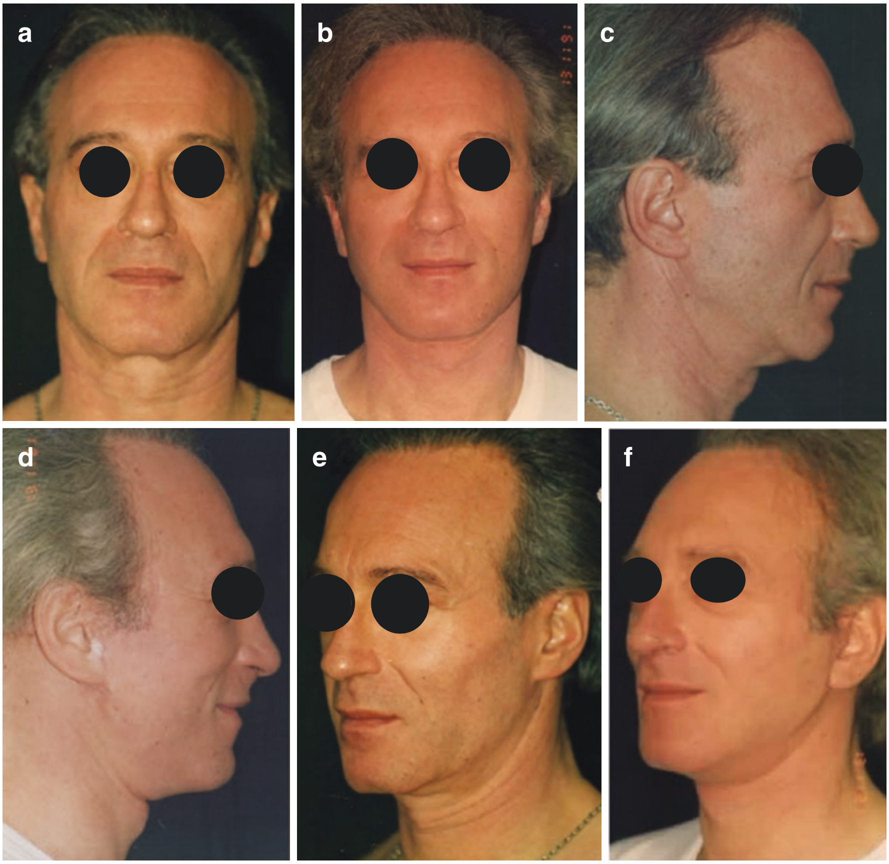

Fig. 9.4 A 59-year-old male patient with clear signs of aging face presenting good indications for facelift. Photos (**a**), (**c**), (**e**), before surgery with excess skin flaccidity on the face and neck and dehiscent platysma musculature with evident borders of both sides on submental region. Photos (**b**), (**d**), (**f**), 1 year after facelift with improvement of facial contour and plication of the anterior borders of the platysma muscles without any treatment of anatomical structures underneath the muscles. The sideburns is preserved on its natural position. Lipofilling was done through reshaping the face

hand, there are also some noninvasive ones that promote some improvement on facial appearance. There are also some procedures such as the use of wire which may improve facial aesthetic lasting for short period of time.

Those approaches that provide temporary results give patient some sort of satisfaction which postpone performing facial surgery rejuvenation. Although patients become happy in the use of nonsurgical procedure, rhytidoplasty may always be employed in order to achieve better result lasting more period of time with pleasant appearance. I do not perform such noninvasive procedures, since my training was directed to do facial rejuvenation operations, but I accept the position of other surgeons that they may be employed adequately to improve aesthetic results. It is

Fig. 9.5 Lasting results of facial rejuvenation surgery. Photos (**a**) and (**d**), a female patient at age 51 old before rhytidoplasty; (**b**) and (**e**), 2 years after facelift; (**c**) and (**f**), the same patient 11 years later. At 62, she is still presenting rejuvenated and harmonious facial contour

important to mention that surgical results lasting longer time with pleasant and smooth facial contour represent the essential principles of our specialty (Figs. 9.4 and 9.5) [20].

Employing noninvasive procedures does not belong exclusively to plastic surgeons but also are performed by other doctors, not qualified professionals, and even by nondoctors. So, they are mixed areas where a great competition between plastic surgeons, dermatologists, and other specialties and nondoctors may work out. Nevertheless, I am convinced that facial rejuvenation operation cannot be replaced definitively by nonsurgical procedures (Fig. 9.5). So, all young plastic surgeons still have the opportunity to learn all surgical knowledge regarding facelift, even it is an opened field where new ideas and innovation approaches may be introduced. In fact, as a result of my practice, my curiosities, as well my research, I had the opportunity to publish my contributions in several topics of facial rejuvenation surgeries [1–6, 8].

Therefore, the future of facial rejuvenation operation depends on the surgical results obtained nowadays, which must be performed by well-qualified plastic surgeons (Figs. 9.5, 9.6, and 9.7). On top of all, there are some medical schools in my

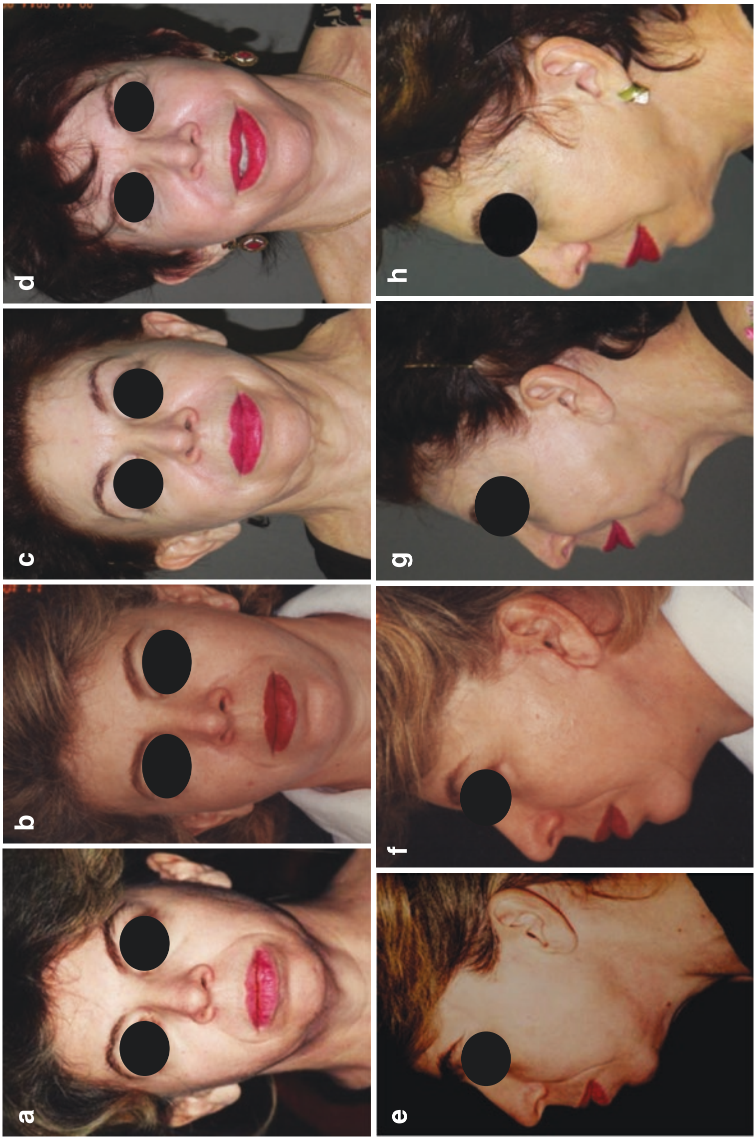

Fig. 9.6 Facial rejuvenation surgery result lasting for a long time, and patient was so happy with her result that she came back asking for another facelift operations. Photos (**a**) and (**e**), a female patient at age 43 before rhytidoplasty; (**b**) and (**f**), the same patient 1 year after full perfiloplasty: facelift combined with rhinoplasty and augmentation mentoplasty; (**c**) and (**g**), the same patient 22 years later (at 65, she is maintaining well-balanced profile and harmonious facial contour, but she asked for another facelift operation); (**d**) and (**h**), 2 years after the second facelift

Fig. 9.7 Secondary rhytidoplasty considering the effects of previous surgery. Photos (**a**) and (**e**), a female patient at age 52 (she underwent rhinoplasty and submental liposuction elsewhere showing irregularities on the cutaneous covering); (**b**) and (**f**), 1 year after I performed facelift; (**c**) and (**g**), the same patient at 64 years old after her second facelift; (**d**) and (**h**), now she is 72 years old after the second facelifting when she is still showing the smooth result and she came asking for the third facial rejuvenation surgery

country that present in the Oficial Courses Programm of specialization in other specialties to teach how to perform rhytidoplasty. I do not agree with such behavior of specialization in other specialties, since the basic knowledge, surgical principles of Plastic Surgery, and all technical details are essential when the operation is done, and they are not adequately touch to the residents.

9.3 Discussion and Conclusions

All fields in medicine are in constant technical evolution with great development that requires persistent curiosity, desire, and humility to learn new scientific information [9]. Therefore, due to all these situations, a young surgeon has the possibility to develop his or her personal contributions to rhytidoplasty operations, which makes this field an open one for new ideas and innovations. So, we must be optimistic, hoping that in the forthcoming years, this procedure will present more and more technical improvements (Figs. 9.5, 9.6, and 9.7).

It is important to emphasize that after a long time of practice, I may express that a satisfactory result on rhytidoplasty will depend not only on updated technical procedures but even on the surgeon-patient relationship during operation and post-operative care. It is also so important careful observation of consciently considerations about several technical details along the period of treatment which encourage our patients as well as others to undergo facelifting procedure (Figs. 9.1, 9.3, 9.4, 9.5, 9.6, and 9.7). Consequently, it is very important to consider all steps before, during, and after operation. As far as good aesthetic results are achieved, our patients are always motivated to perform the operation couple of years latter, since the aging phenomenon does not spot. That is an excellent reference point because the operation is a palliative one. As far as the patients are happy with the surgical results, they have enough motivation for another surgery some years later (Fig. 9.7).

The future of rhytidoplasty procedure will depend on the surgical results achieved nowadays. It means that the reputation of our specialty as the whole area and in specific field of facial rejuvenation operations [4–8].

This is a wide and deep concept of the operation that is the main result the valorization the inside of each patient, with a more careful analysis of his or her expectations, aiming at a precise operative indication (Figs. 9.1, 9.4, and 9.5).

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Chapter 10
Complementary Procedures to Rhytidoplasty

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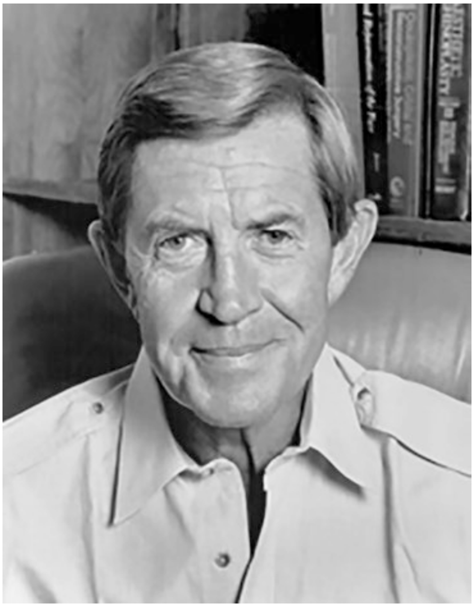

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10.1 Introduction

Facial aging, due to a sum of innumerable factors, has become one of the main demands in the search for new methods of treatment, especially for those patients who are candidates for surgical approaches such as rhytidectomy but still need to perform ancillary procedures preoperative, perioperative, or postoperative, in quest for beauty and rejuvenation and meet the expectations of each patient.

In an attempt to understand the dynamics of aging and its changes individually, many studies have been carried out, focusing mainly on the factors already recognized as participants in the process, being bone resorption and remodeling, relaxation, and soft tissue degeneration and subcutaneous tissue atrophy.

Aesthetic surgery has become socially accepted nowadays, and with an increase in human life span, facelift is being requested more. The main purpose of a facelift is to remove skin excess and tighten flaccid tissues secondary to aging, improving the overall looks of the face and neck.

Rhytidoplasty is the surgical treatment of the cheek, midface, jawline, and neck. It means wrinkle (*rhytid*) shaping (from plasticus pertaining to molding or shaping). One of the downfalls of the rhytidectomy is that it targets only skin excess and loose tissue in the areas mentioned before without treating photoaging, blepharochalasis, nose aesthetics, pigmentation disorders, scarring, and lipodystrophy. However, it could be performed in combination with a series of procedures, either surgical or nonsurgical, not only to enhance the final outcome but to achieve the patient's expectation of full-face rejuvenation.

10.2 The Aging Face

The skin, the largest organ of the human body, is constantly suffering from oxidative stress, caused by several factors in the daily life, among the main ones are exacerbated exposure to the sun and pollution, generating a high demand for antioxidant agents to the human body in general.

As repeated exposure to endogenous and exogenous reactive oxygen species (ROS) occurs, the skin tries to maintain the redox balance, through preventive mechanisms of repair, and the physical defenses of the antioxidant system.

The epidermis and dermis present a varied antioxidant defense systems, composed by ascorbic acid, α-tocopherol, glutathione, and ubiquinol distributed in different amounts and cellular compartments. Low-molecular-weight antioxidants act in various ways on the skin tissue, either by chelation of metal ions or by direct neutralization of free radicals.

Individual aging results from the combination of intrinsic and extrinsic factors [1]. The intrinsic factors are those present in all tissues, and there is a decrease in functional capacity and increased susceptibility to certain diseases and environmental stress. The skin generates changes such as sagging, fine lines, deepening of wrinkles, and dryness. Extrinsic factors have multifactorial causes, mainly environmental, such as chronic sun exposure and pollution. The combination of these factors promotes the following changes in the skin: thickening and dryness, formation of deep wrinkles, melanoses, telangiectasias, and other benign, premalignant, and malignant lesions (Fig. 10.1).

The traditional approach when talking about the face is to divide it for its study in thirds. However, this classification does not include all the aspects involved to assess the problem of the aging face which results from bone resorption, laxity of the facial retaining ligaments, fat redistribution, and loss of the anatomic contours of the facial form, Therefore, treating the aging face requires a multifaceted three-dimensional plan.

The main goals should be:

1. Improving skin texture and photodamage
2. Controlling hyperkinetic movement
3. Replacing volume loss
4. Addressing ligaments' laxity and fat redistribution

A combination of procedures may be performed, along with rhytidoplasty, to achieve three-dimensional results.

Fig. 10.1 Principal changes during aging: upper eyelid skin becomes redundant, crow's feet, nasolabial fold, transverse forehead furrows and glabellar vertical lines, sagging skin

10.3 Surgical Complementary Procedures to Rhytidoplasty

10.4 Transcutaneous Frontoplasty with Myotomes Using Laser Diode

This technique develops from the use of lasers, by means of microtransdermal incisions, allowing access to the portions of the muscles of the frontal region where the laser acts by promoting local myotomies. These myotomies promote the reduction of function and action of the muscles, especially in the frontal and corrugator muscles and the procerus and supraciliary muscles.

The most widely used is the diode laser, which is reliable and economical and can be introduced through small incisions (< 1 mm), leaving scar areas on the skin.

10.4.1 The Technique Step-by-Step

1. To carry out the marking of this procedure, it is firstly necessary to identify the areas of greatest risk in this region, identifying the supratrochlear nerve outlet above the orbital rim, by means of a slight pressure made with the thumb on the upper eyelid and 1 centimeter medially. This maneuver is repeated bilaterally (Fig. 10.2).
2. The delimitation of the risk of injury areas is followed by the marking of the areas of myotomies as follows:

10.4.2 Areas of Myotomies

- Two zones of medial nerve myotomy supratrochlear
- One myotomy zone at midpoint between the two supratrochlear nerves
- One myotomy zone at midpoint between the supraorbital nerve and the supratrochlear nerve

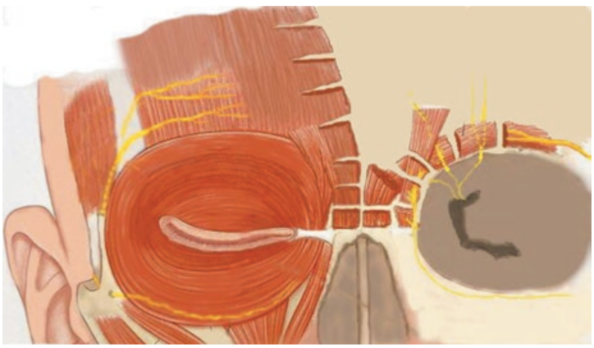

Fig. 10.2 Identification of nerve branches location is mandatory to avoid lesions [2]

- One to two zones of lateral myotomies to the supraorbital nerve on each side
- Three areas of myotomy in the frontal muscle on each side, being that these should be merged or be non-coincident between the two sides

Important: To prevent unwanted scars in the region of the procedure, you must make the laser cannula inlet, with a Jelco iv catheter number 14, respect the direction puncture being horizontal in the forehead and vertical and oblique into the procerus muscle diagonally to the eyebrow.

These procedures may be performed alone, under local anesthesia or, at the time of surgery, during rhytidoplasty or blepharoplasty. In the interval between myotomies, the tissues must be allowed to cool down from the high temperature caused by the laser by placing ice or cold compress.

10.5 Bichectomy

A bichectomy or bichatectomy is considered a quick procedure, with precise indications and the objective to soften subtly the shape of the face [3]. It is characterized by the careful removal of the buccal fat pad (Bichat's fat pad) (Fig. 10.3).

Fig. 10.3 Sub mental liposuction + bichectomy before and after. (**a**) Incision just below the Stensen duct and removal of buccal fat pad. (**b**) Removal of 2/3 of the buccal fat pad bilaterally

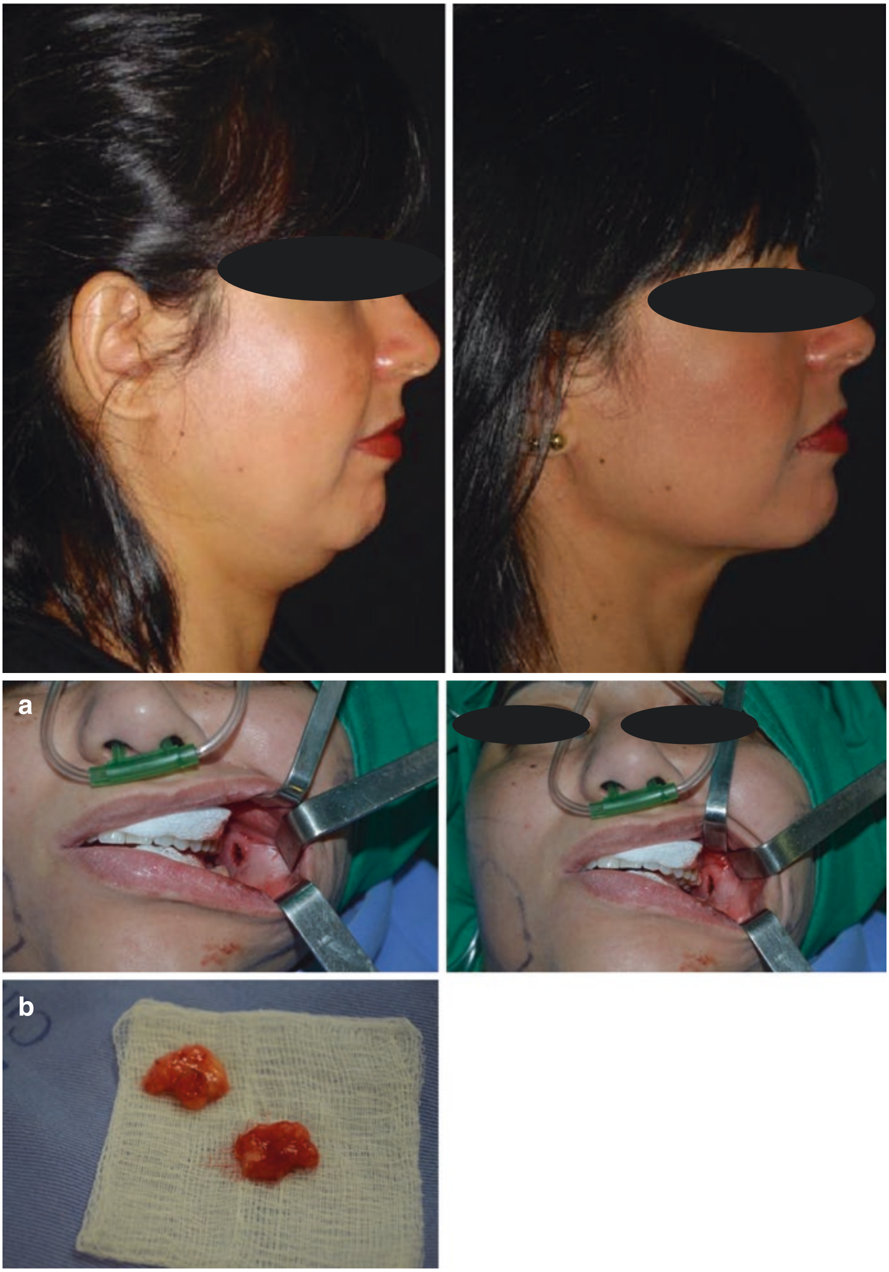

Fig. 10.3 (continued)

10.5.1 The Technique Step-by-Step

1. Initially, identify the anatomical structures of reference, aiming to choose the area of incision. As principal anatomical reference, we have the Stensen duct, which is the duct of the parotid gland. The incision will be performed just below it and slightly posteriorly thereto, forming an incision approximately 1.5 centimeters
2. Following the incision (Kelly tweezers), for dissection of the anatomical planes toward the condylar process of the mandible, avoid lesions to anatomical structures that are located in its vicinity, such as the facial artery, maxilla, parotid duct, and facial nerve [3]
3. Subsequently, it is delicately incised the fibrous capsule surrounding the Bichat's fat pad and, with circular movements, the removal of most of the fat pad (Fig. 10.3a), preserving on average one third of the total volume. In order to finalize the procedure, close the mucosa with separate points using catgut wire number 5–0 (Fig. 10.3b)

10.6 Autologous Fat Transfer

Considered one of the main findings in the diagnosis and treatment of aging, facial volume loss has become the object of many studies in an attempt to soften this problem [4, 5]. Currently many types of facial synthetic fillers have been in the market, among them being hyaluronic acid, considered perfect for all indications possible (Fig. 10.4).

Used in the past, autologous fat grafts have been widely studied as facial volumizer and presented satisfactory results in face filling.

Current studies aim to answer some questions that have not yet been elucidated, such as the following:

1. *What is the best donor area for autologous grafting?*
2. *How should the harvesting of the fat and its processing be?*
3. *What is the best injection technique?*

10.6.1 The Technique Step-by-Step [4, 5]

1. Harvesting and preparation of fat autologous (Fig. 10.5)
2. Identification and selection of areas for volumizing (Fig. 10.6)
3. Retrograde grafting (Figs. 10.7 and 10.8)

Fig. 10.4 Autologous fat transfer and facelitfting before and after pictures

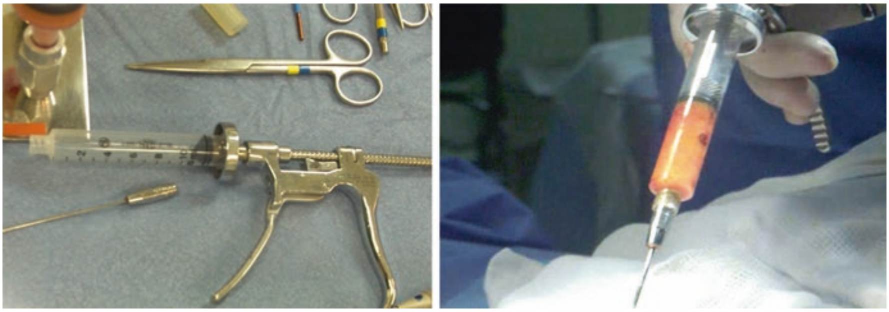

Fig. 10.5 Fat is harvested through conventional liposuction before decantation. Fat injection should be performed with individual syringes of 1 ml for face grafting and 10 ml for body grafting to avoid cellular trauma to the adipocyte

Fig. 10.6 Selection and markings of the areas to be treated

Fig. 10.7 Retrograde grafting to the nasolabial fold

Fig. 10.8 Comparison between the injected (right; 8 cc) and the noninjected (left)malar regions

10.7 Mentoplasty

Being an important component of the lower facial region, thus promoting a balance of multiple facial structures (nose, lips, teeth, and neck), optimization of the chin and mandible, through the systematic understanding and analysis of the anatomy and deformities present, has become an important tool in facial harmonization.

Among the possibilities of recognized treatment, we find some therapeutic options, such as the injection of fillers or autologous fat, alloplastic implants, or bone genioplasty, being the choice of the method based on the deformity presented by each patient. This initial evaluation will be based on detailed patient history, including previous dentoalveolar traumas, orthodontic treatment, or prior oral surgery.

During the physical examination, a three-dimensional evaluation is essential, observing the anatomical relationship and its possible imbalances (excesses, deficiencies, or neutrality) in the horizontal, vertical, and transversal planes [6].

The selection of the operative technique should be based on the deficiency presented in the mental region. In this chapter, we will present the technique with alloplastic implants.

Complications are uncommon, especially if a careful detachment is performed, preserving the mental nerve. There is also the possibility of implant displacement and some discomfort for the patient if the soft tissue coverage of the implant is thin.

10.7.1 Alloplastic Implant

Indication: > Simple horizontal microgenia

10.7.2 *The Technique Step-by-Step*

1. Marking of the facial midline, for an exact placement of the graft.
2. Anesthesia:
   - Mental nerve block
     - Infiltration of the submental region and gingivolabial and central portion of the lower lip and chin (anesthesia + vasoconstriction)
3. Performing the surgical incision:
   - Submental (2–3 cm)
   - Intraoral
4. Detachment and identification of noble structures.

   Attention: Submental pathway (submental groove) is performed by planes (skin and subdermal fat) until identification of the mental muscle, which should be divinized, to reach a supraperiosteal plane in the central region of the mandible (O plane may promote some bone erosion of the anterior mandible).

The lateral wings of the implants can be positioned in the periosteal plane, promoting a greater stability of the implant.

During lateral dissection, the mental nerve must be identified for its preservation. If the implant requires lateral advancement, in addition to the nerve exit foramen, it should be positioned below the nerve outlet [6].

5. Synthesis by planes.

   Attention: It is important to reapproach the mental muscle and soft tissue suspension to prevent future soft tissue ptosis in this region.
6. Use dressing strips for maintenance of the immovable region for a minimum period of 3 days (Fig. 10.9).

Fig. 10.9 Mentoplasty before and after pictures

10.8 Lobuloplasty

The aging process may promote in some people a hypertrophy of the auricular lobe, generating a disproportion between the lobe and the external auricular pavilion. This hypertrophy may be due to hereditary factors or pathologies.

The procedure for lobe reduction consists of a simple, safe technique with very satisfactory results.

10.8.1 The Technique Step-by-Step

1. A triangular excision of the total thickness is made, marking the excess tissue to be removed, in the anterior region of the lobe [7]
2. A triangular excision of the total thickness is made, lateral and perpendicular to the first one, to avoid the excavation of the central zone of the lobe [7]
3. Suture the perfect approximation of the remaining edges

Attention: The initial fixation of the new lobe is important, mainly to avoid inferior traction and the appearance of elf ear.

10.9 Nonsurgical Complementary Procedures to Rhytidoplasty

10.10 Laser Procedures (CO2/Erbium-YAG)

In the quest to improve skin tightness, promoting the elimination of wrinkles and line thinning and thus rejuvenation, we have made use of noninvasive therapies as ablative lasers, whether CO2 or erbium-YAG.

These techniques promote epidermal remodeling and production stimulation of collagen at a dermal level. These lasers are capable of promoting the elimination of the epidermal layer and of the papillary portion of the dermis by propagating a thermal wave in the tissues responsible for collagen synthesis (Fig. 10.10).

Among the main adverse effects of treatment with ablative lasers, promoting a withdrawal of patients from their social and work activities for a few weeks, are prolonged erythema, hyperpigmentation, scarring, secondary intention wound healing, and infection.

Fig. 10.10 Rhytidoplasty + laser resurfacing before and after pictures

10.10.1 Laser Erbium-YAG

Used as an auxiliary in the treatment of aging of the skin from the year 1989, the erbium laser became a

great ally of plastic surgeons. Numerous surveys are carried out year after year, in the search to improve the effects of this adjuvant therapy in facial aging, contributing to enlarge its indication list where we had before restrictions on the use of laser of CO2.

Featuring wavelengths of 2.94 millimeters and having water as its chromophore, this laser has an absorption index by water ten times greater than the CO2 laser.

This laser has a power of ablation of 10–20 μm (at 5–10 J / cm2), causing thermal damage of the order of 10–20 μm. Because it has a greater absorption by water, more energy is consumed on the surface, resulting in less transmission of energy to the tissue surrounding the treated area, contributing to a smaller area of thermal damage. It must be noted that there will only be production of new collagen induced by the laser erbium when used with parameters above 20 J/cm 2 (20 HZ–30% overlap).

10.10.2 Main Features

- Every laser shot removes the same amount of tissue.
- The ablation of collagen happens through the entire thickness of the skin.
- Minor thermal damage with greater ablative effect.
- Can remove thermal damage from CO2, epithelization of tissue to form more vascularized cells.
- Successive ablative effect.
- More superficial, requiring a more laser shots.
- A deeper ablation into the papillary dermis results in bleeding.
- Does not stimulate collagen below 20 J/cm2 (2) [8].

10.11 Micro-focused Ultrasound

Another technology that could be applied for skin tightening and collagenases is the high-intensity focused ultrasound (HIFU). The HIFU has been investigated as a tool for treatment of benign and malignant tumors. What separates HIFU from lasers or radiofrequency, is that it can target deeper tissues and reach temperatures as high as 70 °C sparing the skin by generating thermal injury secondary to micro-focused ultrasound waves leaving the surrounding tissues intact. HIFU does not depend on the movement of electrons through the resistance to their movement across the tissues neither uses chromofores as its mode of action as a Laser treatment would use.

This technology was cleared by the FDA in 2009 for a noninvasive brow lift, followed by clearance for full-face treatment and in 2012 for the lifting of lax submental region and neck tissue. Hayashi et al. demonstrated that collagen denaturation ranges from 11% above 60 °C to a maximum of 59% at 80 °C and that this response to heat is responsible for the lifting effect and overall skin quality of micro-focused ultrasound since it promotes neocollagenesis and collagen remodeling (Fig. 10.11) [9, 10].

The suggested protocol for a full-face and neck treatment takes a maximum of 90 minutes, and the results achieved may last up to 2 years (Figs. 10.12 and 10.13) [9, 10].

The adverse effects that can be seen with micro-focused ultrasound are mild erythema and edema, neuropathic pain, and numbness in the jawline. Various studies confirm that these side effects are transient in nature.

10.12 Botulinum Toxin

Botulinum neurotoxins are proteins synthesized by the anaerobic bacteria *Clostridium botulinum* which then undergo isolation, purification, and stabilization in order to be human consumed for medical purposes. There are seven serotypes of botulinum toxins (BNT-A, BNT-B, BNT-C, BNT-D, BNT-E, BNT-F, BNT-G); however, humans are only susceptible to five (BNT-A, BNT-B, BNT-E, BNT-F, BNT-G), and only two are available as drugs ((BNT-A, BNT-B). Botulinum toxin was

Fig. 10.11 Microfocalized energy delivered to the tissues for stimulation of collagen synthesis and skin tightening

Fig. 10.12 Before and after pictures. Single treatment after 90 days. (Courtesy of Ulthera Inc.)

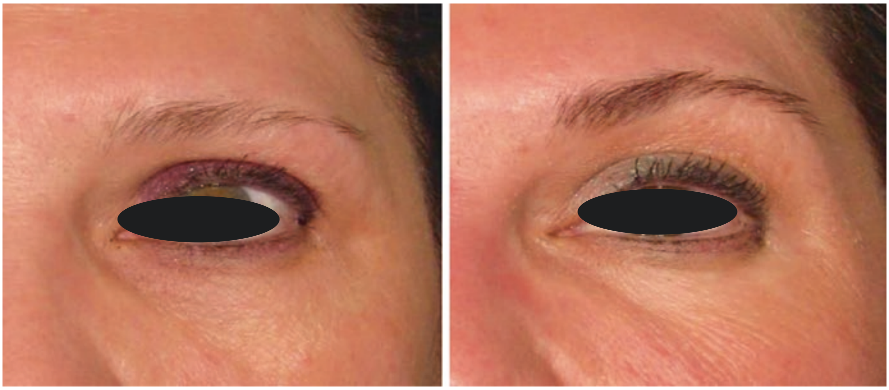

Fig. 10.13 Before and after pictures. Single treatment after 450 days. (Courtesy of Ulthera)

cleared by the FDA in 1989 for strabismus and blepharospasms, in 2002 for treating glabellar lines, and in 2004 for primary axillary hyperhidrosis.

10.12.1 Four Steps Mode of Action

1. Binding by the heavy chain of the neurotoxin to the nerve membrane
2. Translocation into the neuronal cytosol
3. Cleavage by the light chain of the neurotoxin of one or more SNARE (soluble N-ethylmaleimide-sensitive factor attachment protein receptor) proteins reducing the exocytic release of acetylcholine into the synaptic cleft
4. Neuronal sprouting, regression, and functional restoration

In the clinic, BNT-A is injected into the overactive muscles of facial expression with an onset of action of 3 to 7 days and lasting for 3 to 5 months (Fig. 10.14). The

Fig. 10.14 Botulinum toxin injections before and after pictures. Frontal muscle above and orbicularis oculi below

dosage should be individualized keeping in mind the paralysis; therefore, the clinical aesthetic result is dose-dependent [11, 12].

Among the most common side effects are upper eyelid ptosis, scleral show, edema, hematoma, allergic reaction, and facial asymmetries [11, 12].

10.13 PDO Sutures

This is the so-called lunchtime facelift. The barbed sutures are introduced under the skin of the face and neck to counteract skin laxity and tissue descent. The procedure has also a bio-stimulatory effect on collagen synthesis inducing an overall improvement on the skin of the areas treated [13].

Threads can be divides into three main categories:

1. Absorbable and nonabsorbable threads
2. Barbed and non-barbed threads
3. Length of the threads (short threads δ 90 mm in length, long threads ε 91 mm length)

In general, barbed sutures are for suspension of the tissue and lifting effect and non-barbed threads for stimulation of collagen synthesis (Fig. 10.15).

Fig. 10.15 PDO sutures before and after pictures 1 month

Fig. 10.16 Barbed threads for lifting of the medial third of the face and submental area and meshwork of non-barbed threads in the forehead for collagenesis stimulation

10.13.1 The Technique Step-by-Step

1. Choose the length of the threads to be used depending on the patient's characteristics
2. Design the vectors to counteract gravity bilaterally
3. Use an antibacterial product such as chlorhexidine before inserting the threads
4. Insert the barbed threads following your previous marking
5. Avoid protrusion of the thread by cutting at the insertion point
6. Create a meshwork with non-barbed threads to stimulate collagen production (Fig. 10.16)
7. Apply ice to minimize edema and bruise (Fig. 10.15)

The most common side effects are mild edema, erythema, and bruising and mild discomfort when introducing the threads. The pain derived from the application of the threads could be minimized using topical lidocaine [13].

10.14 Chemical Peels

Chemical peels are caustic agents applied topically to produce renovation of the epidermis and dermal stimulation. They can be classified according to their depth of tissue injury into superficial peels which penetrate only the epidermis, medium peels which present ablation of the epidermis and papillary dermis, and deep peels which induce chemoexfoliation in the epidermis, papillary dermis, and reticular dermis. Due to toxicity and inability to control the damage produced to the deep layers of the skin, deep peels are becoming less popular in favor of lasers which may offer precise thermal depth injury with less complications than deep peels such as cardiotoxicity, hepatotoxicity, nephrotoxicity, and scarring [14, 15].

Different factors influence the penetration of the chemical agent such as ph, concentration, excipient, volume applied, layers applied, and time of exposure [15].

Among the indications for chemoablation are:

- Solar lentigo, ephelides, melasma
- Warts
- Acne, rosacea
- Scarring
- Photoaging
- Actinic keratoses

Superficial	Medium	Deep
Alpha hydroxyacids (30–50% glycolic acid, 10% lactic acid, and 40% mandelic acid) Beta hydroxyacids (salicylic acid up to 30%) Alpha ketoacidosis (50% pyruvic acid)	50–70% glycolic acid >30% salicylic acid 30–50% monolayer application of trichloroacetic acid 20–50% resorcinol	> 50% monolayer application of trichloroacetic acid 30–50% phenol

Chemical peels are contraindicated during pregnancy, herpes simplex in active face, if the patient is allergic to the formula components and Fitzpatrick skin types V and VI and recent sun exposure. The most common side effects of chemical peels are post-inflammatory pigmentary alterations, bacterial or fungal infections, reactivations of HSV, scarring, and epidermolysis (Fig. 10.17).

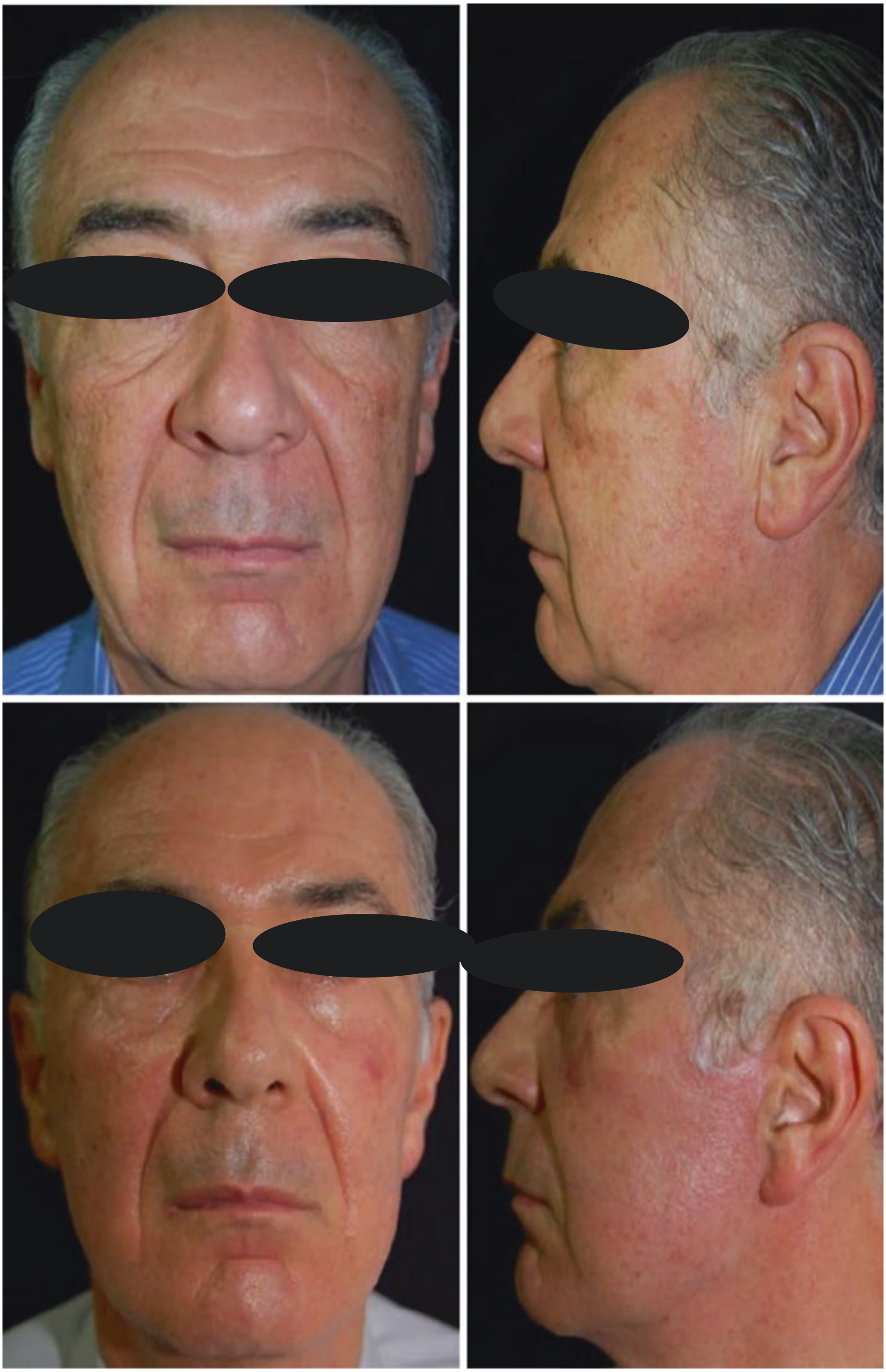

Fig. 10.17 Facelifting + chemical peel before and after pictures

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Chapter 11
Facial Aging: Clinical Considerations and Anatomical Changes

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Fig.11.1 A female patient showing evident facial aging along her life. Photos (**a**) and (**d**), at 23 years old, when she underwent blepharoplasty; (**b**) and (**e**). at 54 years old asking for face-lift; (**c**) and (**f**), at 55 years old, 1 year after rhytidoplasty

11.1 Introduction

Facial rejuvenation procedure is a constant challenge in Plastic Surgery since aging face is a natural and biological phenomenon to demonstrate the age with physical signs (Fig. 11.1). In fact, the senescence action occurs in the whole body, but it is much more representative on the face since the facial expression becomes even more important due to physical and emotional reactions.

Facial oldness involves all anatomical structures of the face and even the bone skeleton, with absorption on orbital regions, malar eminences and also ligaments elements, musculoaponeurotic and subcutaneous layers, and cutaneous structures (Fig. 11.2).

Fig. 11.2 Facial aging – a female patient showing physical alterations on the face as time goes by. Photo (**a**), at 24 years old when she got married; photos (**b** and **d**), the same patient at 55 years old showing noticeable facial modifications cause by aging process; photos (**c**) and (**e**), the same patient at 56 years old after face-lift operation. Her husband brought me her photo (**a**) taken during marriage saying that the operation recovered her image 30 years ago

11.2 Method

11.2.1 Anatomical Alterations

A useful research was published by Pitanguy [13], which described the variation of anatomical reference points of the face according to aging process. They demonstrated that on the upper lip, nasogenian folds, lower lids, and eyebrows are the segments of the face that present the most important modifications during life.

The presence of signs on the whole face is indication of internal alterations of the body. The adequate knowledge of the physiology of oldness, that includes anatomical variations suffering along of the time, is fundamental to achieve success on facial rejuvenation procedure (Fig. 11.3). Besides, surgeon's experience is essential in performing the operation in order to obtain good surgical results [8].

Fig. 11.3 A 69-year-old female before and after facial rejuvenation combined with liposuction on submental and submandibular regions, suture of the lateral and anterior borders of the platysma muscles, without any treatment underneath of the platysma . Photos (**a**, **c**, **e**), before surgery with excess skin laxity on the neck and dehiscent platysma musculature with accumulation of adiposities on lateral and anterior sides of the neck. Photos (**b**, **d**, **f**) – postoperative 1 year after face-lift

In a remarkable publication, Pitanguy [13] mentioned that the mankind faced two major problems: demographic explosion and overflow of the age. He described that in developed countries at that time, the average life span reached 65 years and very short period would reach 70s. His prevision was correct since nowadays it is already over 75. The consequence of such alteration in population is a sort of competition between young and old people which is a strong motivation to induce to seek doctor's offices hoping to feel younger physically as well as mentally. Such peculiar moment for specific change in men and women's life is not a precise one, since each person feels the need according to their social group, professional activities, and other variety of concepts.

There is a reduction in the bone volume of the orbital borders associated with the relaxation of the soft tissues, which facilitates the herniation of orbital fat bags and progressive depression of the nasolabial folds. In addition to all these changes, there is ample relaxation of the lower third of the face and neck, which can damage the cervicomandibular contours(Figs. 11.4 and 11.5).

Several factors are responsible for all alterations of facial and cervicomandibular modifications [13]. Genetic effect is peculiar to each person, but exposure to sun, smoking, and ionizing radiations is responsible for deep change involving aging face (Fig. 11.6).

The epidermis presents special modifications on the process of maturation promoting cellular disorganization which may damage the composition of the cutaneous layers. In the dermis, the collagen tissue fibers become less intense and elastic fibers degenerate, making the skin progressively thinner (Pitanguy [11], Pitanguy [15]).

Also, there are alterations of the adipose tissue of the face, which is evident on malar regions represented by accentuated depressions [1, 3] (Figs. 11.1, 11.3, 11.4, and 11.5). Even the muscular fibers present general alterations in all thickness of the facial panniculus. In fact, there are several modifications to the face, which are a constant challenge in carrying out any attempt at facial rejuvenation operation (Fig. 11.2) [6].

Due to all these considerations, rhytidoplasty is a palliative procedure since it is not possible to block aging phenomenon. Plastic surgery of aging aims the

Fig. 11.4 Facial aging of a female patient during her life. Photos (**a** and **e**), at 29 years old before she underwent augmentation mentoplasty; (**b** and **f**), when she was 38 years old with good improvement of her profile after augmentation mentoplasty; (**c** and **g**), at 62 years old showing signs of facial aging before face-lift; (**d** and **h**) at 64 years old, 2 years after rhytidoplasty associated with fat suction of the neck and plication of the lateral and anterior platysma bands without any procedure underneath it

Fig. 11.5 Treatment of facial aging and reduction otoplasty and reduction of ear lobule as well. Photos (**a** and **d**), a patient at 61 years old, after face-lift performed at 48; photos (**b** and **e**), the same patient 6 months after the second face-lift; photos (**c** and **f**), the same patient at 71 years old, 4 months after her third face-lift; photo (**g**), the right ear of the same patient before her third face-lift; photo (**h**), her right ear after reduction otoplasty and reduction ear lobule combined with her third face-lift. Rhytidoplasty

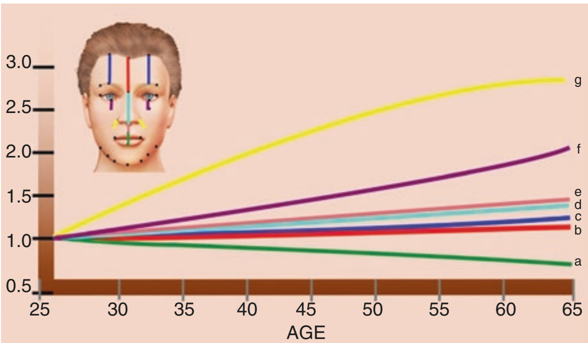

Fig. 11.6 Above is a diagram which is the summary of Pitanguy's research about aging face. He demonstrated that the upper lip, the nasogenian fold, and the lower lid present the most severe change along the evolution of aging face, as it is described below: green line (**a**), limits between the upper lip and lower lip; red line (**b**), the mid forehead; blue line (**c**), the forehead; light blue line (**d**), the mid nose; rose line (**e**), between the nose and upper lip; purple line (**f**), palpebral pouches; yellow line (**g**), nasogenian fold

adaptations of the continent to the new content, chronologically modifying the appearance that the human being presents in the continuous process of senescence.

11.3 Anatomic Alterations to the Face Caused by Aging Process

According to Pitanguy's description [13] (Fig. 11.6), there are specific regions on the face that may present complex and deep anatomical alterations caused by aging phenomenon which are visible and noticeable: eyebrows, malar regions, lower and upper lips, lower and upper lids, the nasogenian fold, the nose and particularly the tip of the nose, the whole auricles, and particularly the lobules (Figs. 11.1, 11.2, 11.3, 11.4, and 11.5) [13, 14].

Each segment of the face damaged by aging phenomenon may be treated by several surgical methods which are described in this book.

According to Gonzáles-Ulloa [12], the facial changes occur with age depending on the individual's genetic differences with several variations in personality, race, exposure to sunlight, skin thickness, facial muscles, as well as foods used to eat.

Cutaneous Aging (Facial): Anatomy, Physiopathology, and Clinical Perspective

The skin is the largest organ of the human body which has several functions: protection against friction, dehydration, invasion of microorganisms, and ultraviolet radiation (melanin). It also has functions of sensory perception (touch, heat, pressure and pain), and absorption and excretion of substances (ions).

11.4 Anatomy

Constituents: Skin, nails, hair, sebaceous glands, sweat glands, and mammary glands (its attachments). It consists of epidermis, keratinized pavement epithelium, and the dermis of connective tissue (Fig. 11.7). Subjacent, joining it to the organs, there is the hypodermis (or subcutaneous fascia), of loose and adipose connective tissue. The skin differs according to its location [2].

11.5 Skin and Attachments

The palms of the hands and the soles of the feet, which suffer a greater friction, have an epidermis composed of several cellular layers and a very thick superficial layer of keratin. This type of skin is called thick skin. It has no hairs and sebaceous glands, but the sweat glands are abundant.

The skin of the remainder of the body, including the face, has an epidermis with few cell layers and a layer of thin keratin and has been called thin skin.

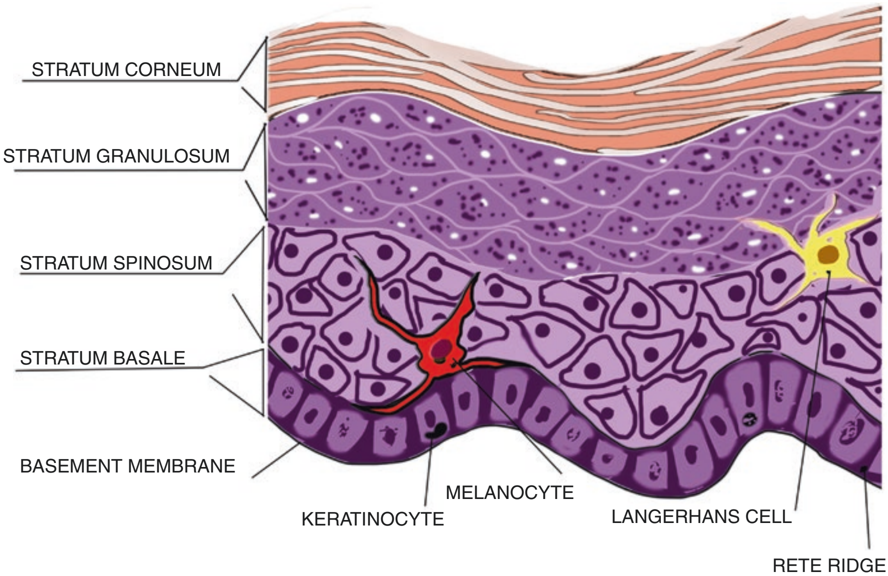

Fig. 11.7 Diagram demonstrating the layers of a normal skin

11.5.1 Pathophysiology

The main structural and functional alterations observed during skin aging are reviewed, considering the intrinsic process of senescence and the damage induced by chronic exposure to actinic radiation. In photoaging, the importance of skin type is stressed, regarding its capacity to react in order to get protection against radiation. Finally, some inflammatory, degenerative, and neoplastic skin diseases associated with aging and photoaging may happen [7].

Cutaneous aging is part of the natural evolution of the skin, with the changes that are observed as a result of age. Skin aging is part of the natural evolution of the skin, with the changes that are observed with the aging of the body. Are considered innate and acquired aging. These being differentiated by multiple endogenous and exogenous factors, among them the indiscriminate exposure to the sun, which causes accelerated photoaging.

11.6 Normal Human Skin and INATO Aging

11.6.1 Young People

The skin, as an organ, is extraordinarily endowed to exercise the two key functions it performs in the organism: coating, in relation to the outside world, and defense, in regard to external aggressions.

Among the former, body molding justifies the remaining functions in terms of individual appearance, personality expressions, and attacks.

In the defense properties of the organism, the plasticity of the organ is highlighted, which is due to the resistance to rupture and its elasticity.

The characteristic composition of the dermis, especially with regard to extracellular materials, explains the aforementioned plasticity.

The relative impermeability of the skin, in turn, depends essentially on the epidermis, the mechanism of keratinization, and the formation of the corneous layer: it is the latter, due to the cellular organization and its chemical composition, that prevents the passage of solid particles, macromolecules, solutes, and ions. As regards impermeability relative to nonionizing radiation, it depends, in particular, on the amount of melanin present, synthesized by melanocytes.

Other key properties are skin renewal and repair: the first one allows the organ to maintain, in a situation of physiological normality, its integrity; the second one regards the need to self-reconstruct when injured.

The sensory information function depends on fine and complex dermal nerve branches, which include the free and encapsulated endings, responsible for the accurate discriminative capacity of the organ. It should, however, also be mentioned, within the informational function of the skin, what refers to the ability of the Langerhans cells to recognize the immune properties of the substances flanking the stratum corneum. Langerhans cells were described by Paul Langerhans in 1868 when he studied the cutaneous human epithelium [7].

The interrelation of the skin with the rest of the organism, for the preservation of homeostasis, plays a particularly relevant role in thermoregulation. It is the effect of the organ in the mechanism of conservation and caloric dissipation, obtained by means of variations in peripheral circulatory output and regulation of sweating [13].

In the subcutaneous layer, there are two components: the subcutaneous fat, which provides volume, and the fibrous reticular skin, which connects the dermis to the underlying SMAS [5].

The amount, proportion, and arrangement of each component vary according to the face region and the patient's average age.

In the scalp, the subcutaneous tissue has a layer with uniform and consistent thickness that attaches to the overlying dermis.

In specialized areas, such as eyelids and lips, the subcutaneous layer is significantly compact, often appearing to be nonexistent. And in regions such as the nasolabial segment and malar region, the subcutaneous layer is very thick [9, 10].

In the nasogenian sulcus, the opposite occurs, with reduction of the subcutaneous layer by the proximity of the dermis to the deep muscular plane, constituting a bridge that connects dermal and subcutaneous fibers to the muscular plane.

11.7 Discussion and Conclusions

Rhytidoplasty is a palliative procedure since it is not possible to stop aging phenomenon with all alterations on the anatomical structures of the face and neck. Plastic surgery of aging aims the adaptations of the continent to the new content, chronologically modifying the appearance that the human being presents in the continuous process of senescence.

Changes with aging occur at all levels of the facial anatomy, including the facial skeleton. The recognition of senescence of the skin is not intuitive but a real one, thanks to its characteristic appearance, being observed changes of color, brightness, surface design, spots, and wrinkles.

Aged skin becomes progressively dry, rough, and translucent, evolving with fixation of personality, intersex, and racial characteristics. However, the intensity variation of these anatomic alterations is unique in each individual (Figs. 11.1, 11.2, 11.3, 11.4, and 11.5).

In innate aging, the overall decrease in skin thickness, especially in the subcutaneous adipose panicle, and the modifications of the dermal architectural organization are responsible for its wrinkling.

In regions with a greater thickness of subcutaneous tissue on the malar region, the reticular skin is significantly longer than in the other regions, predisposing its fibers to weakening and distension with aging [9].

The fibrous and fatty components in the subcutaneous tissues are organized into distinct compartments because they are not uniform. The limit of these compartments corresponds to the location of the retention ligaments, which is superficially inserted into the dermis.

With aging, changes such as lowering of fat, selective atrophy, hypertrophy, and attenuation of the retentive ligaments, cause poor positioning of the fat compartments, often separating them. Although minimally decreased, the distinct compartmentalization of the retentive ligaments maintains the subcutaneous fat in their relative positions.

The reduction of the epidermal cellularity and its functional disturbance, associated with the dermis, is also an important causal factor in the decrease of the impermeability of the organ during aging.

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Chapter 12
Treatment of Deformities of Senile Orbit to Improve Facial Contour

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12.1 Introduction

Facial aging is a dynamic process involving the aging of soft tissue and bony structures. To effectively rejuvenate the aging face, it is necessary to understand the dynamic aging process. Epidermal thinning and the decrease in collagen cause the skin to lose its elasticity. Loss of fat, coupled with gravity and muscle pull, leads to wrinkling and the formation of dynamic lines. The aging process has also been shown to affect the facial bones. Aiming to achieve the most natural and harmonious rejuvenation of the face, all changes that result from the aging process should be noted and corrected. Failure to address changes in the skeletal foundation of the face may limit the potential benefit of any rejuvenation procedure. Correction of the skeletal framework is increasingly viewed as the new frontier in facial rejuvenation, as postulated by Mendelson and Wong in 2012. Orbit area has an important effect on the senile face. Therefore, the first step in successfully treating deformities of the senile orbit is to recognize them.

12.1.1 Deformities of Senile Orbit

Narrow palpebral fissures, short lower lids, and full cheeks are hallmarks of youthful periorbita. This is made possible by a facial skeletal morphology with adequate anterior skeletal projection (midface convexity) to support the soft tissues. Aging results in soft tissue descent with rounding of the palpebral fissure, lengthening of the lower lid, and a loss of cheek prominence. Yaremchuk and Kahn noticed that faces whose midface skeletons are flat or concave do not manifest these youthful attributes, tend to age prematurely, and are prone to lower lid malposition after blepharoplasty [9].

Only during the current decade, with the application of three-dimensional computed tomography (CT) analyses, has a more accurate understanding of facial skeletal aging been possible. Recent data support the concept that the aging process causes not only soft tissue atrophy leading to volume depletion in the periorbital and midface area but also a loss of projection of the midface skeleton. Certain areas of the facial skeleton undergo resorption with aging. Older patients suffer effects of dental loss that aggravates the maxillary atrophy. The resultant deficiencies of the skeletal foundation contribute to the stigmata of the aging face (Fig. 12.1) [1, 9].

The orbital aperture increases with age, in both area and width, for male and female. Resorption is, however, uneven and site-specific. The superomedial and inferolateral aspects of the orbital rim, in particular, recede more, although the changes occur at different rates (Fig. 12.2). The volume loss in the upper eyelid, especially in the medial part, has been described as the “A-frame” deformity. The inferolateral orbital rim changes manifest earlier, by middle age, whereas in the superomedial quadrant, recession may be noted only in old age. The inferomedial quadrant of the orbit also tends to recede in old age, especially in males. In contrast,

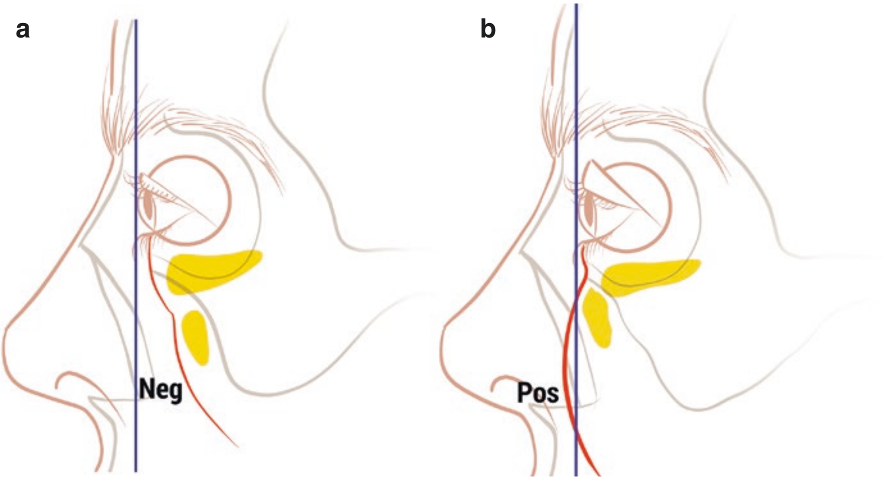

Fig. 12.1 Changes in the sagittal position of orbital fat, the infraorbital rim, and the cheek prominence that occur with aging. (Left) In the youthful face, the cheek mass lies anterior to the surface of the cornea, and the orbital fat lies slightly anterior to the orbital rim. (Right) With aging, the cheek mass moves posterior to the surface of the cornea. The infraorbital rim also recedes, and the orbital fat moves slightly anteriorly. The red line is dropped vertically from the cornea. The orbital fat is designated in yellow

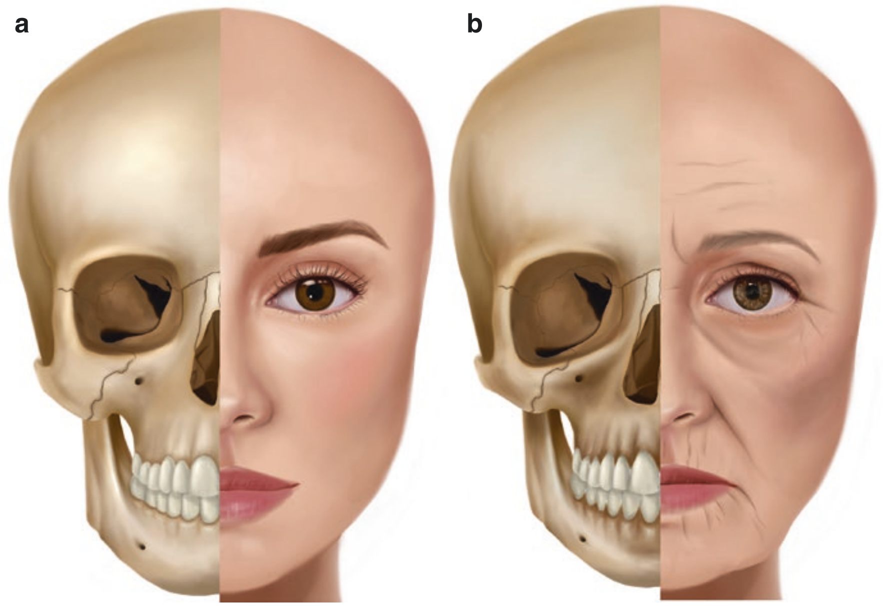

Fig. 12.2 Orbital aging. The superomedial and inferolateral aspects of the orbit have the greatest tendency to resorb. This contributes to the following characteristics of periorbital aging: increased prominence of the medial fat pad, elevation of the medial brow, and lengthening of the lid-cheek junction

the central part of the superior and inferior orbital rims is more stable, with little if any resorption occurring with age [1].

Why does this reabsorption occur? It is interesting to note that the sites identified as areas prone to bony resorption in the facial skeleton correspond to the more mobile part of the face during animation, especially the orbicularis oculi covering the lateral brow, the lateral orbital crow's feet areas, and the inferolateral orbital rim. The mobility required for the function of these regions is structurally associated with a less ligamentous fixation of the soft tissues to the bone. Hence, the attachment of the muscles and ligament to the bone in these areas is attended by little stress. It is reasonable to speculate that the opposite, a lack of stress, may be a factor contributing to bone losses in these areas.

What are the general consequences of the resorption of the facial skeleton? Superomedial rim remodeling may contribute to the unmasking of the medial upper lid fat, a change currently attributed to weakening of the orbital septum. This, in combination with the glabellar angle becoming more acute with age, may also lead to the perceived descent of the medial brow and the formation of glabella skin creases. The inferolateral rim remodeling and increase in orbital aperture width may contribute to the formation of crow's feet and lower lid lag (Fig. 12.3).

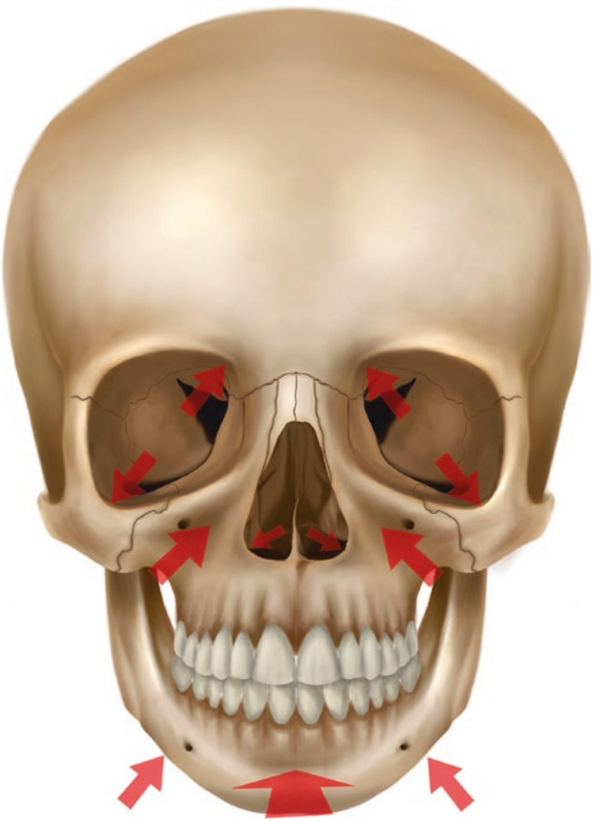

Fig. 12.3 Arrows indicate the areas of the facial skeleton susceptible to resorption with aging. The size of the arrow correlates with the amount of resorption. The darker areas are those of the greatest bone loss. The stigmata of aging, manifested by the facial soft tissues, corresponds with the areas of weakened skeletal support

Trying to further develop a concept of how the periorbital area changes with age, a possible working hypothesis is that the bony structures undergo morphologic change and also result in a widening of the orbital aperture that results in a change in the appearance of the overlying soft tissue envelope. The overall widening of the orbital aperture results in a change in the relationship between the orbital contents and the surrounding bony framework. This may result in changes. Prominence of fat pads, deepening of the sulci, or enophthalmos, ptosis, scleral show, and ectropion may be seen with aging [2].

The changes seen in the upper half of the orbit may result in the soft tissues rolling into the orbital aperture and thus the appearance of brow descent and lateral orbital hooding. In the lower half of the orbit, the tissues may roll over the recessed bony ledge, leading to lag of the lower lid, prominence of lower lid fat pockets, and deepening of the nasojugal groove as disproportionate tissue piles up against the orbicularis origin along the medial rim and the origin of the orbicularis is reshaped with its underlying bony attachment [5]. In the midcheek, weakness of skeletal support medially contributes to the “tear trough deformity” [1]. The orbital rim moves relatively posterior to the anterior cornea as well as undergoing progressive curve distortion particularly in the inferolateral aspect. Thus, the midface skeletal structures retrude with age relative to the upper face [3, 4].

12.1.2 Treatment of Deformities of Senile Orbit

The traditional concepts of periorbital and midface aging revolve around the theme of changes occurring in the soft tissues, with atrophic laxity leading to tissue descent. Facial rejuvenation techniques have focused on reversing these changes by repositioning, redraping of the tissues, and reducing the skin, with an emphasis on vectors of lift. Although these approaches are effective to a major degree, they do not necessarily produce a completely harmonious or natural rejuvenation. Soft tissue augmentation to replace volume loss has become more accepted recently by many to enhance the treatment plan for those seeking facial rejuvenation. This volume loss is likely caused by soft tissue atrophy in addition to a loss of bony support and projection. The bony components of the face are important for overall facial three-dimensional contour, as they provide the framework on which the soft tissue envelope drapes. If this framework experiences a morphologic change with age, the overlying soft tissues will subsequently project differently [1, 5].

Once both the soft tissues and the skeleton contribute to midface contour and both components are affected by the aging process, both soft tissue and skeletal augmentation can be appropriate to restore midface convexity. These modalities, however, are not equivalent in their impact on the appearance of the midface. Free fat grafting and the injection of various fillers are intuitive (and majority of surgeons advocates it) for the restoration of soft tissue volume loss due to senile atrophy. It has a limited role in simulating the effect of an increase in skeletal projection. Whereas augmenting the facial skeleton results in an increase in the projection of the skeleton, augmenting the soft tissue volume results in an inflation of the soft tissue envelope and blunting of the contours of the skeleton. Overaugmentation of either component brings home the point. If overly large implants were placed on the skeleton, the appearance would be too defined and ultimately skeletal. If too much fat were placed in the soft tissue envelope, an increasingly spherical and otherwise undefined shape would result [9]. Therefore, there must be a proper balance and adequate replacement of each component.

Augmentation of the infraorbital rim with alloplastic implants can provide convexity to the deficient upper midface skeleton. The implant that has the biggest impact on periorbital aesthetics is one that augments the infraorbital rim (Fig. 12.4). By changing globe-rim relations, it transforms the "negative vector" of upper midface concavity to the "positive vector" of upper midface convexity (Fig. 12.5). Infraorbital rim augmentation is routinely accompanied by subperiosteal midface resuspension. Suspension of the cheek soft tissues on this now supportive framework narrows has several benefits. It narrows the palpebral fissure, shortens the lower lid, and gives fullness to the cheek. The addition of lateral canthopexy can restore lower lid position when previous blepharoplasty has resulted in lower lid malposition in patients with deficient midface skeletons.

Operative technique: Access to the midface skeleton is obtained through the lower lid (preference is a transconjunctival retroseptal incision; to gain better exposure, it may be combined with the lateral extent of the lower lid blepharoplasty incision), intraoral incisions, and, if appropriate, temporal (or bicoronal) incisions. The entire midface is undermined in the subperiosteal plane. The infraorbital rim is augmented with a porous polyethylene implant immobilized with screws. The midface soft tissue envelope is elevated and fixed with sutures tied to the infraorbital rim implant. A bridge of bone canthopexy may be performed when it is necessary to reposition the lateral canthus and to provide additional support for a repositioned lower lid [9].

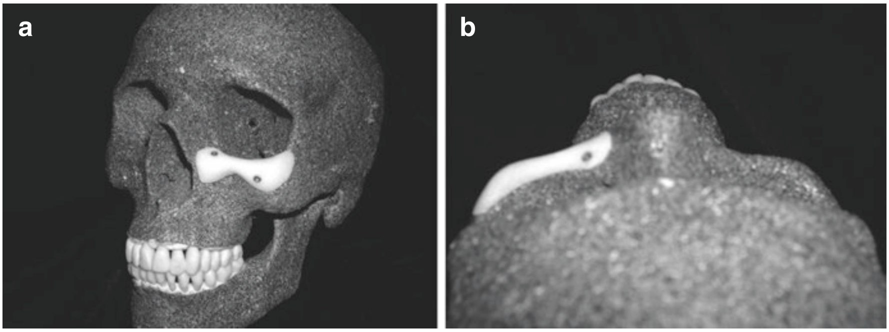

Fig. 12.4 Implants designed specifically for infraorbital rim augmentation provide 5 mm of anterior projection (Porex Surgical, Newnan, Ga.). They are carved to meet the specific needs of the patient. Screw fixation assures application of the implant to the skeleton. (**a**) Oblique view. (**b**) Overhead view. Note the rim projection provided by the implant. Note that the implant provides anterior without lateral midface projection

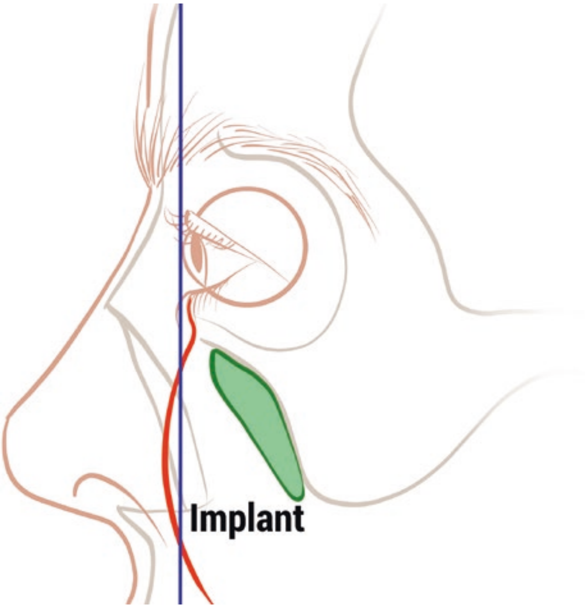

Fig. 12.5 “Reversed” negative-vector relationship. Alloplastic augmentation of the infraorbital rim can reverse the negative vector

Silicone implants are a popular choice for skeletal reconstruction and augmentation and provide efficient and effective rejuvenation, especially with the use of the textured silastic implant. The rates of extrusion and malposition of the silicone implants over time, however, have led some to use more porous textured implants. The clinical utility and morbidity associated with the use of porous polyethylene facial implants have been described well [5]. Yaremchuk reported in 2003 on 370 consecutive implants with an average follow-up of 27 months. The overall reoperation rate was 10 percent, which included operations to remove implants because of infections or to improve displeasing contours [7, 8]. Skeletal augmentation offers a permanent rejuvenation of the facial skeleton and may be performed in conjunction with soft tissue redraping.

Besides the replacement of the skeleton, the addition of volume to the soft tissues has enabled better restoration of youthful volume and shape than mere lifting alone [1], particularly in the malar region and nasojugal groove. As the majority of facial soft tissue volume loss through aging is attributable to fat loss, fat may represent the ideal soft tissue replacement. Improvements in technique have enhanced the predictability of facial fat grafting.

Following this paradigm shift away from resection surgery and toward filling procedures, Tonnard et al. [6] proposed the augmentation blepharoplasty, aiming to refill the deflated areas in the periorbital region. The technique consists of a fine particle fat (microfat) grafting procedure that involves the use of small-diameter cannula for transfer of autologous fat to the medial part of the upper eyelid, the orbitomalar groove, and the malar area and over the inferior orbital rim with or without manipulation of intraorbital fat. These procedures, associated with raising the tail of the eyebrow through a lateral temporal lift, conservative skin excision, and inferior orbicularis muscle suspension, revealed favorable, natural-looking, and long-lasting improvement of the treated areas. Shortcomings of classical resection blepharoplasty, such as hollowing of the upper eyelids, incomplete blending of the eyelid-cheek junction, and persistent deflation of the midface, were avoided; natural blending of the eyelid-cheek junction and the full and crisp aspect of the upper and lower eyelids seen at a younger age were regained (Fig. 12.6) [6]. When autologous fat is not an option, alternative facial fillers including calcium hydroxylapatite and hyaluronic acid may provide excellent results.

Moreover, the treatment of the aged orbital region can be complemented with standard procedures for soft tissue: blepharoplasty to treat still apparent upper and lower lids fat and skin excess; endoscopic frontoplasty for glabella skin creases, crow's feet, and superior replacement of the lateral eyebrow; lateral canthopexy for scleral show and senile ectropion; and lateral canthoplasty with tarsal strip for more severe ectropion cases (Fig. 12.7).

In recent years, augmentation for selected areas of the facial skeleton has become a powerful adjunct in our approach to facial rejuvenation. Although many materials can be used, the use of porous hydroxyapatite granules is preferred (InterPore International, Irvine, CA, USA) for their versatility and due to proven clinical experience. Hydroxyapatite is biocompatible, having the same mineral composition as

Fig. 12.6 Patient with orbital elderly. (**a**) Preoperative picture of blepharoplasty. Notice the deep tear through, medial fat pads. (**b**) One year after eyelid repair, with small fat resection and canthopexy. (**c**) Five years postoperative view, after patient has become long-distance runner and lost fat tissue. (**d**) Postoperative picture after fat injection in the malar area and upper orbital rim

Fig. 12.7 A patient of 60 years of age. (**a**) Notice the preoperative view negative vector of eyelid plan (antimongoloid position) and scleral show, demonstrating the laxity of the lower eyelid. (**b**) After lower blepharoplasty, including a canthopexy. (**c**) Five years postop, with maintenance of eyelid contour

bone, and in its porous form, hydroxyapatite is not prone to resorption because it supports fibrovascular ingrowth, contributing to long-term stability. The granular form provides surgical flexibility, enabling small volume enhancements if need be, yet with minimal subperiosteal dissection. This approach of directly addressing the underlying deficiency is preferable to techniques that attempt to camouflage these changes such as extensive tissue redraping alone or the use of supraperiosteal soft tissue fillers [1].

12.2 Conclusion

A defining characteristic of youth is good skeletal structural support. Facial aging results from a combination of soft tissue and bony changes, with bone loss in specific areas of the facial skeleton (in the orbits, mainly superomedial and inferolateral), resulting in decreased support and projection of the soft tissue envelope and contributing significantly to the features of the aging face. To achieve the most natural and harmonious rejuvenation of the face, all changes that result from the aging process should be noted and corrected, starting from correction of the skeletal framework. Augmentation of the infraorbital rim with alloplastic implants provides convexity to the upper midface skeleton. Together with lower lid and midface soft tissue suspension, it creates or restores youthful periorbital aesthetics.

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Chapter 13
Improvement of Facial Contour Through Ear Reconstruction

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1923–2012

13.1 Introduction

The normal facial contour presents two auricles situated on each side of the head in an imaginary axial tube passing in its center. Each auricle with its internal structures is an important organ in the aesthetic balance of the face. Usually it is not noticed when its size, shape, position, location, and even absence appear normal. However, any alteration in those references points causes a significant, noticeable, aesthetic disturbance.

An aesthetically unbalanced facial contour due to a defect of the auricular framework normally causes dissatisfaction with one's physical appearance, associated with deep psychological damage. Frequently, these patients use a variety of artifices to hide the deformity and eventually show alterations in their self-image. Due to all those circumstances, reconstruction of the auricle is much more than a matter of surgery such that it should reinstate the characteristic features that are essential to the patient's physical and psychological recovery [8].

There are two major groups of ear deformities: acquired and congenital. The acquired defects have several origins: trauma that may be caused by a car accident, a burn, a human or an animal bite, the wrong application of piercing, and tumor resection, among others. On the other hand, congenital abnormalities have some varieties of clinical forms [26]. The term microtia, due to its constant use, symbolized almost all congenital auricular deformities. However, in my classification there are other anomalies such as anotia, agenesis of the auricle, severe microtia, moderate microtia (eutopic and ectopic), and macrotia [12–13] (Figs. 13.2, 13.3, and 13.4).

13.2 Technique

Reconstruction of the auricles on congenital and acquired deformities can be performed on patients at 6 or 7 years old on male or female. It should not be done in younger patients because until that age, the auricles are still in a period of real growth and the costal cartilages, which are essential to create the new auricular framework, are undeveloped and very thin. The operation is performed at the hospital under general anesthesia after careful preparations that are physical examination, blood tests, heart evaluation, and adequate surgical planning.

13.3 Surgical Planning

When one goes back to the history of ear reconstruction, there is no doubt that Gillies in 1920 [18, 19] introduced the necessity of creating a new auricular framework to replace the structure of the future auricle. Therefore he opened a wide field in this area, since it is the first step on surgical planning because the size, shape, location, and position of the future ear must be planned before the day of operation. Later again Gillies [18, 19] introduced the use of a model made from an X-ray film taken from the opposite auricle; it is a useful procedure until today. In bilateral deformities the planning needs surgeon's imagination. Later Converse [17] and also Tanzer [30] had similar preparation. I had the privilege to learn from Prof. Pitanguy and also through his publications [24, 25] a similar approach. Later during my

Fig. 13.1 Surgical planning to model the future auricular skeleton before ear reconstruction. Photo (**a**) the opposite side is taken as reference and prepared in an X-ray film; (**b**) the model is placed on the deformities to evaluate the size and shape of the future ear; (**c**) creation of the anatomical details of the model is made with a scissor with patient awake during consultation at the clinic

useful period of fellow at the New York University with Prof. Converse, I had again the privilege to see him planning the ear reconstruction. Also, I learned from Monasterio et al. [22, 23] similar criteria regarding surgical planning for treatment of acquired deformities. Therefore, such organization is deep in my mind giving me the necessity to plan adequately all operations before ear reconstruction (Fig. 13.1).

Therefore, my personal organization comes direct from Gillies since both of my two professors Pitanguy and Converse were trained by him just after the World War II. I did not met Gillies, since he died in 1960 when I was still in high school, but I

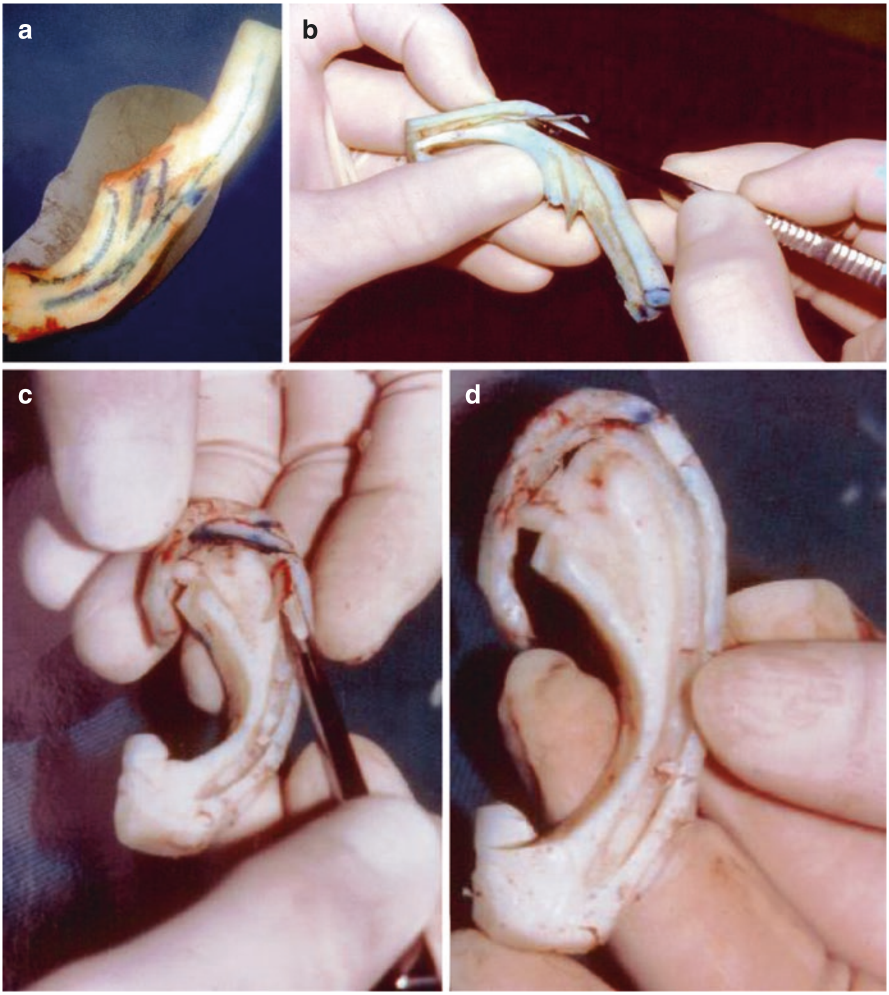

Fig. 13.2 Intraoperative photos to demonstrate modeling of the new framework. Photo (**a**) the costal cartilage is already removed from the chest of the patient; (**b**) carefully excavating; (**c**, **d**) the new skeleton is created with all anatomical and aesthetical details

feel that his fundamental knowledge is well sculptured in my mind. Meantime to create a new auricular skeleton is a valuable orientation on the way to reconstruct an auricle in which rib cartilage is the best organic material (Fig. 13.2). In fact, to sculpture a new frame is a hand work to excavate the cartilage (Malbec [20]) Millard Dr. [21].

13.4 Modeling of the Auricular Skeleton

In all cases of ear reconstruction, it is mandatory to replace the auricular cartilage. The success of the surgery basically depends on the framework provided. In creating the new ear, I prefer use of the autogenous rib cartilage which is obtained by meticulous excavation (Fig. 13.2). In order to have enough cartilage, we recommend performing the reconstruction on patients over 6 years old. For younger patients I suggest physical exercise, such as swimming and playing tennis, and other activities which improve the development of the costal cartilage. Fabrication of the new frame yields a rewarding outcome in ear reconstruction.

For ear reconstruction I use the right costal cartilage (Fig. 13.2). The right costal cartilage is used in order to organize the surgical team in the operating room. However, if this rib is damaged, the left side is used. Each rib cartilage has its own natural curvature which is helpful in creating a framework (Fig. 13.2). The reverse side of this cartilage is useful in modeling the opposite ear.

The size, shape, location, and position of the ear are determined by the normal side. In cases where both ears are deformed, these reference points are established based on the surgeon's experience. A model is then created showing the size and shape of the future frame, as suggested by Converse [17], Tanzer [29], and Pitanguy [24]. The film pattern is prepared prior to the operation (Fig. 13.1).

An important step during surgery is choosing the rib cartilage to be removed. After exposure of the eighth and ninth rib cartilage, the reverse side of the film pattern is used in order to select the more convenient one, based on the creative judgment of the surgeon. I draw the shape and the size of the frame before removal of the rib cartilage. The perichondrium is incised along the chosen rib cartilage and it is carefully undermined all around.

Tearing of the pleura with pneumothorax has been reported by Tanzer [30], Spina [27]. But I never had this sort of complication in over 2, 000 operations performed for ear reconstruction. After removal of the rib cartilage, the perichondrium is sutured in its natural position to provide regeneration of a new costal structure [4, 5, 8–13].

The aesthetic definition of the reconstructed ear is determined strictly by the reliefs of the auricular cartilage. Therefore, all of our efforts must be directed to the carving of the framework. Excavation of the cartilage results in more detail than the procedure of suturing one over the other, as reported by Pitanguy [24].

13.5 Total Reconstruction in Congenital Deformities

13.5.1 First Stage of Reconstruction

The remnant cutaneous tissue on severe microtia in my classification always has a vertical fold, which was described by Converse [17] and later by Tanzer [29, 30] and Brent [15] in auricular reconstruction. In my method [1–5] two horizontal incisions are made dividing that fold into three cutaneous flaps: superior, medium, and inferior. All the remnant cartilaginous tissue of the auricular deformity is resected. When the superior flap is big enough to create the crus helicis, it is rotated upward. The medium flap is sutured onto the periosteum forming a depression which originates in the external auditory canal. A cartilaginous graft is placed under the skin to form the tragus. The inferior flap is rotated down and backward describing an angle of 90° to form the lobule.

A horizontal incision on the mastoidean area is made followed by tunnelization of the skin on the region corresponding to the future helix and antihelix. This creates the subcutaneous tunnel. The skin corresponding to the future conchal cavity is not undermined.

The cartilaginous framework is introduced into the subcutaneous tunnel and can be sutured to the cartilage of the tragus and to the periosteum of the mastoid forming the auricular skeleton.

A careful dressing is applied on the reconstructed ear which is removed 1 week later at my clinic. The patient stays only 1 day at the hospital.

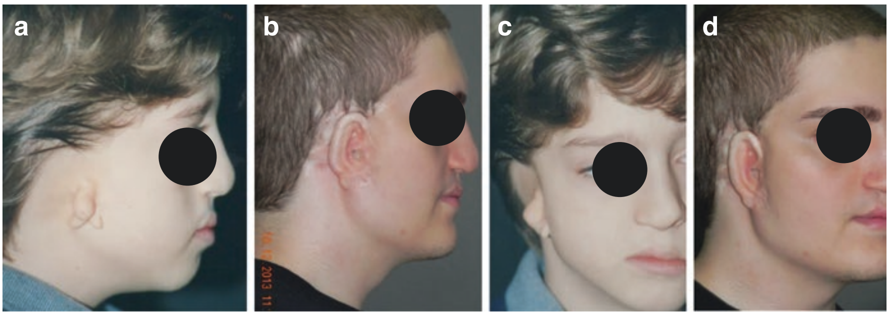

Fig. 13.3 An 8-year-old boy with anotia on the right side with severe associated hypoplasia of the hemiface. Photos (**a**, **c**) before surgery; (**b**, **d**) same patient some years later after two stages of ear reconstruction using costal cartilage to sculpture the new auricular framework showing great improvement on his facial contour

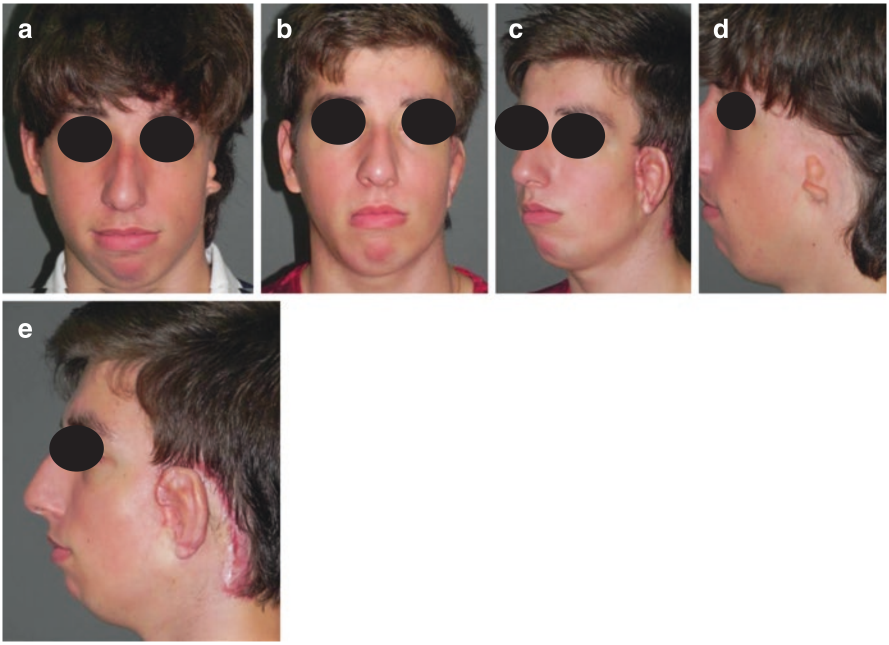

Fig. 13.4 A 19-year-old boy with moderate ectopic microtia on the left side with severe associated hypoplasia of the hemiface. Photos (**a**, **d**) before surgery; (**b**–**e**) after two stages of ear reconstruction including the use of rib cartilage to excavate the new auricular frame with better improvement of facial contour

13.5.2 Second Stage of Reconstruction

A second operation is done 6 months later, following my previous descriptions [8, 12, 14]. A cutaneous incision is done following the margin of the external auricular framework introduced during the first surgical stage. Sometimes a second operation is not necessary because of good projection and definition of the ear are obtained by the first operation. The position and location of the new auricle reinstates the harmony of the facial contour (Figs. 13.3, 13.4, 13.5, 13.6, and 13.7).

Reconstruction of the auricle after acquired deformities follows the similar surgical principles as it is described in my publications (Fig. 13.8) ([8], Avelar 1997, 2011, 2013, 2017).

Fig. 13.5 A 7-year-old girl with anotia on the left side with complex associated anomaly of the hemiface. Photos (**a**, **b**) before surgery; (**c**) after two stages of ear reconstruction using costal cartilage to model the new auricular skeleton; (**d**) same patient at 16 years old showing the reconstructed auricle on the left side when lipofilling was planned to perform reshaping of the hemiface; photos (**e**, **f**) final result after remodeling the face achieving harmonious facial contour; (**g**–**i**) showing lipofilling procedure on left sides of the face as well as on the chin

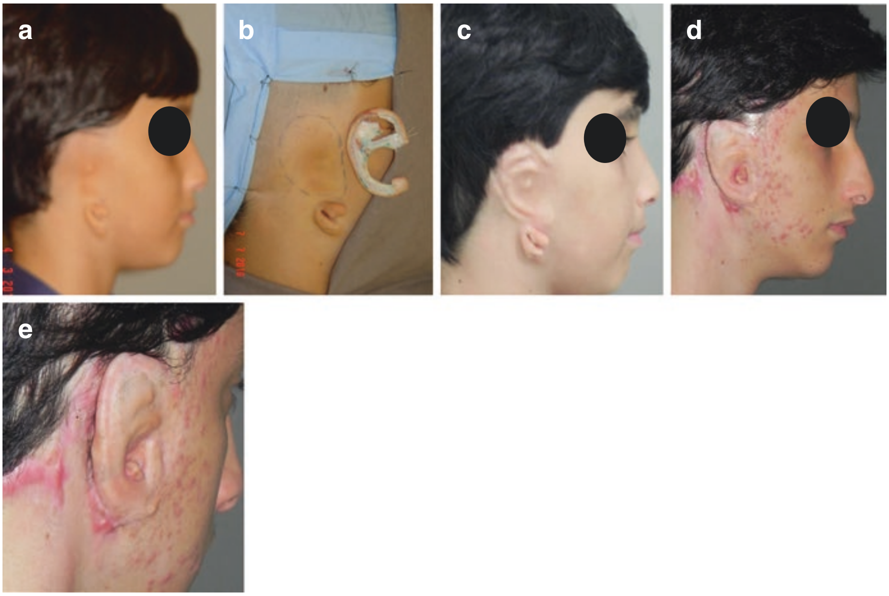

Fig. 13.6 A 12-year-old boy with moderate ectopic microtia on the right side with complex associated hypoplasia of the hemiface. The remnant external auditory meatus of the congenital anomaly is located much lower than the auricular region. Photo (**a**) before surgery on profile view; (**b**) during first stage of ear reconstruction, the new frame is already excavated; (**c**) after first stage when the new frame was embedded; (**d**) final result after two stages of reconstruction and the external auditory meatus was transposed to its natural location; (**e**) – final aspect of the new ear in oblique view

13.6 Complications

Until nowadays many severe complications in the donor area and in the reconstructed ear may happen when technical details are not employed. Chest deformities and damage to the pleura with pneumothorax resulted from extensive resection of the perichondrium together with rib cartilage. In order to avoid this sort of complications, I recommend preserving the costal perichondrium as described above [2, 3, 5, 8, 10].

The second type of complication was due to local infections following skin necrosis and exposure of the auricular cartilage graft. Such problems may occur following trauma of the skin that covers the framework. For this reason the skin flap should be tunnelized on the subcutaneous level, thus preserving all the layers of the skin, as well as taking into consideration the vascular network underneath as I already described [4, 8, 10]. External stitches were used as postoperative dressing may cause severe damage to the skin followed by local infections and cutaneous necrosis [17, 29, 30]. I use only wet cotton to dress the new ear, keeping the bandage on for 1 week. I do not recommend any external mattress sutures tied over cotton pledges [11, 13, 14].

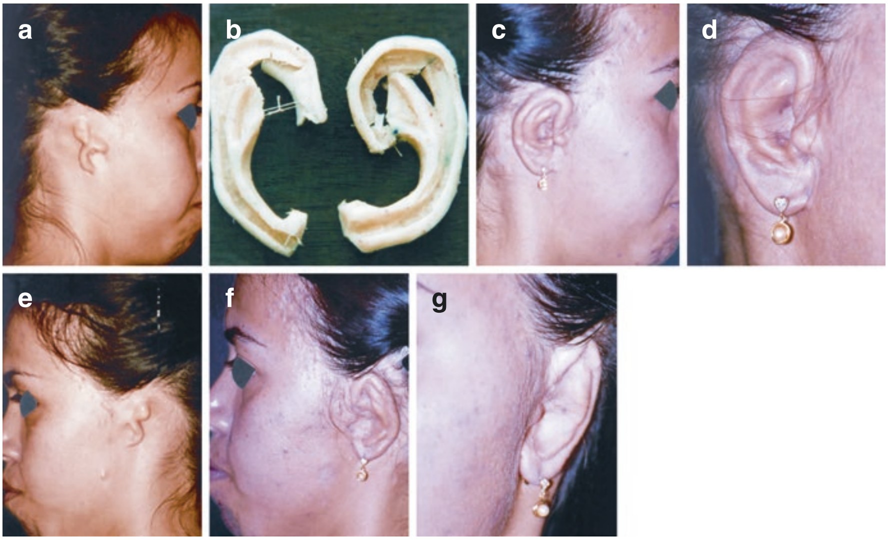

Fig. 13.7 Bilateral microtia on a 17-year-old girl causing disharmony of the face who underwent ear reconstruction simultaneously on right and left sides. Photo (**a**) before operation; (**b**) two skeletons were modeled using only one rib cartilage; (**c**, **d**) postoperative view of the reconstructed right ear; (**e**) preoperative view of the left side; (**f**, **g**) the surgical result after two stages of reconstruction of the left side

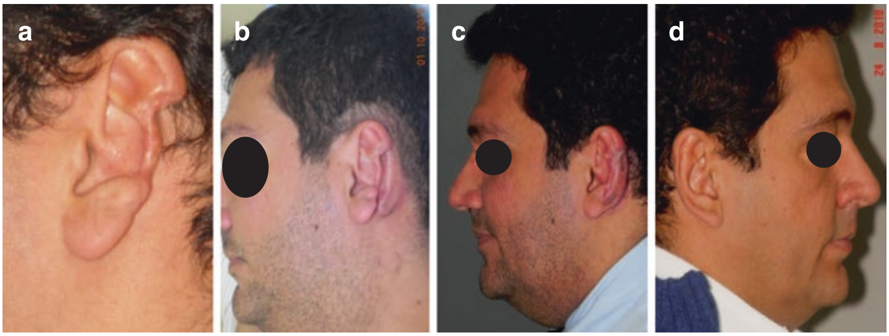

Fig. 13.8 Partial ear reconstruction on a male to repair severe damage of the auricle caused by human bite. Photo (**a**) before operation showing missing segment of the left auricle; (**b**) after first stage one can see the rib cartilage graft underneath the skin on the mastoid area; (**c**) post operatory view after the second surgical stage on the left side showing a good balance of the face; (**d**) the right side of the same patient showing the normal ear in good balance with the reconstructed ear on the left side

I do not use any kind of drainage or suction [15, 16]. The skin flap lies smoothly on the auricular framework following all the details excavated on the cartilage graft. No pressure on the skin is necessary because the cutaneous flap covers naturally the fashioned rib cartilage graft.

Another type of problem is cartilage absorption. I have described that this is caused by excess tension of the skin on the cartilage graft, skin loss after secondary infection, and poor blood supply to the new ear. Therefore, if these three conditions are avoided, cartilage absorption should not occur [8–11].

13.7 Discussion

Congenital dysgenesis of the auricles is frequently accompanied by some other craniofacial deformities causing an unbalanced facial contour. Alterations to correct disharmony of the ears require specific treatment of the bone structures. I believe that correction of those abnormalities should be done after ear reconstruction in order to avoid damaging the neighboring tissues which may cause problems when rebuilding the auricle (Figs. 13.3, 13.4, 13.5, 13.6, 13.7).

Ear reconstruction surgery, in most cases, has been vastly simplified through the use of my technique which creates a subcutaneous tunnel on the area of the future helix and antihelix, preserving the margin of the ear and conchal cavity as well. It is useful to emphasize that there is a posterior facial flap that covers the posterior aspect of the reconstructed auricle. The cutaneous fold remnant of the congenital deformity is rotated down- and backward in order to create the lobule.

The facial temporal flap and retro-auricular flaps, which I described [1–3] for use in primary reconstruction on microtia, are used only for severe traumatic amputations or for treatment of some postoperative complications. In 1977 [1, 2] I described the anatomy of those facial flaps: one is supplied by the temporal superficial artery and the second by the posterior auricular artery. By using these flaps, it became possible to reconstruct the auricle in one single operation. According to the medical literature, such reconstruction required several surgical stages [17, 29, 30]. However, the facial flaps greatly increase the blood supply to the reconstructed ear avoiding many complications that occurred when other techniques were used. Therefore when I described the anatomy of the facial flaps, that made it possible to reconstruct the auricle in one operation [1–3]. The remnant lobular tissue is replaced in its normal position at the same time that facial flaps are raised and rotated to cover the anterior and posterior surfaces of the cartilage framework [6, 7]. A simplified technique was presented at the 7th International Meeting in Rio de Janeiro in 1979 [4]. I reserved the use of facial flaps only for specific cases, because even in very severe acquired deformities, it is possible to dissect a subcutaneous tunnel to embed the auricular cartilage graft.

13.8 Conclusions

It is described the importance of the ear when reinstating the harmony of facial contour. This is the result of employing the same technique for 40 years. Since 1979 I employ routinely the same surgical procedure to reconstruct the auricle on congenital anomalies (Fig. 13.3) as well as on acquired deformities (Fig. 13.8). Associated malformations of the face and skull structures in conjunction with dysgenesis of the pinna are emphasized (Figs. 13.5, 13.6, and 13.7). Creation of the new auricular framework is approached by excavation (Fig. 13.2). Removal of the costal cartilage is done to preserve the perichondrium in its natural position to replace the rib, avoiding perforation of the pleura. The basic technique of reconstruction is similar to the one described in my publications.

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Chapter 14
Changes in Facial Skeleton with Aging

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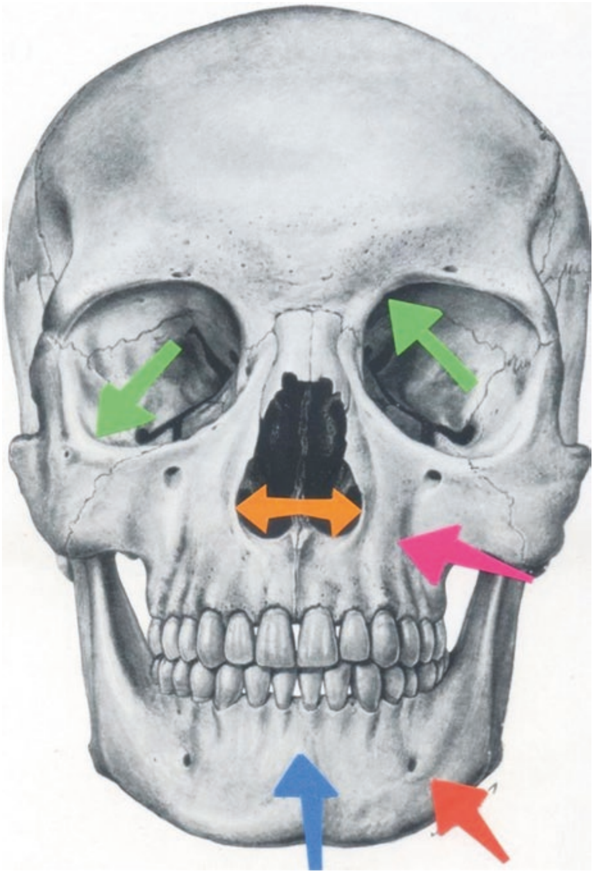

Fig. 14.1 Changes in facial bones with aging. (1) Superomedial orbital rim recedes. (2) Inferolateral orbital rim recedes. (3) Bone loss along lower half of the maxilla and alveolar process. (4) Increase of pyriform aperture. (5) Reduction in mandible alveolar height by resorption. (6) Resorption of the bone just below the mental foramen

14.1 Introduction

Correction of the skeletal framework is increasingly viewed as the new frontier in facial rejuvenation. It currently is clear that certain areas of the facial skeleton undergo resorption with aging. Areas with a strong predisposition to resorption include the midface skeleton, particularly the maxilla including the pyriform region of the nose, the superomedial and inferolateral aspects of the orbital rim, and the jowl area of the mandible. These areas resorb in a specific and predictable manner with aging. In patients with a congenitally weak skeletal structure, the skeleton may be the primary cause for the manifestations of premature aging (Fig. 14.1) [1].

14.2 Definition

Aging of the face results in both superficial wrinkling of the skin and changes in a three-dimensional (3-D) topography of the underlying structures. The major forces contributing to facial aging include gravity, skeletal remodeling secondary to bone resorption, subcutaneous fat redistribution and loss, hormonal imbalance, chronic solar exposure, and smoking [2].

One theory of aging is that the accumulation of random and widespread damage to the DNA over a lifetime may cause cellular senescence. In their study, Harries et al. observed that age-associated disruption to the balance of alternatively expressed isoforms for selected genes suggests that modification of mRNA processing may be a feature of human aging. The main structures that make up the facial anatomy are the bones, mimetic muscles, ligaments, various fatty compartments, and skin [3].

14.3 Changes Observed in Craniofacial Morphology

In a longitudinal radiogrammetrical study, Israel showed that the skull, cranial base, and upper facial compartments increase from adulthood into senescence in the order of 5–7%. Behrent's thesis on longitudinal craniofacial skeleton morphology concluded that growth rates slowed but continued into older age. In a cross-section group analysis of 160 skulls from the Smithsonian Institute, Bartlett et al. observed that facial width, depth, and height either increased or remained unchanged in older people. These studies do not address specific anatomical facial regions, but together they support the theory that the skull continues to grow, though at varying rates from infancy throughout late adulthood [3].

Changes observed in craniofacial morphology included:

1. Appreciable reduction of facial height, most marked in the maxilla and mandible and strongly correlated with loss of teeth
2. Modest increase in facial width
3. Modest increase in facial depth, except in those regions associated with tooth loss
4. General coarsening of bony prominences

14.3.1 Transverse Dimension (Width)

An increase in virtually all transverse dimensions is observed with increasing age in the female population, whereas such a change is not observed in males. This change occurs at all levels: the skull, upper face, midface, and lower jaw.

Anteroposterior dimension (depth): In this group of measurements, variability is observed. Males show little change in any of the parameters observed, with the exception of a decrease with advancing age in those measurements from the cranial base to the anterior maxilla; this change is likely due to a loss of alveolar bone consequent to tooth loss. Females demonstrate this change in part but show an increase in cranial vault, upper face, and midface depth. Supraorbital projection, due to frontal sinus pneumatization and remodeling, is a characteristic of both young and old males, not changing with age, whereas a significant increase in projection is seen in aged females.

Vertical dimension (height): In both male and female populations, upper face heights and posterior lower face height remain unchanged. Anterior lower and mid-face heights decrease with age. These changes are all likely due to the loss of alveolar ridge bone height consequent to tooth loss.

Angular dimension: In the aging male, a significant increase in nasofrontal angulation was observed, which was not seen in females. In neither sex was any observable change in the gonial angle seen [1].

14.4 Histomorphometric Analysis

14.4.1 Histomorphometric Analysis

In both males and females, increasing porosity of bone as a function of age is demonstrated. In females, there is an increase in both the number and size of osteons, thus resulting in an absolute increase in porosity correlating strongly with the increase in osteon size. Cortical porosity in the male is less than that in the female at all ages represented, and this difference is more pronounced at higher ages. Histologically, osteoid, indicating the presence of new bone formation, was visible only on the external cortical surface at all ages in both sexes [1].

14.5 Regions of the Face Affected

A. Periorbital: In an analysis of male skulls, Pessa and Chen found that the bony orbit became larger and the curvilinear form changed as age increased. The volume of the bony orbit has also been shown to increase with age. Kahn and Shaw reported that the width of the orbital aperture increases in both sexes with advancing age. The medial height of the supraorbital rim also increases in both sexes, which suggests that the superior orbital rim recedes with age. The inferior orbital rim recedes laterally in women, and the entire inferior orbital rim recedes in men [3].

Skeletal aging therefore results in curvilinear distortion of the orbital aperture in that the supramedial upper orbit and inferolateral lower orbit curve progressively with age. The loss of bony volume and projection of the lateral aspects of the orbit can cause a loss of support, and a variation in volume of the overlying soft tissue, which will contribute to its descent and bunching. Lateral orbital hooding and crow's feet that are seen in older people may be attributed to these changes. The timing of when these changes occur in men and women can differ. In women appreciable change occurs early in life, whereas in men it varies. The canthal position remains the same, and the apparent malposition in the elderly is an illusion. In their study on 320 men and women aged between 10 and 89 years, van den Bosch et al. found that the lower lid drooped in both sexes after the age of 35, and it was twice as pronounced in men. One could hypothesize that the recession of the bone, which reduces the projection of the rim, may contribute to the drooping of the soft tissue. Clark and Demer used magnetic resonance imaging in 12 patients to study the contents of the orbits and compared function between young and old. They found that the medial and lateral rectus extraocular muscles move inferiorly as age increases, which predisposes the elderly to concomitant strabismus. As the bone around the orbit recedes, it may displace the extraocular muscle, which has implications on aesthetics and function.

Remodeling of the supramedial rim may contribute to the increasing prominence of fat of the upper medial lid, which again is found in older people. The glabellar angle becomes more acute with age, which may also lead to the descent of the medial brow and the formation of creases in the glabellar skin. This loss of bony volume and the projection of the supraorbital rim may contribute to the appearance of ptosis of the brow and lateral orbital hooding, which is seen in the older population.

These bony periorbital age-related changes, particularly of the upper half, will support the clinical appearance of a descending brow and lateral orbital hooding and in the lower half the descent of the lower lid and its junction with the cheek and deepening of the nasoyugal groove.

The orbital aperture increases with age, in both area and width. Resorption is, however, uneven and site specific. The superomedial and inferolateral aspects of the orbital rim, in particular, recede more, although the changes occur at different rates. The inferolateral orbital rim changes manifest earlier, by middle age, whereas in the superomedial quadrant, recession may be noted only in old age. The inferomedial quadrant of the orbit also has a tendency to recede in old age, especially in males. In contrast, the central part of the superior and inferior orbital rims is more stable, with little if any resorption occurring with age (Fig. 14.1).

Pessa found no significant changes in the orbital angle (superior-to-inferior mid-orbital rim points on the lateral view) with aging, indicating that either the orbital rims do not recede or that one does not recede more rapidly than the other. Mendelson et al. directly measured the lengths of the orbital roof and floor with aging (at the midaxis of each orbit) and found no significant change in these distances with aging, indicating that the central portion of the superior and inferior orbital rims does not recede with aging.

B. Midface: The midface skeleton is formed by the maxilla in the medial and middle thirds and by the body and arch of the zygoma in the lateral third. Contrary to conventional orthodontic teaching, it has been clearly demonstrated recently that midface retrusion does occur with aging in dentulous patients. The rate of bony resorption in the midface, however, is not uniform. The maxilla is more susceptible to age-related loss than the zygoma. Shaw and Kahn studied how the maxilla changes with age and particularly looked at the glabellar, pyriform, and maxillary angles. They used three-dimensional computed tomography to show that the glabellar and maxillary angles in both sexes decrease considerably as age increases. They also showed that the pyriform angle did not alter noticeably, but the area of the pyriform aperture increased. Zadoo and Pessa showed that the

Figs. 14.2 and 14.3 Case 1 A 49-year-old female ,without previous surgeries we can see good malar projection but a depression of soft tissues between middle and lower third of the face secondary to aging of lower third

actual contour of the bony maxilla alters with age, and Pessa et al. reported that maxillary retrusion also occurs (Figs. 14.2 and 14.3).

Pessa measured the maxillary angle (superior-to-inferior maxilla at the articulation of the inferior maxillary wing and alveolar arch) of young and old patients and demonstrated significant bone resorption with loss of projection of the maxilla. Shaw and Kahn similarly noted a significant reduction of the maxillary angle with aging. Using a more precise approach to measurement with standardized parasagittal computed tomography (CT) slices through the midaxis of the orbit to measure the angle between the floor of the orbit and the anterior maxilla, Mendelson et al. confirmed the important finding that the maxilla retrudes with aging and quantitated the changes. The maxillary angle decreased by about 10 ° between young (age 30 years) and old (age 60 years) individuals.

However, Zadoo and Pessa found a significant reduction in the pyriform angle in a comparison between young and old male skulls ($n = 5$ in each group). The findings of Shaw and Kahn support the idea that the bone recedes evenly around the pyriform aperture but the pyriform angle does not alter. These changes may result in the nose appearing longer and in drooping of the nasal tip.

Loss of teeth will cause loss of bone along the lower half of the maxilla and the alveolar process.

C. Perinasal: The characteristics of the aging nose are well-known and include the following key changes: The nose lengthens and the tip droops, with the columella and the lateral crura displacing posteriorly. Changes in the bony foundation that support the nose in youth, the paired nasal bone, and the ascending processes of the maxillae are responsible for many of the soft tissues changes seen in the nose with aging. Shaw and Khan found that the pyriform aperture, resembling the situation of the orbital aperture, enlarges with aging as the edges of the "nasal" bones recede with age. Similarly, bone loss is not uniform, with the greatest resorption occurring in the ascending process of the maxilla. The posterior displacement of the bone rim is greatest at the lower pyriform aperture, which is the critical area for support of the lateral crura and the external nasal valves. Pessa measured the length of the perpendicular line from the nasion to the pyriform on standardized lateral views of three-dimensional CT images and observed that the distance increases significantly with aging, indicating preferential bone loss in the lower part of the pyriform aperture. This manifests clinically as posterior displacement of the alar base (relative to the fixed position of the medial canthus). Bone loss here contributes also to deepening of the nasolabial fold with age, which previously had been attributed solely to soft tissue laxity and descent. The anterior nasal spine also recedes with aging (although at a slower rate) , and this reduced skeletal support contributes to retraction of the columella, with downward tip rotation and apparent lengthening of the nose with aging (Figs. 14.4 and 14.5).

Figs 14.4 and 14.5 Case 2 A 57-year-old female with previous blepharoplasty and rhinoplasty 16 years before. She has evident loss of malar bone projection, receding superomedial and inferolateral orbit, increased pyriform aperture and pyriform fossa depression, bone resorption with loss of projection of the maxilla. Lateral orbital hooding and crow's feet that are seen may be attributed to loss of bony volume and projection of the lateral aspects of the orbit with loss of support

D. Lower face: The main change is a reduction in alveolar height that is caused by resorption and an increased labiomental fold and the appearance of a "witch's chin." The depository effect will lead to a change in contour from the typical geometric form of the parabola.

A recognized aging feature of the lower mandibular border is the "prejowl sulcus," the geniomandibular groove. Resorption of the bone just below the mental foramen will cause this triangular defect, and the rejuvenation surgeon should consider this when planning correction of the jowls.

The dentate mandible is assumed to expand continuously with aging. This was substantiated by two longitudinal studies. Pecora et al. found that the length of the mandible increases with age for both genders based on lateral cephalograms of 19 male and 20 female subjects. Pessa et al., using frontal radiographs of eight males and eight females from the Bolton-Brush Growth Study, found an increase in mandible width and height with increasing age. The most recent study on aging of the mandible compared three-dimensional CT scans in a population of 120 young, middle-aged, and elderly subjects. In contrast to earlier studies, although certain measurements increased significantly with aging, some measurements contracted. There were no significant changes in the bigonial width and ramus breadth with aging. Whereas the mandibular angle increased, the ramus height and mandibular body height and length decreased. These findings contradict the earlier studies, which suggest that the mandible expands continuously with age. This may be related to the measurement of normal growth in young subjects who have not yet reached skeletal maturity, inadvertently giving a result that the mandible is larger than in the old-age group. For example, in the longitudinal study of Pessa et al., the age range of the female young group was 5–17 years. Comparing these young subjects with mature subjects would most likely result in the latter appearing larger, thereby giving the impression of continuous expansion with aging. Shaw et al. compared subject groups in three age ranges: 20–40, 41–64 years, and older than 64 years (i.e., all subjects had attained full maturity). These standard parameters, based on linear measurements, will fail to detect in-between areas of reduced skeletal projection such as the prejowl region of the mandible that develops into an area of relative concavity and contributes to the appearance of jowls. Jowls appear at a younger age in patients with microgenia because of the relatively inadequate skeletal support in this area [4] (Figs. 14.7, 14.8, and 14.9).

14.6 Anatomohistologic Changes of the Retaining Ligaments of the Face

Multiple retaining ligaments are distributed all around the face. Some are simple ligamentous attachments between the skin and the underlying muscles; others have a definitive anatomical landmark. They are divided into osteocutaneous and fasciocutaneous ligaments. The zygomatic and mandibular ligaments are osteocutaneous and originate from the periosteum of the malar bone and the parasymphysis of the mandible. They are inserted directly into the dermis. The masseteric and the parotid cutaneous ligaments are formed of the fascial coalescence and become attached to the dermis. Their attenuation will result in the descent of the malar and buccal fat pads, which augment the nasolabial fold and exacerbate the jowls. The temporal and orbital ligaments are also important. The temporal fusion line is not affected by aging, but when the brow becomes more elastic and ptosis of the lateral brow is visible, it is a telltale sign of aging. The two major ligaments supporting the facial soft tissues, the zygomatic and mandibular, develop minimal if any laxity between their origin and their connection with the SMAS, although some weakening of the mandibular ligament occurs superficial to the SMAS. The next strongest ligaments, the upper masseteric over the accessory lobe of the parotid and the upper key masseteric ligament, also show minimal change, in contrast to the masseteric ligaments below the oral commissure, which being in the most mobile area associated with jaw opening have a tendency to weaken and stretch relatively early in the aging process, although less so in Asian faces. Although a significant diminution of the facial volume occurs beneath the deep fascia, the visual impact of this is seen in the overlying soft tissues. These deep changes result from bone loss, atrophy of the masticatory muscle, and deep fat changes. The facial skeleton changes profoundly with aging due to significant resorption in certain areas. The resultant loss of bony projection and support gives the visual impression of sagging or descent of the overlying soft tissues. Because the ligaments strongly connect the soft tissues to the skeleton, the effect of skeletal shrinkage is transmitted [5] (Fig. 14.6).

14.7 Aging of the Bone Mineral Density of the Face Skeleton

Facial bone aging has recently been described as primarily resulting from volume loss and morphologic changes to the orbit, midface, and mandible.

Facial aging is a dynamic process, with changes occurring to the skin, muscle, fat, and underlying facial skeleton. As we have gained a better understanding of the aging process, soft tissue augmentation for volume loss has been added to the treatment plan for many seeking facial rejuvenation. This volume loss is likely due to soft tissue atrophy in addition to a loss of bony support and projection. Multiple studies have suggested that the bony aging of the face is primarily a process of contraction and morphologic change.

The aging of the bony components of the face is important to understand, as the facial skeleton provides the framework or scaffolding on which the soft tissue envelope drapes. This change in BMD may contribute to the appearance of the aging face and potentially affect facial rejuvenation procedures.

The bony components of the face are important for the overall three-dimensional contour of the face, as they provide the framework on which the soft tissue envelope drapes. If this framework experiences a morphologic change with age, the overlying soft tissues will subsequently project differently. Facial bony aging has been

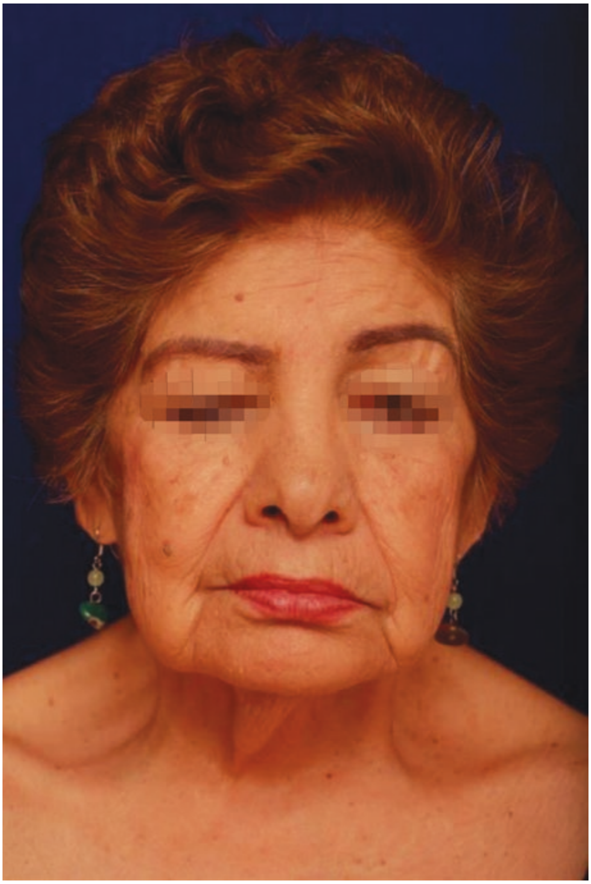

Fig. 14.6 Case 3 An 82-year-old female without previous surgeries, with important ptosis of the soft tissues and marked right eyebrow ptosis. Remodeling of the supramedial rim contribute to the increasing prominence of fat of the upper medial lid. Loss of bony volume and the projection of the supraorbital rim contribute to the appearance of ptosis of the brow and lateral orbital hooding. We can observe also attenuation of the zygomatic and mandibular ligaments that originate from the periosteum of the malar bone and the parasymphysis of the mandible and the masseteric and the parotid cutaneous ligaments resulting in the descent of the malar and buccal fat pads, which augment the nasolabial fold and exacerbate the jowls

characterized in recent studies by volume loss and morphologic change. This loss of facial bone volume may be related to a decrease in BMD, similar to what is seen in the axial skeleton.

The bones of the face are formed by intramembranous ossification without cartilaginous precursors, which differs from the rest of the axial skeleton and long bones. Thus, the growth and bony resorption of the face may be regulated by different factors. This has led many to believe that the facial bones and long bones age differently. Deguchi et al.,however, analyzed this question by studying 134 subjects in 3 separate age categories based on mandibular cortex erosions and the lab values of serum bone-specific alkaline phosphatase (S-BAP) and urinary N-telopeptide cross-links of type 1 collagen (U-NTX). He found that mandibular inferior cortical erosion on radiographs was associated with increased levels of S-BAP and U-NTX and that there was a strong association between mandible and general bone metabolism.

The earliest suggestion of an association between osteoporosis and facial bone loss was made in 1960. It is well-known that subjects with tooth loss undergo

Figs. 14.7, 14.8, and 14.9 Case 4 A 68-year-old female with a blepharoplasty 17 years before; that illustrates the changes in the mandible with bone resorption ptosis of the prejoul tissues and increased labiomental fold and the appearance of a "witch's chin"

significant alveolar bone loss, but decreased mandibular bone density has also been found in multiple studies independent of dental status. D'Amelio et al. analyzed the mandibles of 15 men (ages 34–85 years) and 16 women (ages 23–82 years) with an X-ray densitometer. He found a significant bone density decrease in the ramus for both sexes with increasing age. A study of 18 postmenopausal women over 2 years showed more bone loss in the mandible by DXA compared with the femur trochanter and phalanges. Thinning of the mandibular cortices of <3 mm has also been associated with low skeletal bone mass.

The maxilla and mandible BMD decreased with age for both sexes as well. This result suggests that the facial bones may undergo a decrease in BMD similar to the axial skeleton. This loss of density may contribute to the decreased facial bone volume and projection seen with aging. These changes in facial bone volume and density may happen at the same time and do not necessarily have a cause-and-effect relationship. Our results suggest that the axial and facial skeleton undergoes similar decreases in BMD with age and that facial bone aging may be linked to the same metabolic factors that cause osteoporosis in the axial skeleton.

The decrease in BMD of the facial bones with age may also have an impact on facial rejuvenation. As we have come to better understand the changes in facial aging, it has become more evident that the most effective approach toward facial rejuvenation should include restoring volume and contour, in addition to reducing the skin envelope. Soft tissue fillers and fat can be used successfully to restore volume loss and, when injected more deeply, result in the restoration of supportive structures and the skeletal foundation. Skeletal augmentation, using implants made of porous polyethylene or silicone, is also an effective method to reverse age-related changes of the facial skeleton in patients with intact occlusion. Screw fixation is usually recommended for porous polyethylene implants, and most implants have been shown to cause some element of bony remodeling. Patients with facial bones that are thinned and less dense may not be the best candidates for such a procedure, as it may predispose them to fracture. The type of volume augmentation should be tailored to each patient to rejuvenate the face and minimize potential complications. A better understanding of facial bone strength and support will further our understanding of facial aging and the future possibilities for facial rejuvenation [6].

Correction of the bony element has the potential to deliver a more harmonious facial rejuvenation. Those individuals who started low down the curve should be considered for a skeletal augmentation, not only to reverse the aging changes but also to bring their natural state higher up the curve so that the soft tissues are better supported for a more attractive look. With more youth, these individuals have more in reserve against future aging. Facial bone structures also explain the observation that we tend to age like our parents, a familial trait that we inherit from them.

In recent years, augmentation for selected areas of the facial skeleton has become a powerful adjunct in our approach to facial rejuvenation. The implication of this is that for both male and female patients, augmentation of the facial skeleton should be done conservatively, with just sufficient volume to restore the contours of youth. Exaggerated augmentations should be avoided. The facial skeleton has a profound effect on an individual's appearance. A defining characteristic of youth is good

Fig. 14.10 Case 5 A 71-year-old female with long evolution of facial paralysis; at age of 35 she had a facial reconstruction and at age of 52 a left rhytidectomy. This case illustrates the bone lost and muscle atrophy in the left hemiface secondary to the facial paralysis

skeletal structural support. Facial aging results from a combination of soft tissue and bony changes, with bone loss in specific areas of the facial skeleton contributing significantly to the features of the aging face [5] (Fig. 14.10).

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Chapter 15
Aesthetic Reparation of the Face, Neck, and Auricles to Achieve Well Balance of Facial Contour

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15.1 Introduction

There are several congenital and acquired external aricles' deformities, and the internal structures of the middle and inner ear are damaged along with face and neck, which causes unaesthetic appearence to the facial contour. During the last two centuries, ear reconstruction has been performed and constantly challenged to solve all problems to achieve good aesthetic results. On top of such concept, to repair congenital and acquired deformities on neighborhood regions of the auricles represents even more difficult procedures. Due to all these circumstances, each patient must be well evaluated in order to make an adequate surgical planning before surgery.

Undoubtedly the normal ears may not be noticed by other persons. However, any alteration on their size, shape, position, and location causes a significant, noticeable, unaesthetic disturbance which requires proper reconstruction. Any unbalanced facial contour due to a defect of the auricular framework normally causes dissatisfaction with one's physical appearance, associated with deep psychological damage. Regarding congenital anomalies according to my classification, there are three groups of patients which must be well identified: anotia, agenesis of the ear, and moderate ectopic microtia [8–13]. The fundamental basis of my classification is the dysgenesis of the structure characteristics of the remnant cartilaginous tissue. Ever since I started my practice, an accurate study on the anatomy of the cartilaginous elements of congenital deformities shows the presence of folds, reliefs, and depressions very similar to the normal ear's cartilage, but smaller than a normal one. About 80% of my patients with congenital anomalies of the ear always present two segments of cutaneous folds which are classified as severe microtia that is not the topic to be described in this chapter [14]. On the other hand, 20% of my patients with congenital anomalies of the auricles are classified as anotia, agenesis of the ear, and moderate ectopic microtia, and they always present complex abnormalities of the face, neck, and skull and also on other segments of the body (Figs. 15.1 and 15.2).

Frequently, those patients use a variety of artifices to hide the deformity and eventually show alterations in their self-image. Due to complex association of deformities, the auricle's reconstruction combined to other facial and neck anatomical structures' reparation is beyond surgery matters, because it reinstates the facial contour features, which is fundamental in physical and psychological recovery.

When a patient presents severe facial asymmetry, it is mandatory to repair facial deformities employing several surgical approaches in order to achieve well balance of the face, neck, and auricles (Figs. 15.1 and 15.2). To reconstruct the auricle in those patients demands adequate surgical planning, since other face and neck segments will require treatment afterwards other segments of the face and neck, improving facial contour. However, in acquired auricle deformities, with face and neck damage also, the surgical planning for ear reconstruction includes neighboring areas (Fig. 15.3). As each patient presents specific deformities, it is mandatory to plan according to each one.

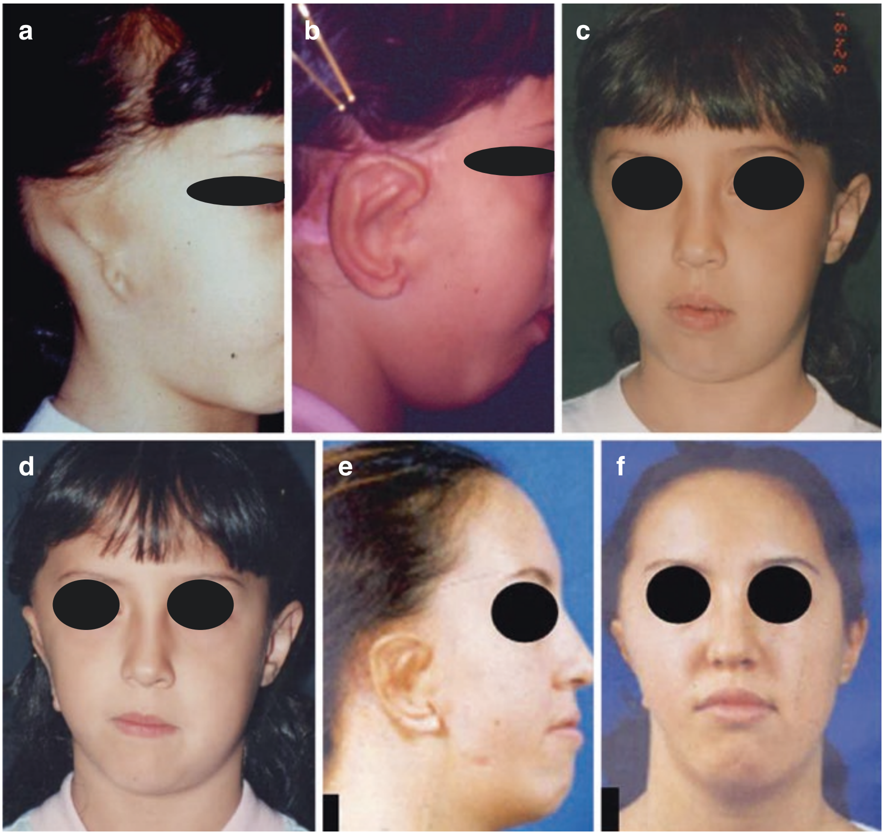

Fig. 15.1 A 7-year-old girl with congenital anomaly (anotia) on the right side with severe associated anomalies of the face and skull. She underwent two stages of ear reconstruction performed with rib cartilage. Photos (**a**, **c**) preoperative view showing total absence of the right ear and unaesthetic asymmetry of the face, neck, and skull; (**b**, **d**) same patient 1 year later after two surgical stages of ear reconstruction; photos (**e**, **f**) same patient at 23 years old showing preservation of the reconstructed ear. She underwent reparation of the face by distraction of mandibular bone well performed by Dr. Vaccari

15.2 Surgical Planning

All patients before undergoing an operation require adequate surgical planning. That concept is even more important when the pacient presents complex auricle, face and neck deformities, due to the specific approach demanded to repair each defect in different areas, with peculiar anatomy. During my period of training in plastic surgery, there was the Surgical Planning Sections at the Unit of Plastic Surgery at the General Hospital coordinated by Prof. Pitanguy which were very useful as a matter of learning with didactic organization. The construction of the surgical planning on patients with complex deformities is even more importante since

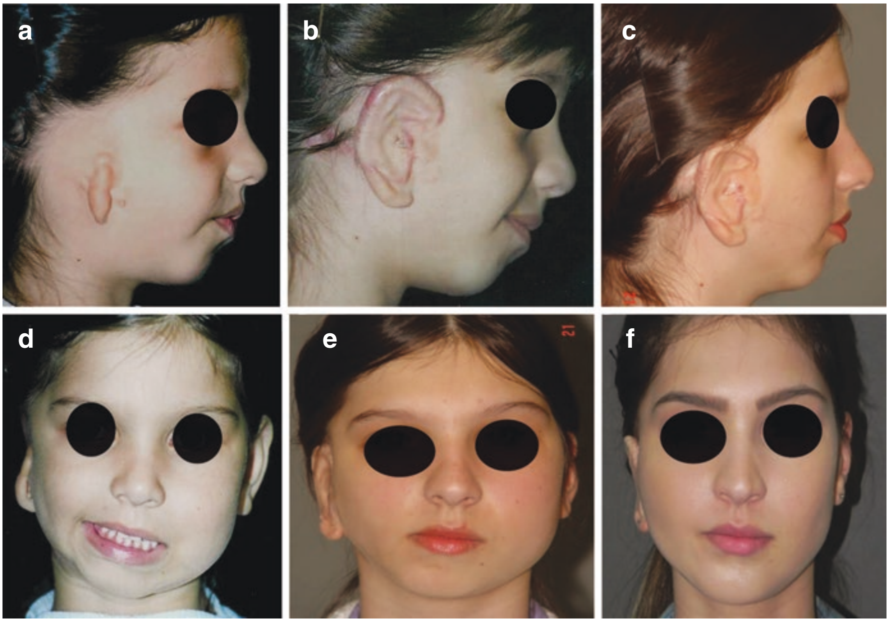

Fig. 15.2 A 7-year-old girl with anotia on the right side with complex associated anomalies of the face due to hypoplasia of facial bones and soft tissues with severe asymmetry of the face with unaesthetic appearance of the facial contour. She underwent ear reconstruction and afterward aesthetic reparations procedure in order to achieve harmony in facial contour. Photos (**a**, **d**) preoperative view showing absence of the right ear associated with unaesthetic appearance of the face; (**b**) after two stages of ear reconstruction using the rib cartilage to create the new auricular skeleton; (**c**, **e**) same patient at 14 years old showing the reconstructed auricle on the right side; (**f**) same patient at 20 years old showing the final result after bone graft on mandibular arch and lipografting operations very well performed by Dr. Alonso remodeling the face achieving harmonious facial contour

several abnormalities should be well evaluated before the surgery, as recommended by [16]. As each patient presents their own peculiar deformities (congenital or acquired), it is useful the individual discussion about them, according to the particularities demanded in each case. When one or both auricles are missing partially or totally, it is a fundamental step to plan its reconstruction at the first stage of the operation (Figs. 15.3, 15.4, 15.5, 15.6, 15.7, 15.8). When it is necessary, the rib cartilage must be removed and then sculpted to create the new auricular framework. However, there are some circumstances that are missing a partial segment of the ear cartilage and that it is possible to repair the defect without a costal cartilage graft (Fig. 15.4). For this reason, surgical planning is an essential step before starting reconstruction procedures when a patient presents several deformities.

In face, neck and auricle congenital anomalies, the ear reconstruction should be the first planning concern (Figs. 15.1 and 15.2). In the other hand, the acquired face, neck and ear deformities can be considered simultaneously in the same surgical planning (Figs. 15.3 and 15.5).

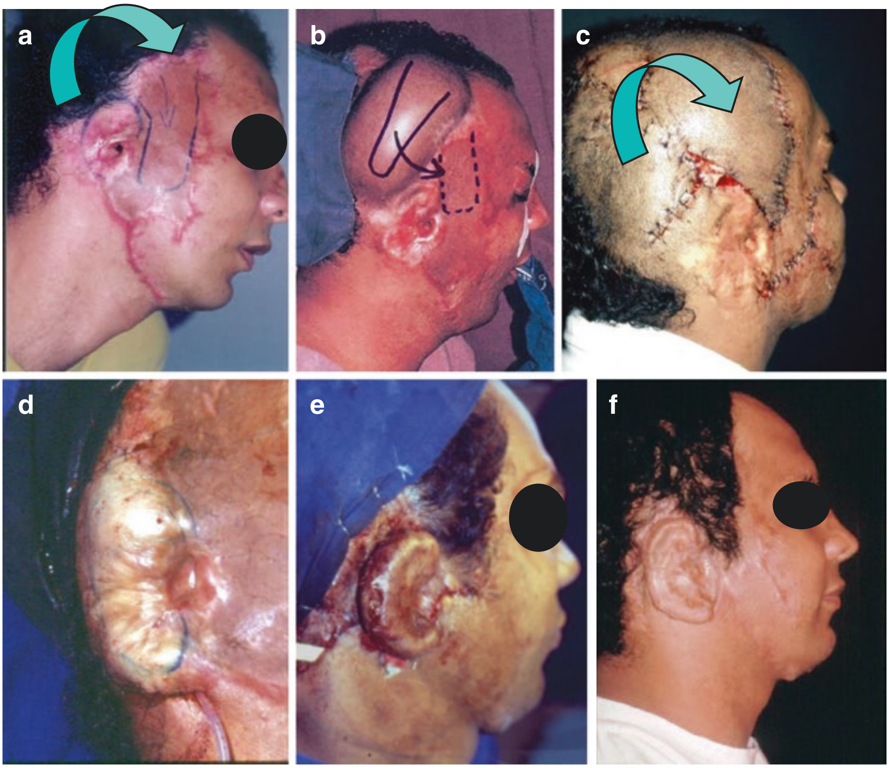

Fig. 15.3 Total reconstruction of the right ear combined with reparation of the face on a male after traumatic amputation of the ear with severe damage of the face caused by car accident and burn. Photo (**a**) – before surgery showing complex deformities of the face and total amputation of the ear showing surgical planning to make transposition of the scalp from parietal region to create the sideburn; (**b**) during surgery one can see a tissue expander extending scalp on the parietal region; (**c**) the scalp flap has been transposed from behind to create the future sideburn; (**d**) during surgery showing a tissue expander to extend the skin of the future auricle; (**e**) the new ear is already lifted where the new auricular framework was embedded during the previous stage, and two face-lifting procedures has been performed to remove severe scars on the face; (**f**) post-operatory photo of the same patient where one can see the reconstructed auricle, the new sideburn was created, and multiple scars of the face were removed

15.3 Technique

When ear imperfections are associated with other deformities of the face and neck, reconstruction of the auricle is done according to surgical planning (Figs. 15.1 and 15.2). For congenital anomalies, usually I start performing the first stage of the auricle removing the eighth or ninth rib cartilage to excavate the new framework of the future organ. Regarding acquired deformities during the first stage, I may perform some sort of reparation of the face and neck according to the abnormality. In all cases the surgical planning is a fundamental step before starting the reconstruction (Figs. 15.3, 15.5, and 15.6). The following technical details should be employed:

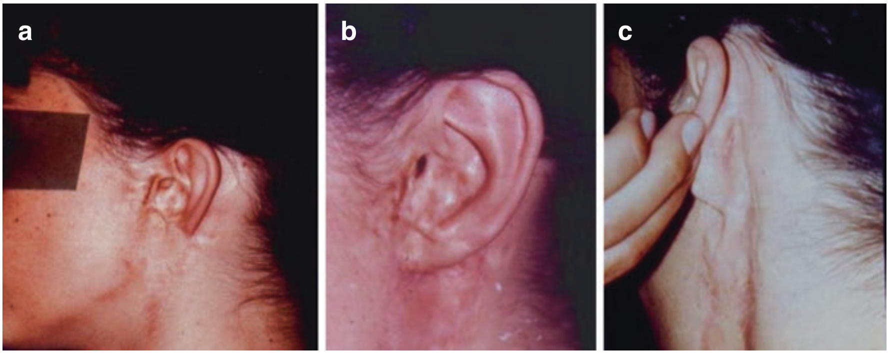

Fig. 15.4 Partial reconstruction of the left ear caused by surgical amputation combined with radiotherapy for treatment of hemangioma. (**a**) A 19-year-old female patient presented with severe damage of the lower third of the left ear. She presented unaesthetic scars on the auricle as well as on the lateral side of the neck and face. Surgical planning was done to create a composite flap (skin and subcutaneous tissue) on the posterior aspect of the auricle to be rotated downward; (**b**) postoperative view of the same patient 1 year after surgery; (**c**) posterior view of the auricle showing the scar on the retroauricular sulcus where the composite flap was created and rotated to reconstruct the lobule combined with face-lift on the left side to remove partially the unaesthetic scars caused by previous radiotherapy procedures

surgical planning, removal of the costal cartilage, auricular framework sculpture and embedding the new frame on its adequate topography (Figs. 15.5, 15.6, 15.7, and 15.8.).

15.3.1 The Operation

All my patients are operated at a hospital under general anesthesia after adequate preparations at my clinic. Among others, cardiologic avaluation, blood tests, photo shooting, hearing avaluation are mandatory, besides meticulous physical examination, varying according to each patient's needs and underlying diseases. There is no routine technique for reparation all patients, since each one presents peculiar deformities which require individual surgical planning as well as operations. For this reason the surgical technique will be described in detail according to the problems of each patient.

15.3.2 Modeling of the Auricular Skeleton

Most of ear reconstruction cases require the auricular cartilage replacement. Regarding the auricular cartilage missing segment, to achieve a successful surgical outcome, basically depends on the creation of the new framework for the

Fig. 15.5 Reconstruction of the left ear associated with reparation of severe damage of the face and neck caused by burn in an 8-year-old boy. Photos (**a**, **c**) unaesthetic aspect of the face, neck, and damaged ear; (**b**, **d**) postoperatory photos showing the final result after ear reconstruction using the costal cartilage, combined with reparation of the face and neck by rotation of the cutaneous flaps; drawings (**e**, **f**) showing rotation of a cutaneous flap from behind the left ear with rotation forward for reparation of the anterior aspect of the neck; photos (**g**–**i**) transoperatory demonstrating rotation of cutaneous flaps from the mastoid region on the right side of same patient to repair unaesthetic scars caused by burn

Fig. 15.6 Partial reconstruction of the left ear combined with reparation of unaesthetic scars on the face in a 37-year-old male caused by burn. Photo (**a**) severe scars on the face and neck and partial amputation of the ear; (**b**) surgical planning for reconstruction of the ear; (**c**) after first stage of reconstruction, one can see the new frame embedded on correct place; (**d, e**) postoperatory photos showing the final result after ear reconstruction using the costal cartilage, combined with reparation of the face and neck

future organ. In creating the new ear, I prefer the use of the autogenous rib cartilage which is obtained by meticulous excavation. In order to have enough cartilage, I recommend performing the reconstruction on patients older than 6 years old. The size and shape of the ear are determined by the normal side as I have previously described ([7, 11, 12], 13]). In cases where both ears are damaged, the reference points are established based on the surgeon's experience. I take an X-ray film for the demarcation of spatial projection of the future auricle, as I learned from Pitanguy [17, 18], Converse [15], and Tanzer [19]. Therefore, during consultations, I can design a standard model for the patient and in the first stage of reconstruction surgery, the auricular framework sculption on rib cartilage, according to my previous descriptions ([15], [4], [6, 10], 1997, [12], 2017).

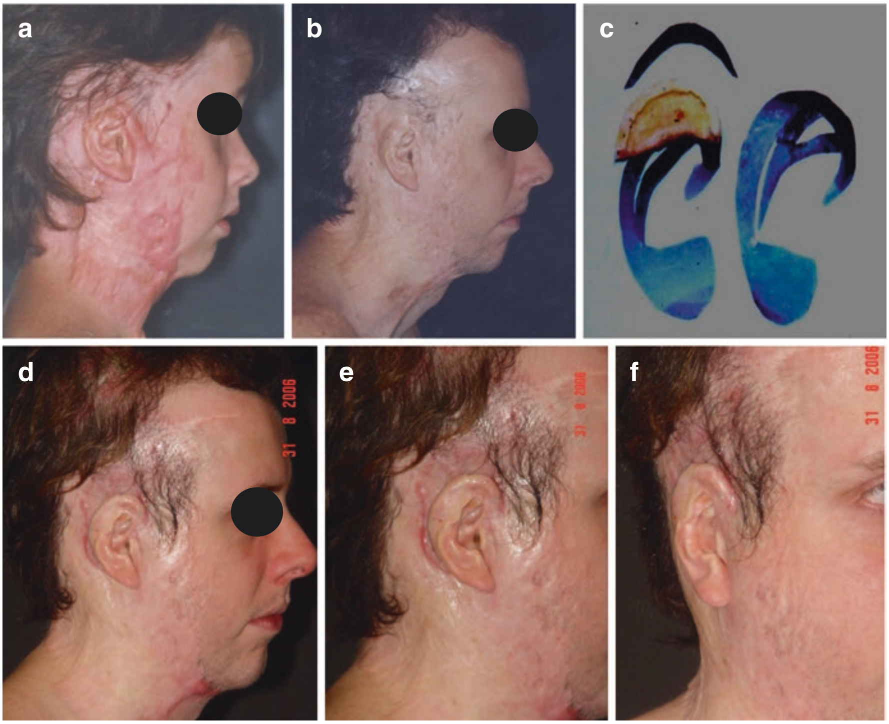

Fig. 15.7 Partial reconstruction of the right ear associated with reparation of severe damage of the face and neck caused by burn in a 9-year-old boy. Photo (**a**) aspect of the face, neck, and partially destroyed ear; (**b**) same patient at 17 years old showing the improvement of the unaesthetic aspect of the face and neck; (**c**) surgical planning to reconstruct the damaged ear; (**d**–**f**) final aspect of the reconstructed ear using the costal cartilage, combined with restoration of hair on scars providing natural result

15.3.3 Reconstruction of the Ear in Congenital Anomalies

In almost every case of congenital abnormalities envolving a missing auricle segment, it is mandatory to begin the procedure by replacing the cartilage. The technique is planned according to each patient (Figs. 15.1 and 15.2).

15.3.4 Reconstruction on Acquired Deformities

There are some cases in which the missing part of the auricular skeleton may be repaired without the cartilage graft, since the excess skin of the face and neck may be folded over itself in order to create it (Figs. 15.4 and 15.9). As there are a variety of clinical forms, each patient needs specific surgical planning as well as the sequential stages for reparation and reconstruction. There is not a routine approach for

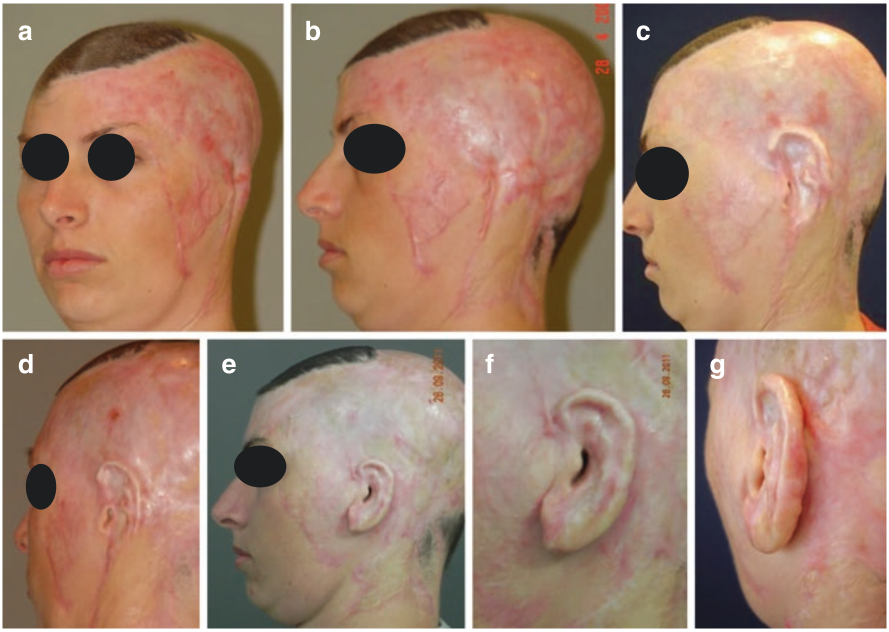

Fig. 15.8 A 29-year-old female presenting total amputation of the left ear caused by scalp avulsion associated with severe cutaneous trauma on the face and neck . Photos (**a**, **b**) preoperative showing total absence of the left ear with severe damage on the skin of the face, neck, and temporoparietal regions; (**c**, **d**) same patient 6 months after first stage of reconstruction when the new auricular framework was introduced on correct place; (**e**–**g**) postoperative view after total reconstruction when face-lift was performed in order to create adequate cutaneous flaps to cover the posterior aspect of the reconstructed ear. Due to rhytidoplasty procedure, most of scars on the face and neck were removed providing improvement of the aesthetic result to the face and neck

reparation of all abnormalities for all patients. During the first stage of reparation, some neighborhood deformities of the auricle may also be treated simultaneously (Figs. 15.3 and 15.5).

15.4 Complications

Undoubtedly ear reconstruction may present some complications during and after operations even when some other procedures are performed as occur on acquired deformities. In order to avoid them, it is fundamental to follow the surgical planning, which is specific for each case and includes a 2 to 3 months post operatory follow up. If the patient can not comply with the postoperative follow-up, the surgery should not be performed; otherwise the surgical result may be affected by local infection, skin necrosis, and cartilage exposure among other unexpected situations. Chest deformities and pleura damage, with pneumothorax, still happen nowadays as

Fig. 15.9 Reconstruction of the lower segment of the auricle and reparation of the severe deformities of the face and neck on a female patient caused by surgical tumor resection of the ear and lateral wall of the neck performed 3 years prior. Photos (**a**, **c**) Lateral and oblique views showing severe deformities on the right ear and lateral side of the neck due to tumor resection. (**b**, **d**) Postoperative view 2 years after reconstruction of the auricle and reparation of the face and neck. (**e**) The surgical plan was based on performing facial rhytidoplasty bilaterally, and the facial and neck cutaneous flaps were turned one over the other to reconstruct the ear. The fascial flaps were raised for rotation in order to repair the deformities on lateral side of the neck. Intraoperative photo showing forward rotation of the posterior flap. (**f**) The arrows indicate the rotation arch of the fascial flaps One can see a fascial flap undermined in front of the ear with inferior pedicle to be rotated down and backward. (**g**) The fascial flaps are already sutured

we know. Ever since I started to perform ear reconstruction, such sorts of complications have never happened in my practice, because I do not damage the perichondrium of the rib ([7], [11, 12], 2017).

I do not use any kind of drainage or suction on the chest wall where rib cartilage is removed as well as on the reconstructed area, as is advocated by others [14]. It is not necessary for external stitches to make pressure on the skin because the cutaneous flap covers naturally the fashioned rib cartilage graft.

15.5 Discussion and Conclusions

All congenital dysgenesis of the auricles combined with deformities of the middle and inner ear (anotia, agenesis of the ear and moderate ectopic microtia) (Figs. 15.1 and 15.2) presents severe associated abnormalities on the face, neck, and other segments of the body ([10], [5], [11, 12], 2017). Reparation or reconstruction of associated anomalies is performed after ear reconstruction is concluded. I recommend that those congenital abdonormalities corrections should be done after ear reparation, avoiding damage to the neighboring tissues, which could cause problems when rebuilding the auricle (Figs. 15.1 and 15.2). However, acquired deformities envolving the ears, face and neck, should be reconstructed simultaneously on the first stage of treatment, with preparation of all segments (Figs. 15.3, 15.5, 15.6, 15.7, and 15.8). As each patient presents peculiar imperfection, surgical planning must be well oriented to repair the auricles and neighborhood areas of the face and neck that cause an unbalanced facial contour.

Ear reconstruction surgery, in most of the cases, has been vastly simplified through the use of my technique which creates a subcutaneous tunnel on the area of the future helix and antihelix, preserving the margin of the ear and conchal cavity as well. It must emphasize that the posterior fascial flap that I described [1–6] covers the posterior aspect of the reconstructed auricle (Fig. 15.8).

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Chapter 16
Treatment of Platysma: The Beginning, Evolution, and Update Approaches

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16.1 Introduction

Facial aging process involves the neck. The main goal in cervicofacial surgery is to perform a safe procedure with natural long-lasting results and provide harmony with all the involving structures.

To achieve an aesthetically acceptable result that includes an adequate cervicomental angle and well-defined mandibular border, the plastic surgeon must have good knowledge of the neck surgical anatomy and understand the aging physiopathology that includes:

1. Flattening of the dermoepidermal union and papillary loss
2. Decreased melanocytes
3. Decreased elastic fibers
4. Diminishing collagen specially type I and little increase in type III

Sun ray exposure is the main cause of premature aging; any medical condition such as actinic keratosis and some skin malignancies are due to prolonged solar exposure periods.

16.2 History

The first attempts to aesthetically improve neck management have evolved since the past century until our era. In 1928 Bourguet [1] reports the first platysmaplasty through submental incision and skin reshaping. For many years all plastic surgeons agreed with this neck approach until in 1964 Aufricht [2] describes platysma lateral plication anchoring to the mastoid fascia. Skoog [3] in 1968 uses a platysma flap without skin undermining; this flap includes the superficial fascia in the lower third of the cheek, and Skoog named this as "buccal fascia." In 1974 Guerrerosantos [4, 5] published the improvement of the neck contour utilizing a suture rein fixed to the premastoid fascia, and in 1978 the management of platysma bands performing myotomies and closure with multiple Z-plasties and cut the posterior border of the platysma muscle and the use of two flaps to give support to the neck. In the same year, Connell [6] writes about neck lipectomy and platysma sling. In 1979 Guerrerosantos ([7]) published management of fatty neck, and in 1983 Guerrerosantos [8] describes clinical classification for neck deformities. In the same year, Connell [9] presents aesthetic correction of neck problems. In 1990 Feldman [10] proposes corset plication of the platysma trough submental incision. In 1992 Guyuron [11] shows his myotomies in the management of a difficult neck. In 1995 Giampapa [12] reports his experience with suspension suture same as what Guerrerosantos published 15 years before. In 1997 Connell [13] presents correction of the anterior belly of the digastric muscle. In 1998 Fuente del Campo [14] uses an overlap of the platysma for neck improvement. In 1999 [15] Matarasso uses botulinum A exotoxin for the management of platysma bands. In 2001 Marten [16] presents the resection of the submandibular gland to correct the aging neck. In 2010 Guyuron [17] published the vest-over-pants technique. In 2010 Rohrich and Pessa [18] describe the neck fat compartments. In 2013 Labbé [19] describes the digastric muscle corset in the management of the neck. In 2013 Narasimhan, Stuzin, and Rohrich [20] published the five steps in neck management. In 2016 Pelle-Ceravolo [21] proposes the complete transection of the platysma. In 2017 Labbé [22] describes the suspensory ligament of the cervico-mental angle.

16.3 Preoperative Evaluation

Before any surgical procedure, a complete evaluation of the whole face including the neck is mandatory; the surgeon must listen to the patient about the discomfort areas and the surgery expectations; comorbidities such as diabetes and hypertension should be emphasized; the medication intake or dietary supplements that allow blood flow improvement should be investigated because they may cause an increase in the risk of intraoperative bleeding; surgeon should inquire about any bad habit specially about smoking. Physical evaluation includes bony structures and soft tissue, position of the hyoid bone and mental shape and projection, quality and quantity of the skin, presence of supra- or subplatysmal fat, evaluation of the platysma position, and submandibular gland position may be determined.

16.3.1 Skin

The skin should be evaluated integrally, identified the degree of laxity, presence of fine and deep wrinkles, scars, folds, benign or suspicion of malignancy skin lesions, any signs of photo damage.

It is important to remember that over the years, the elastin and collagen fibers lose their properties so that the greater the age, the laxity increases.

Prolonged sun ray exposure results in alterations of the skin surface, actinic keratosis and basal cell carcinomas being the main effects; sun damage also allows a wrinkle appearance.

16.3.2 Fatty Tissue

Excess fat in cervical region can be present, with deficit or poor distribution; it is important to identify if fatty tissue is above or below the platysma muscle. Rohrich and Pessa [18] divided the cervical fat localization in three compartments: central, medial, and lateral.

16.3.3 Platysma Muscle

The platysma plays an important role in neck rejuvenation; if laxity is present, it allows the band formation in the medial and lateral region of the neck; these bands are noticeable during muscle contraction, and they are more evident over the years even without muscle activity.

16.3.4 Mandibular Ridge

Aging makes evident the loss of the mandibular ridge revealing jowl dropping and fold formation due to the falling of the cheek tissue toward the neck.

Also it is important to identify during cervical aging that the anterior belly of the digastric muscle and submandibular gland can be perceived as evident.

16.3.5 Hyoid Bone

The position of the hyoid is evaluated; if the localization is superior and posterior, an acute cervico-mental angle will be produced and that shows an attractive neck, but if the hyoid is anterior and inferior, it creates an obtuse cervico-mental angle.

16.3.6 Earlobe

Careful earlobe inspection must be done; over the years the earlobe becomes longer and larger, so surgical correction becomes necessary in some cases to achieve better results.

16.3.7 Chin

Front and profile chin examination shows deficit or excess projection as well chin ptosis known as witch's chin.

The obtuse cervico-mental angle can give a visual effect of deficit in lateral projection, but tightening the neck tissue toward the hyoid bone corrects this defect.

16.4 Neck Deformity Classification

Some classifications for neck deformity have been described. The most commonly used classifications are the following: Dedo [23] evaluates the skin, fat, mandibular deficiencies, and hyoid position; Matarasso [15] evaluates skin flaccidity and platysma bands; Kamer and Lefkof [24] classify according to the bottoming of the skin; and Rohrich [25] evaluates the skin tone, platysma integrity, and fat distribution.

16.5 Guerrerosantos Neck Flaccidity Classification

16.5.1 Grade 0

Patients with aging develop changes in the face, but the neck still appears youthful (Fig. 16.1)

Fig. 16.1 Grade 0 neck deformity

Fig. 16.2 Grade I neck deformity

16.5.2 Grade I

In addition to the aging changes, patients under grade I of cervical flaccidity can present any of the next conditions, mild skin laxity, mild fatty tissue accumulation in both submental region and submandibular area, mild platysma muscle flaccidity in submental region, and eventually submandibular gland ptosis, or anterior belly of the digastric muscle can be present (Fig. 16.2).

16.5.3 Grade II

Patients show the next changes: moderate skin flaccidity, moderate fatty tissue in both submental and submandibular regions, moderate platysma muscle flaccidity, and eventually submandibular gland ptosis, or anterior belly of the digastric muscle can be present (Fig. 16.3).

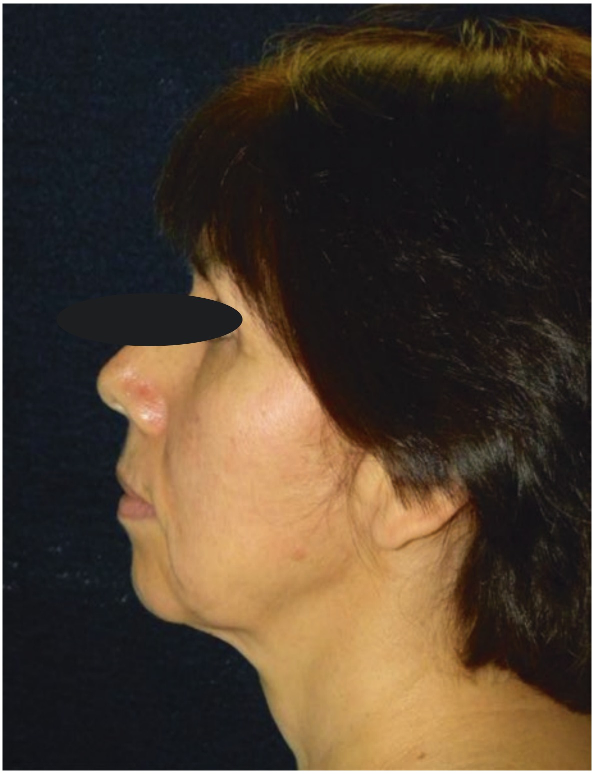

Fig. 16.3 Grade II neck deformity

16.5.4 Grade III

Patients with severe skin laxity are divided into two groups:

- Group A: Patients with severe skin flaccidity and severe fatty neck, submandibular gland ptosis, and anterior belly of digastric muscle (Fig. 16.4)
- Group B: Patients with severe skin flaccidity and thin neck (Fig. 16.5)

16.6 Surgical Approach

Every case must be individualized, understanding that not every key fits in all locks.

The author prefers to perform the procedure under intravenous sedation and local anesthesia, but it can be done under general anesthesia.

Fig. 16.4 Grade III A neck deformity

16.6.1 Grade 0 Patients

In these patients the approach is similar to the classic rhytidectomy with limited subcutaneous cheek; the neck and mastoid region undermine the classic Aufricht [2] plication maneuver, or Tonnard [26] purse-string suture plication with absorbable material can be used (Fig. 16.6); then the posterior border of the platysma is plicated toward the mastoid region (Fig. 16.7) as suggested by Baker and Gordon [27]; finally the skin excess is removed, and the flap closure is done without tension.

16.6.2 Grade I Patients

Patients in this grade the cheek is undermining still limited but extends to all neck, cheek management with purse-string suture or SMAS plication, submental incision is performed if it's necessary depending on accumulation of fat in submental region,

Fig. 16.5 Grade III B neck deformity

the author prefers direct fat resection over liposuction. To improve the neck contour and correct the submandibular gland ptosis a plication suture is placed 1–1.5 cm below the mandibular border going to the anterior border of the submandibular gland toward the mastoid fascia (Fig. 16.8). Then skin closure is performed without tension.

16.6.3 Grade II Patients

In this grade the skin undermining is wider both in the cheek and neck; in the cheek the SMAS is superficial plicated as in the other grade procedures; the fat excess in the neck is removed; management of the platysma includes resection of muscular strip across the posterolateral portion; a plication suture below mandibular border is performed, skin closure without tension.

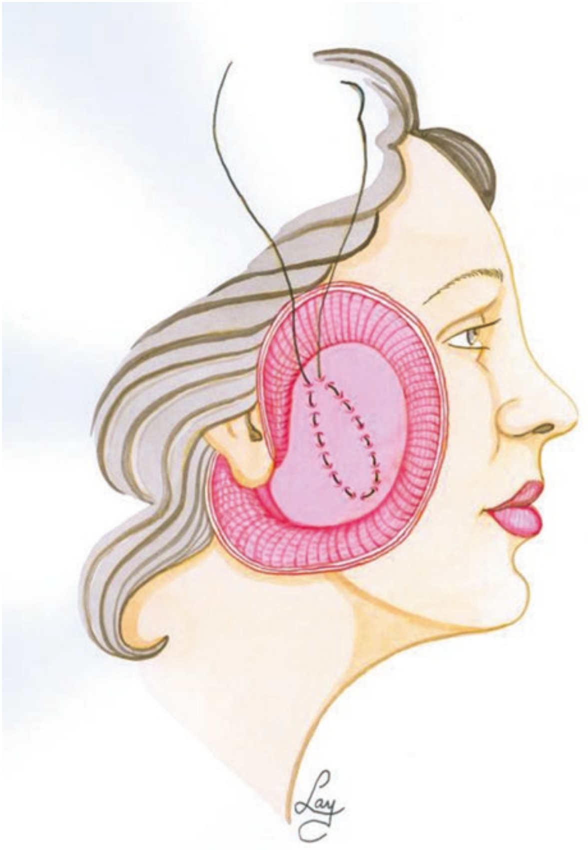

Fig. 16.6 Purse-string suture to correct downward of the cheek

16.6.4 Grade III Patients

16.6.4.1 Grade IIIA

Before attempting to correct the fatty fallen neck, the clinical inspection is very important, because the fat could be over or under the platysma; if subplatysmal fat is present, careful resection must be done, avoiding excess in resection to prevent the cobra neck condition.

In these patients the cutaneous undermining must be wide; the neck lipectomy is performed by submental incision and postauricular incision, and then trough submental incision, the horizontal platysma myotomies are done, and the corset suture is performed with multiple Z-plasty closure (Fig. 16.9); after that the plication suture below submandibular border is placed; if anterior belly of digastric muscle is present and submandibular glad ptosis isn't corrected with plication suture, a row of vertically horizontal mattress plication sutures can be placed across the platysma to reduce laxity in the area; these stitches correct the glandular prolapse and correct

Fig. 16.7 Posterior border of the platysma is plicated toward the mastoid region

Fig. 16.8 Plication suture below mandibular border to improve neck definition

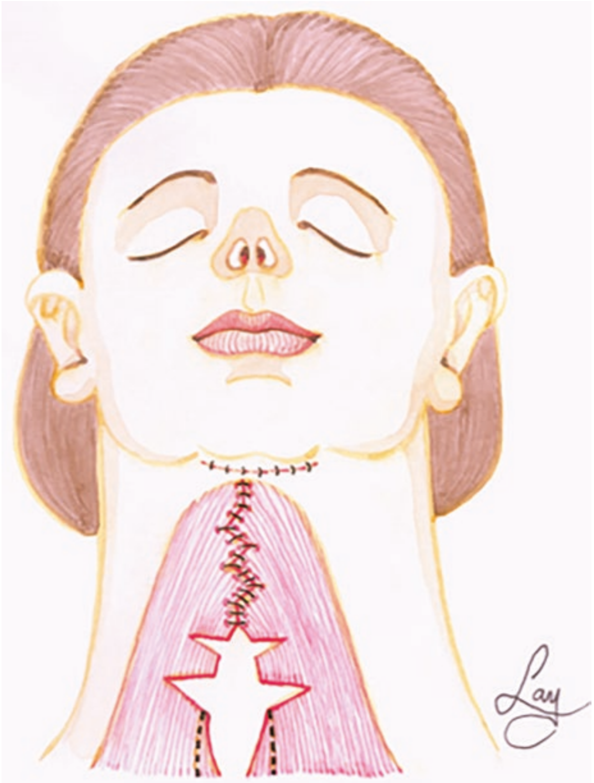

Fig. 16.9 Horizontal platysma myotomies and multiple Z-plasty closure

digastric muscle flaccidity. The skin closure is carried out after the redundant skin is removed.

16.6.4.2 Grade III B

It is not necessary to perform lipectomy. Platysma management be individualized in each patient according the clinical manifestations, an horizontal strip resection and confection of two platysma flaps could be done (Fig. 16.10) or medial myotomes can be performed. If submandibular gland and anterior belly of the digastric muscle are present the management is the same as the patients in grade III A, after that skin closure is performed without tension.

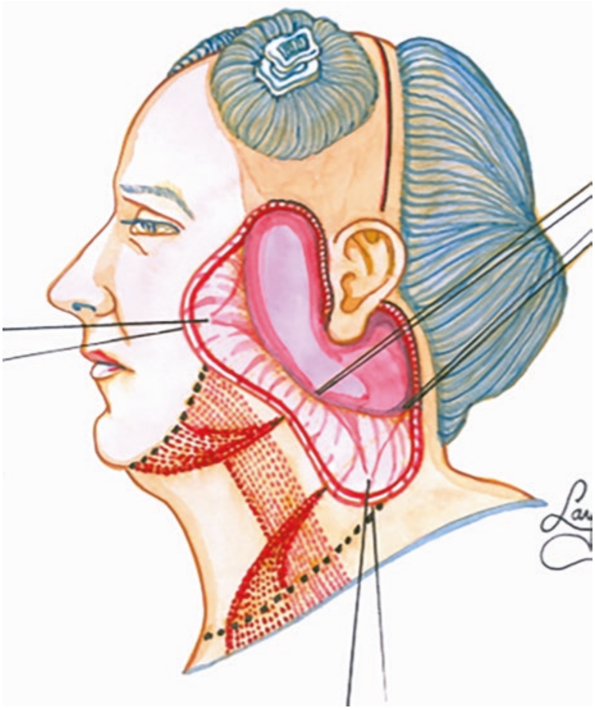

Fig. 16.10 Platysma flaps

16.7 Complications

16.7.1 Hematoma

Postsurgical fluid collection is the most common complication. In properly performed aesthetic surgery of the neck, small pockets of serous fluid and blood can infiltrate the dermis, subcutaneous plane, and underlying muscle structure, resulting in the perception of "lumps and bumps." These small collections of fluid are normal in the initial postoperative period and by definition cannot be aspirated; on the other hand, due to the wide undermine, larger hematomas can occur. Immediate treatment is necessary for larger hematomas or those that are actively bleeding or expanding because the separated skin flap in such cases is exposed to the acidic effects of degenerating blood products that put the flap at risk of necrosis and permanent tissue loss.

16.7.2 Infection

The rich blood supply into the neck can make infection an uncommon complication.

Necks that require significant fat contouring are more likely to become infected because of inadequate evacuation of denuded fat cells and blood. The fat cells die and mix with blood to become an ideal medium for bacterial growth; *Staphylococcus* is by far the most common microorganism which causes infection.

16.7.3 Skin Necrosis

The skin flap undermine in neck surgery is vulnerable to ischemic conditions and can evolve to necrosis. According to literature skin necrosis can be present in 4% of neck surgery; most common site of necrosis is the postauricular region due a tension during the closure.

16.7.4 Hypertrophic Scar

This commonly occurs behind the ear, but can also develop at the site of a posterior hairline incision. A careful history can help identify patients who may be predisposed to this type of abnormal wound healing so that they can be given preoperative counseling. The treatment for hypertrophic scarring is usually triamcinolone (10 mg or 40 mg) given intralesionally, or treatment with one of the newer fractional lasers, which are useful in reducing the bulk of abnormal scar tissue.

16.7.5 Nerve Injury

Neck surgery can involve nerve injury; the nerve that is most frequently involved is the great auricular during skin flap elevation which causes paresthesia of the earlobe; another nerve involved is the marginal branch of the facial nerve; in this lesion, a neuropraxia most often results which disappears in a few weeks. In case of direct injury to the marginal branch if the surgeon perceives it, it is essential to check the integrity of the nerve by nerve stimulation and achieve a classic epineural suture if necessary.

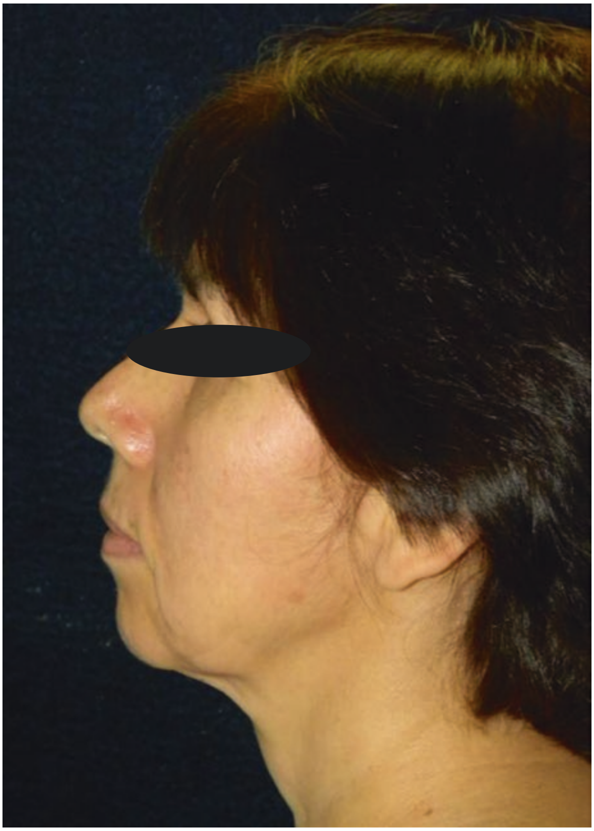

Fig. 16.11 Before grade 0 neck deformity

16.8 Clinical Cases

The author presents before and after pictures of neck management according to each classification grade of classification (Figs. 16.11,16.12,16.13,16.14,16.15, 16.16,16.17,16.18, 16.19, and 16.20)

16.9 Conclusion

Many surgical techniques for neck restoration have been proposed; the main goal must be to achieve an effective improvement of the neck region. Individualizing each case is mandatory, and the new technologies such as *Laser, Cool-Sculpting, Radiofrequency, Ultrasound, etc.* are being applied but should be used as complementary arsenal.

Fig. 16.12 After grade 0 neck deformity

The neck surgeon must understand anatomy of the region and must have sufficient skill and adequate abilities to perform the procedure.

Fig. 16.13 Before grade I neck deformity

Fig. 16.14 After grade I neck deformity

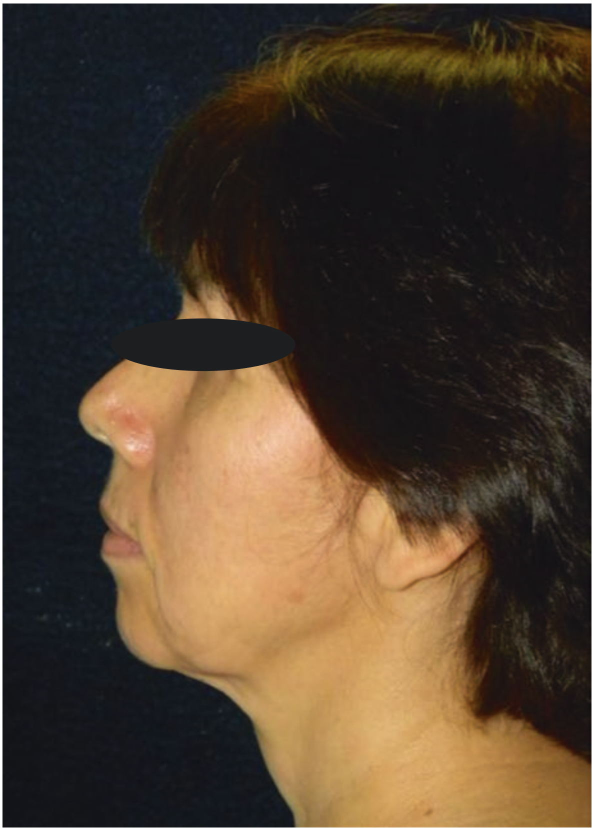

Fig. 16.15 Before grade II neck deformity

Fig. 16.16 After grade II neck deformity

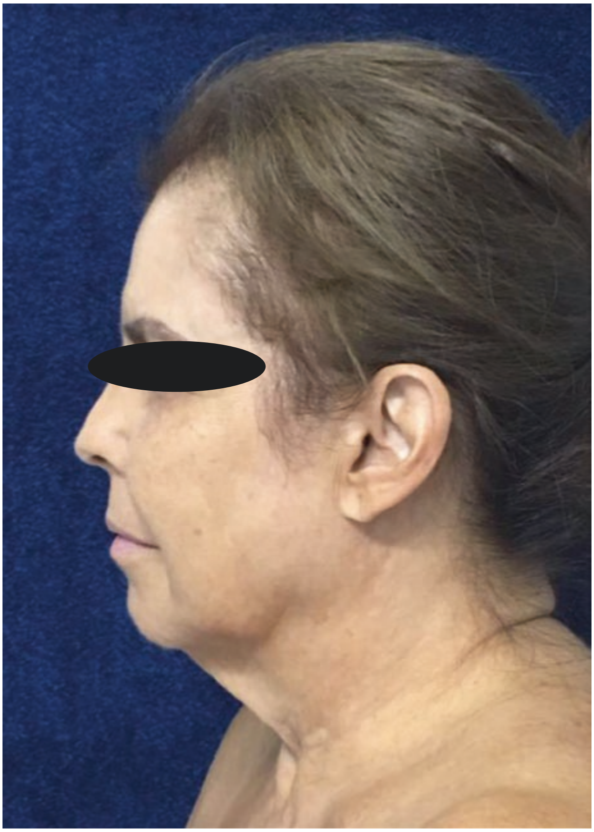

Fig. 16.17 Before grade IIIA neck deformity

Fig. 16.18 After grade III A neck deformity

Fig. 16.19 Before grade III B neck deformity

Fig. 16.20 After grade III B neck deformity

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Chapter 17
Liposuction to Improve the Neck and Facial Contour

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17.1 Introduction

To restore the facial contour, lipectomy of the neck associated with rhytidoplasty used to be the unique procedure before liposuction technique. Later the new method became a useful one in patients with accumulation of fat on those regions. So far, since Illouz [14] introduced his revolutionary concept to remove localized adiposities all over the human body, it seemed that liposuction became the ideal treatment of the local fat on submandibular and submental regions with minimal rate of complications. That was an excited approach at that time, since to treat adiposities on the anterior and lateral sides of the neck by using lipectomy used to be the best procedure to restore facial contour associated or not with rhytidoplasty. Regarding such approach [17] made the first step, followed by Padgett and Stephenson [21] and Davis [12], using submental fat curettage. Later this field was improved by Adamson et al. [1] who included imbrication of the platysma muscle. Extensive lipectomies were advocated by Millard [18, 19], Badin [9], Skoog [24], Loeb [16], and Pitanguy [22]. However, the remarkable Guerrerosantos' contribution [13] opened a new field in rhytidoplasty through lipectomy associated with different treatments on the platysma muscle. Later, Connell [11] proposed a similar approach. However, submental and submandibular lipectomy may present postoperative depressions and skin retractions because of the removal of too much fat, with an ungracious final surgical result, as mentioned by Wilkinson [27].

Due to the popularized surgical technique, the cervical and submental areas were focused for treatment during face-lifting operations as reported by Souza Pinto [25] as a significant approach. Nevertheless, detailed anatomical dissections were reported by Cardoso de Castro [10] which brought valuable improvement on the treatment of neck surgery. Latter, Pontes [23] published a new approach by creating a natural cervicomandibular angle, including treatment of the platysma with extensive skin undermining with subcutaneous lipectomy.

When I started performing liposuction on cervical regions, it was evident that a new and safe treatment became possible with smooth aesthetic results [2]. Since the beginning I recommended that the cannula tip should be turned towards the depth, on the platysma muscle, in order to preserve the subdermal layer underneath the cutaneous covering. Such concept introduced a long time ago still nowadays is a fundamental step when liposuction is performed on submental and lateral sides of the neck [2, 4]. On the other hand, Teimourian [26] recommended to keep the opening of the cannula turned against the subdermal layer in order to remove more fat. After a long time I described it, I still follow the same approach, emphasizing again that in cases of liposuction is performed combined with rithydoplasty, or as an isolated technique, the surgeon must preserve the face and neck flap subdermal skin layer, avoiding any damage that may create unaesthetic irregularities [3]. The most current descriptions concerning adiposites removal on subplatysmal level are traumatic methods, which create risks for complications and it is not adequate for aesthetic procedures [20]. I prefer to maintain on the level above the platysma muscle avoiding any damage, since the final result is fine with much less morbidity

Fig. 17.1 Remodeling of face and neck contour under isolated liposuction. Photos (**a**, **c**) preoperative; photos (**b**, **d**, and **e**) postoperative views

(Figs. 17.1, 17.2, and 17.3). It is not necessary to perform any procedure on the compartment beneath the platysma since the fibrotic scar tissue formation underneath the cutaneous covering makes a strong enforcement below the mandible arch lasting the surgical result (Figs. 17.4, 17.5, 17.6, and 17.7).

17.2 Selection of Patients

In my previous publications, a clinical classification was described to employ liposuction approach for treatment of excessive adiposity of the face and neck [3, 6, 8]. Ever since I have performed the technique, selection of patients is a very important step preoperatively. Fat suction is made only on the adipose tissue lying between the cutaneous level and the platysma muscle, and it is not recommended to remove fat

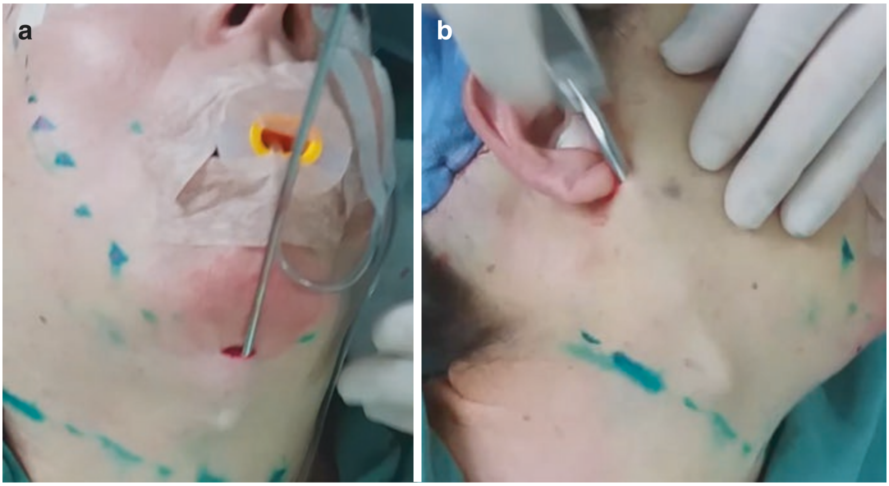

Fig. 17.2 Intraoperative photos demonstrating isolated liposuction procedure. The dotted lines show surgical planning demarcated before surgery. Photo (**a**) a submental cutaneous incision with a #3 cannula; (**b**) through a cutaneous incision on the base of the ear lobule to reshape the lateral sides of the face and neck

Fig. 17.3 Liposuction procedure on submental and submandibular regions. Photos (**a**) liposuction on the submental region through a submental incision using a reverse curve cannula with the tip face to the concave side, avoiding ay trauma avoiding any trauma on the subdermal layer; photo (**b**) a curve cannula is placed on the lateral side of the neck to demonstrate the correct position; (**c**) using a curve cannula with one hand, the surgeon performs liposuction done with the pinch procedure with the opposite hand holding the panniculus

lying below the muscle structures (Fig. 17.3). I found an easy and safe procedure with great improvement on facial contour.

The main point for choosing the technique is the unaesthetic disturbances of the area with its localized adiposities. Careful examination of the anatomical structures of the neck and face to evaluate the flaccidity of the platysma muscle and the accumulation of excessive fatty in submental and submandibular regions is a must.

Fat suction is a good indication whenever there is excessive adiposity on the neck regions between the skin and the platysma muscle (Figs. 17.4 and 17.5). However, I do not recommend isolated fat-suction technique for submuscular adiposities or

Fig. 17.4 Improvement of facial and neck contour after isolated liposuction surgery. Photos (**a**, **c**, and **e**) before surgery; photos (**b**, **d**, and **f**) after isolated liposuction operation

Fig. 17.5 Isolated liposuction procedure performed in a 28-year-old female presenting adiposities on the lower segment of the face and neck regions. She underwent a previous liposuction elsewhere with unpleasent result. Photos (**a**, **c**) before operation; (**b**, **d**) after isolated liposuction remodeling face and cervical regions

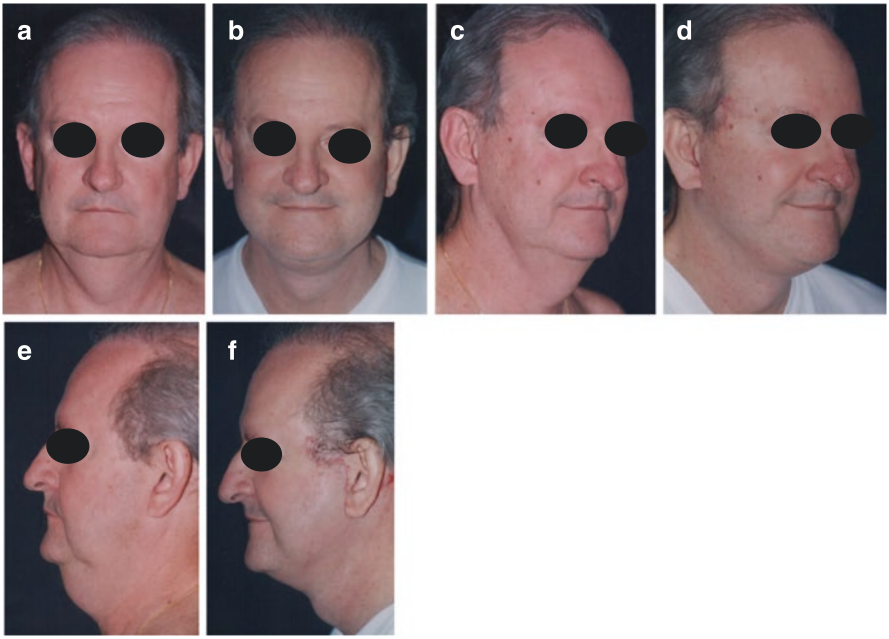

Fig. 17.6 A 51-year-old male patient underwent face-lift combined with liposuction of the neck to improve facial contour. Photos (**a**, **c**, **e**) before surgery with excessive adiposities on the neck with severe disturbance to the aesthetic appearance on the face. Photos (**b**, **d**, **f**) 1 year after face-lift combined with liposuction on neck regions remodeling facial contour. Liposuction was done all over the neck only above the platysma without any procedure below the muscle level. The sideburn is maintained on its natural position with invisible scars around it

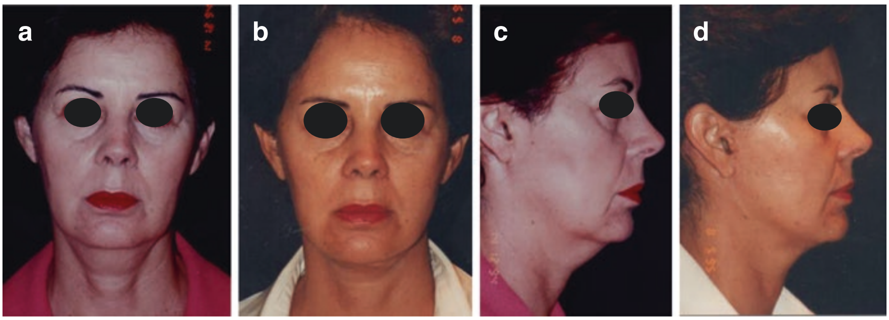

Fig. 17.7 Remodeling of face and neck contour achieved by rhytidoplasty associated with liposuction. Photos (**a**, **c**) preoperative views; photos (**b**, **d**) after operation

severe cases of flaccidity of the muscular structures. If a surgeon intends to remove those kind of adiposities, it must be corrected by a direct approach, through a frontal submentionian skin incision, or lateral ones, otherwise there is a high risk to internal anatomical elements which I do not recommend.

There two types of patients that can be treated with liposuction technique on cervical regions: (a) isolated one which usually is indicated for young patients without redundancy of skin and cutaneous flaccidity (Figs. 17.1, 17.4, and 17.5) and (b) liposuction combined with rhytidoplasty for those patients with excess of cutaneous covering (Figs. 17.6 and 17.7).

17.3 Technique

The operation is always performed at a hospital under local anesthesia with intravenous sedation under the control of an anesthesiologist. Also general anesthesia can be used when rhytidoplasty is done associated with liposuction procedure. Local infiltration is made with anesthetic even when general anesthesia is employed. My preference is to employ local anesthesia (with dilution of 1:200,000), that is, 0.4% lidocaine with epinephrine. A practical formula is 40 mL 2% of lidocaine plus 1 mL epinephrine (1:1000) and also 160 ml water, giving a total volume of 201 ml. Besides local anesthetic infiltration, I do hyperhydration with serum and epinephrine similar when rhytidoplasty is performed (Fig. 17.8). A submental incision of 0.5 cm in length is made on submental region and another one behind the earlobe (Figs. 17.2 and 17.8). A cannula n.3 or n.4 is introduced and, with the suction machine is not connected, with back-and-forth movements are used between the overlying skin and the platysma muscle in the submental and submandibular regions and the lateral aspects of the neck (Fig. 17.2). Since my first publications until nowadays, I used to recommend that the surgeon must hold the cannula with one hand and with the other one that he or she fold the panniculus with accumulated adiposities in order to make the tunnel between the thumb and the index finger. I

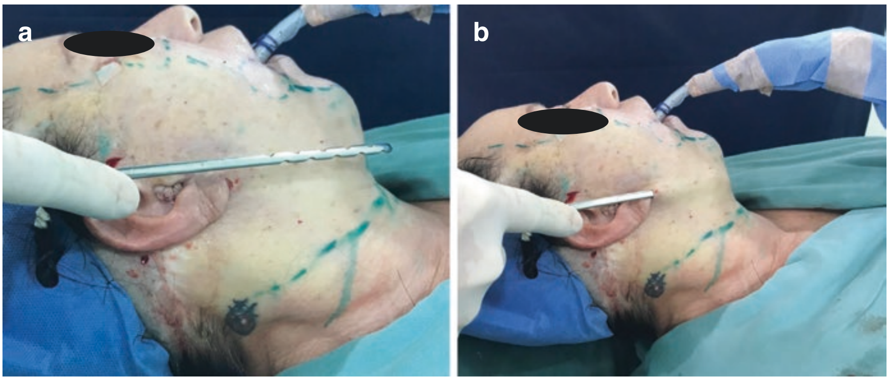

Fig. 17.8 Tunnelization of the lateral regions of the neck employing my flat and straight instrument with irregularities on the border of both sides. Photo (**a**) external view of the instrument; (**b**) the same instrument creating tunnels (tunnelization) introduced through a 0.5 cm cutaneous incision on the base of the ear lobule

was so convinced about that important maneuver that I illustrated the cover of our book (*Liposuction*) published in Brazil with Illouz in 1986 [15]. I always emphasized that the tip with the orifice of the cannula, should be faced toward depth on the upper portion of the platysm, so this tip does not touch the subdermal skin layer. I made all effort in order to avoid any trauma to the subdermal layer of the cutaneous flap.

Afterward, the suction machine is turned on, and the fat is removed through the same back-and-forth movements of the cannula. The lateral sides of the neck are also treated by advancing the instrument to obtain a new cervicomandibular contour. A retroauricular incision of 0.5 cm in length on both sides is made, and suction is used once again in a similar manner to model the region. When isolated fat suction is performed, the submental and submandibular areas are covered with an elastic tape bandage for 7 days.

However, when rithydoplasty surgery is performed in association to liposuction, firstly liposuction procedure is performed in face and neck regions, in order to remodel facial and cervical contours (Fig. 17.8). Afterward tunnelization procedure is performed by using my personal surgical instruments as it is described in detail in another chapter (Fig. 17.9). Following such technical sequence, there is no bleeding during, neither after the surgery. Also the subdermal layer is totally preserved all over the face and neck cutaneous flaps. Following the operation the skin incisions for rhytidoplasty are made as a matter of a routine manner, and the cutaneous flaps are raised. Usually some remaining bridges of tissue are left between the tunnels coming from the muscle level to the cutaneous covering. If such connected bridges make some irregularities on the skin flap, they may be cut with scissors in order to achieve harmonious and smooth surface of the facial and neck cutaneous flaps. The dissection is easier, the area for undermining is reduced, and the operative time is shorter.

The sequence of rhytidoplasty follows as usual. I do not use drainage, and the patient stays in the hospital for 24 hours and goes home the next day returning at my

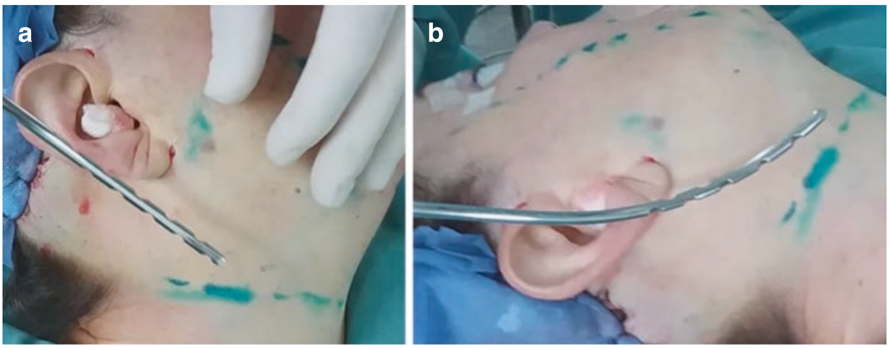

Fig. 17.9 (**a**, **b**) After liposuction procedure tunnelization using my surgical instruments to create wider tunnels

clinic 2 days later, when the bandage is removed and hair is washed. When isolated liposuction is performed, adhesive tapes or elastic tapes cover the submental and submandibular regions for 7 days. This tapes are placed in a way that maintain a slight traction upwards, pulling the cutaneous flap.

17.4 Complications

As far as the liposuction procedure is performed above the platysma muscle, there is very low rate of complications where there is no important anatomical structure. Along my practice I have followed such conduct to treat female and male patient achieving good level of aesthetic results (Figs. 17.1, 17.4, and 17.5). Most of my patients that underwent rhytidoplasty procedure, also combined liposuction, since they present enough excesss of cutaneous flaccidity. I have found that ecchymosis is the most common occurrence postoperatively which may last for 8–10 days in male and shorter time in female. Skin necrosis and hematoma have not happened since I associated dissection with tunnelization using my surgical instruments which avoid any damage to the anatomical structures. The use of drainage is not a routine in my practice since there is no bleeding during as well as after operation.

Patients do not complain about pain since there is minimal intra-operative trauma through tunnelization procedure which does not hurt any anatomical structures.

17.5 Discussion and Conclusions

Application of liposuction technique to remodel cervicofacial adiposities is an excellent surgical procedure for rejuvenation of the face and neck which may be combined with rhytidoplasty even with treatment of SMAS and subcutaneous lipoplasty (Figs. 17.6, 17.7, 17.10, and 17.11). It is evident that the submental fat can be removed surgically as it is described before liposuction technique became a current operation. Liposuction method is indicated in obvious deformities where fat distribution is limited on subcutaneous compartment of the face and all regions of the neck (Figs. 17.1, 17.4, and 17.5). However, I do not recommend employing the technique in cases with retroplatysmal fat where introduction of a cannula increases preoperative risk. I have never performed such procedure since the anatomy underneath the platysma muscle must be preserved avoiding any surgically trauma. As it is an aesthetic procedure, one may not employ any method increasing perioperative mobility. Even in male patient with very fat neck with complex unaesthetic appearance, it is possible to achieve good surgical result without any traumatic procedure below the muscle (Fig. 17.6). One must have in mind that to employ a procedure for aesthetic purpose should bear a minimal risk since it is possible to achieve good aesthetic result. Once again I emphasize, the main point for valuable results when

Fig. 17.10 Remodeling of face and neck contour achieved by rhytidoplasty associated with liposuction surgery. Photos (**a**, **c**) before operation; photos (**b**, **d**) after face- and neck lift combined with liposuction procedure above the platysma without any treatment of the structures underneath the muscle

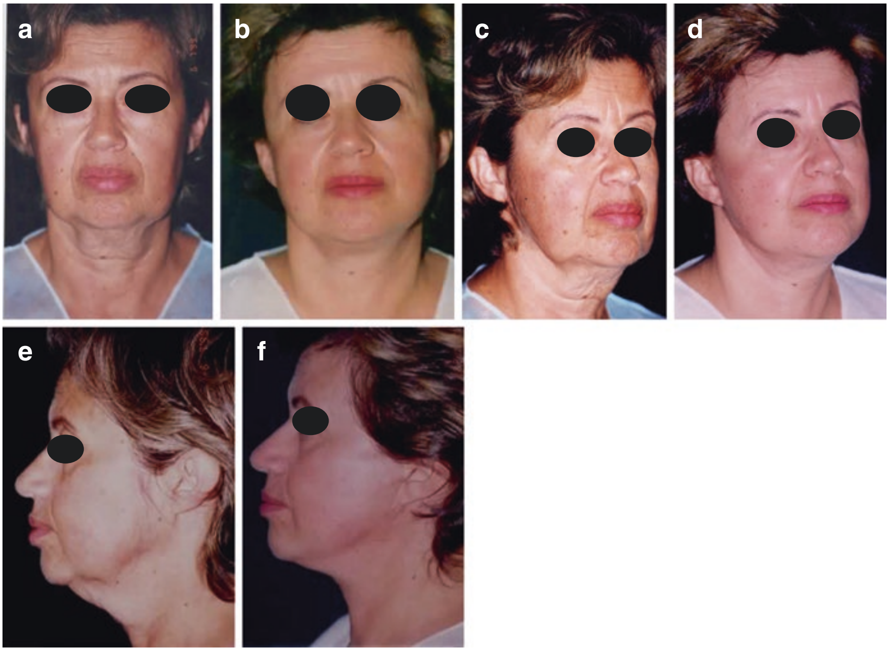

Fig. 17.11 Improvement of facial and neck contour through rhytidoplasty combined with liposuction. Photos (**a**, **c**, and **e**) preoperative views; photos (**b**, **d**, and **f**) postoperative views

performing isolated liposuction technique as well as the combined procedures, is to achieve rejuvenation and remodeling of face and neck contour. Despite the small volume of what is aspirated, it is important to remember that the subcutaneous fibrous cicatrization and even the later postoperative absorption of fat, are important behaviors that should be considered in the remaining tissue [2, 3], as in submandibular and submentonian areas, where long-therm results are more evident, and which guarantees longer-lasting cervicofacial reshaping. A fibrotic tissue formation underneath the cutaneous covering is developed postoperatively which works as a suspension to the neck keeping on adequate position lasting long postoperative results.

For young patients without cutaneous flaccidity only fat suction is performed (Figs. 17.1, 17.4, and 17.5). Therefore, selection of patients and indication of the operation are fundamental steps before surgery.

When liposuction procedure is performed in combination with rhytidoplasty, fat suction is firstly done and afterward subcutaneous tunnelization procedure before skin incisions. On the other hand, if the cutaneous flaps are firstly dissected, the canulla's negative pressure cannot be maintained with an adequate apport to aspirate adipose tissues.

The open end of the cannula must be directed toward the platysma avoiding any damage to the subdermal layer. The back-and-forth movements of the instrument do not damage any important structural tissues at this level, according to the anatomical dissections of Cardoso de Castro [10]. The mandibular border is the superior limit of the suction area when only the neck is treated (Figs. 17.2 and 17.3). If the open end of the cannula is turned to the superficial aspect of the skin, it may damage the subdermal layer, as negative pressure may remove too much fat tissue underneath. Such removal may produce scar tissue and retraction of the skin with ungracious results. Therefore, I recommend that keeping the tip of the canulla faced toward the platysm muscle.

There are several benefits to the liposuction technique in removing adipose tissue of the facial and neck regions: (1) absence of cutaneous scar on submental region, (2) less skin undermining, (3) minimized skin trauma, (4) shorter surgical time, and (5) much less complications postoperatively.

Patient's selection for the fat-suction procedure is an important preoperative step. Isolated liposuction is indicated when there is no skin excess to treat, as usually occurs on younger patients, without redundant skin and cutaneous flaccidity, and conditions are in favor to a good recover.

Ever since liposuction technique was introduced, facial and neck contour may achieve smooth surgical result due to nontraumatic procedure. Also, when liposuction is combined with rhytidoplasty in the use of my tunnelization procedure, there is a minor rate of complications [6–8].

One of the most important facts of the technique is the trauma to the adipose tissue caused by the repeated movements of the cannula. I have described that the quantity of adipose tissue removed through suction is increased in the postoperative period by organic absorption, traumatized by the instrument, and the negative pressure of aspiration [3]. The poor vascularization of the adipose tissue is a valuable factor in postoperative absorption. My observation comes from cases of mastoplasty with reduction of the abundant adipose tissue over de mammary glandular. In those cases, I perform a moderate resection, because a breast volume decrease has been observed a few months after the surgery, this finding can be attributed to the absorption generated by surgical trauma [3].

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Chapter 18
Facial Filling Combined with Rhytidoplasty

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18.1 Introduction

18.1.1 Facial Changes

18.1.1.1 Slimming and Aging

The facial structures change with time due to aging and/or weight loss [1], the youthful appearance with shiny and firm skin changes, due to the deflation of the fat compartments, the ligament weakening, muscular and skin atrophy, when this occurs, the facial structures do not return to the previous state, these are the characteristics of aging.

Among the numerous techniques that exist for facial rejuvenation, rhytidoplasty, also referred to as facelift, is recognized as the most effective one [2], on account of the mobilization of the tissues that compose the face, and may be conducted, depending on the indication, in a superficial or profound way, with an endless number of variations, all of them technique and surgeon dependent, in the search for natural results.

With the development of technologies for facial liposuction [3], excess fat located in the neck (double chin) and in the anterior and inferior prominences of the cheeks (jowls) could be modeled, leading to more natural results by reducing the volume and preserving the vascular network that was not sectioned during the dissection conducted for the purposes of the lifting. As a complement, fat grafting stood out by making it possible to selectively increase volume [4] in areas such as the temporal and malar regions, the chin and the lips, with the help of the patient's own fat, generating a tridimensional factor that the old techniques were not able to achieve, a result of the face's liposculpture [5].

18.2 Method

18.2.1 The Importance of SMAS [6]

Among the most employed techniques, the action on the superficial musculoaponeurotic system (SMAS) and the skin predominates; repositioning the SMAS provides firmness to the deep layer structures, and the skin accommodation is made in a natural way and with less tension.

The tension lines that exert traction on the SMAS and the skin act in different directions, but the sum of their resultants projects the direction of the flap upward, which translates into facial rejuvenation, and backward, determining the rejuvenation of the cervical area (Figs. 18.1 and 18.2).

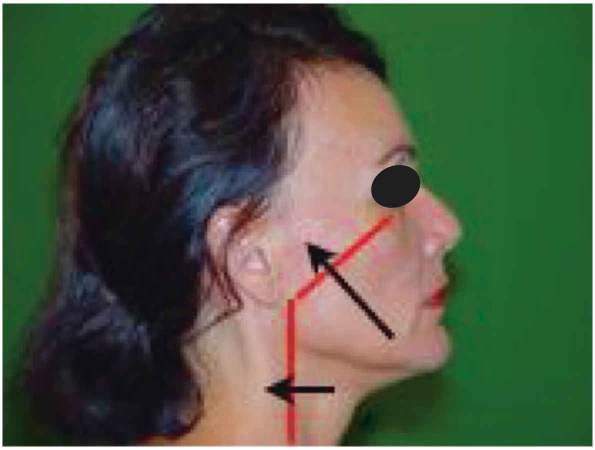
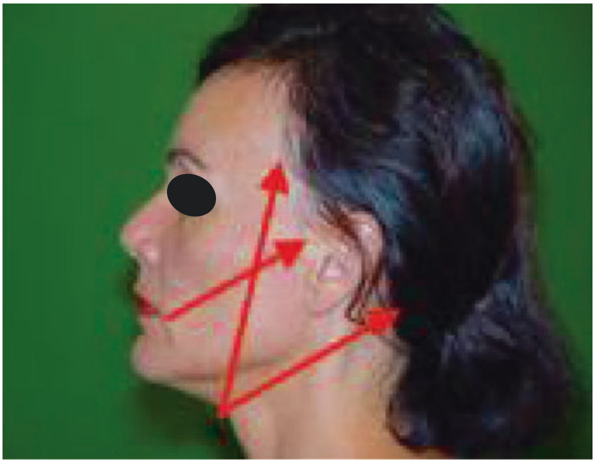


Fig. 18.1 In red the drawing where the incision is made on the SMAS, in black the direction of applied force

Fig. 18.2 The red arrows indicate the direction of the traction on the skin



Of fundamental importance for muscle mobility, the retaining ligaments [7] of the face perform this function by fixing the muscle extremities between the soft spaces.

In facial rejuvenation surgery, the chief point of fixation is the area located in front of the auricular pavilion, which extends to the posterior border of the platysma known as Lore's fascia, an area before and below the tragus, a ligament insertion area described by Furnas as platysma auricular fascia (PAF).

This fixed area allows for suture stitches on the SMAS, which result in anchoring and distribution of tensile strength, leading to the rejuvenation of the lower 2/3 of the face.

18.2.2 The Importance of Expansive Anesthesia

Hydric expansion of the areas destined to a facelift or to adipocyte aspiration and grafting is proved to be more effective and less traumatic.

In the facelift, the dissection becomes easier, and there is a better visualization and very little bleeding.

The liquid injected at a temperature of approximately 23 degrees Celcius, cools and distends the fat, constricts the vessels and reduces bleeding.

The same happens in the recipient area: the cooling and the fluid distension of the tissues allow for the placement of new cells at different levels, with less trauma, from the periosteum to superficially close to the dermis, as if the fat cells were bottles of wine in a cave, in different spaces; this way, the bottles do not break and the adipocytes suffer practically no lipolysis [8]. It is the same reasoning.

The injected solution consists of 10 ml of the anesthetic lidocaine 2% without epinephrine, 500 ml of Ringer's lactate diluent, and 0.5 ml of the vasoconstrictor adrenaline.

The fat is easily distensible. It pushes the skin upward and the densest structures are compressed downward, emptying the vessels due to the pressure exerted by the blood on their walls. From these details, we have developed the technique of *expansive anesthesia* in order to perform tissue dissection in facelift and fat grafting.

18.2.3 Facelift

The demarcation of the surgery begins in the scalp: a vertical line, ranging between 35 and 70 mm long, distant horizontally 40–50 mm from the beginning of the hairline in the temporal region, slightly curved, going toward the insertion of the helix in the glabrous area of the scalp, continuing down the front through the sinuosities of the auricular pavilion, and around the earlobe up to the projection of the posterior auricular muscle (Figs. 18.3 and 18.4). Depending on the degree of cervical aging, this line may end at this muscle, or continue horizontally toward the hair, or even, in more severe cases of aging, go down close to the border of the hairline in the cervical area (Figs. 18.4 and 18.5).

The expansion begins over the drawing in the scalp, using 10 ml syringes and 21Gx11/4″ needles, and increasing as the needle slides close to the skin, following the traced contour in its entirety, distending the whole skin and the preauricular and retroauricular subcutaneous cellular tissue of the temporal region (Fig. 18.6). With the 22Gx31/2″ spinal needle, the areas of interest in the face are expanded up to the limit of the nasolabial fold. In the neck, the projection of the cricoid cartilage is the reference between this point and the posterior cervical area as the inferior limit of the infiltration. The average volume injected in each hemiface is 150 ml.

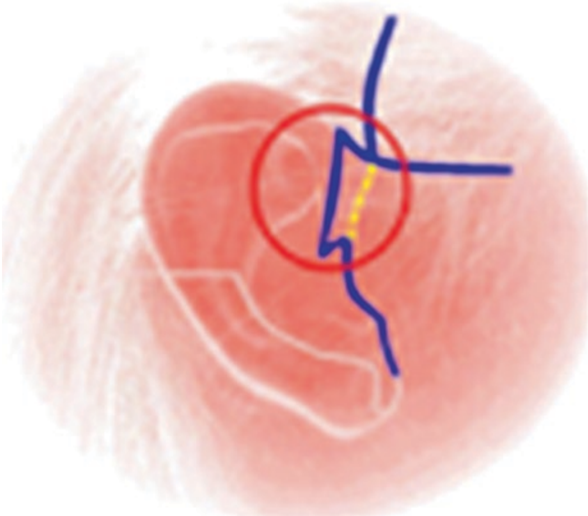


Fig. 18.3 Wing, broken lines result in better scars

Fig. 18.4 Retroauricular region, convex-concave incision

General anesthesia with a technique determined by the anesthesiologist intends to keep the patient's blood pressure stable and at the same level at the beginning of surgery, which reduces the risk of bleeding in the immediate postoperative period.

Round scalpel handle #3 with surgical blade #15 incises the skin and the subcutaneous layer superficially, beginning in the scalp and following the predetermined drawing. In the earlobe, its movement during the demarcation enables to determine its exact implantation, preventing deformations due to excessive and poorly planned removal. The blade, placed at a 90-degree angle in relation to the lobe, prevents

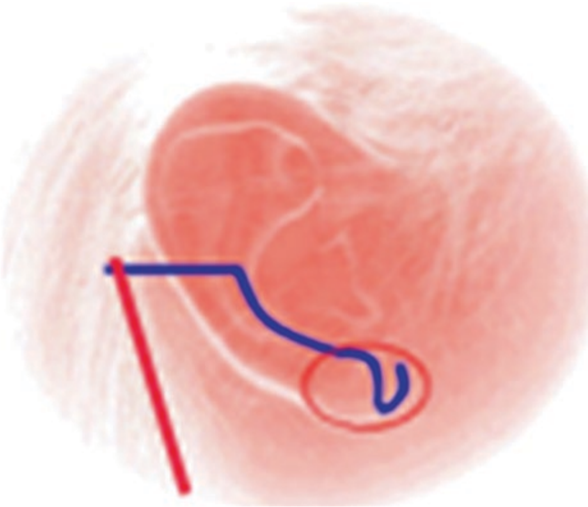


Fig. 18.5 Incision close to the hair

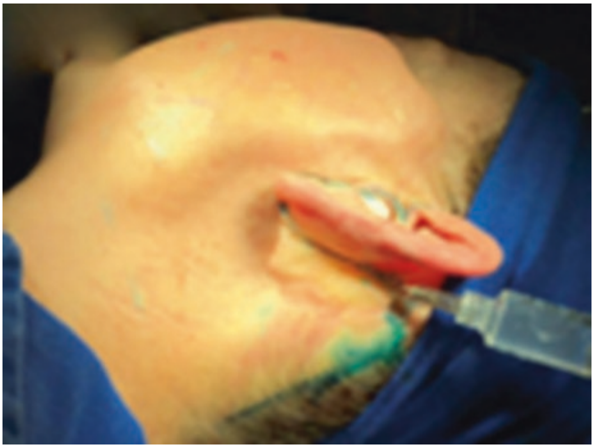


Fig. 18.6 Tissue distension

beveling, going around the lobe and toward the retroauricular area, in which the posterior contour forms a concavo-convex line, concave in the lobe and convex in the concha. This characteristic makes it possible to distribute the tension forces, leading to an optimal cicatricial outcome when the flap is perfectly accommodated in the fold.

Dissection is made with the same blade, starting in the retroauricular area, widely distended by the anesthetic. Hydric distension causes the most firm structures – muscles, vessels, and nerves – to separate from the fat of the subcutaneous cellular tissue [5], which is softer, with minimum risk of damaging important structures and with little bleeding.

The second area to be prepared is the scalp, hydrically distended, which allows for a perfect dissection through the temporal access, preserving the hair bulbs and separating the temporoparietal fascia from the superficial layer of the deep temporal fascia. Attention should be given to the preservation of the temporal artery branches and to the superficial temporal vein, whose ligature is not necessary (Fig. 18.7).

Hydric distension preserves and makes it easy to mobilize the flap, without compromising the vitality of the hair bulbs.

The dissection of the preauricular area is made easier by the expansive anesthesia. The maneuver of entering the helix by forming a broken line as if it were a short wing, *wing* (Fig. 18.3), results in a superior cicatricial outcome, making it virtually invisible after a few postoperative months. The post-tragal incision makes it possible to better conceal the scar. In men it is mandatory to meticulously remove the hair bulbs in the flap made to cover the tragal cartilage.

The dissection with the blade in the preauricular area is performed on average up to 25 mm away from the ear, in preparation for liposuction. In the dissected area near the earlobe, a 2 mm wide and 150 mm long lipossuction cannula, connected to a 10 ml syringe, is inserted into the subcutaneous tissue close to the skin up to the excess fat in the anterior region and lower prominences of the cheeks, duly expanded by the anesthetic (Fig. 18.8).

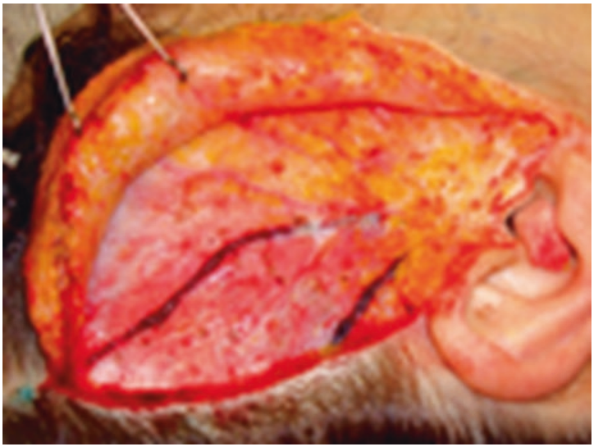


Fig. 18.7 Preservation of hair bulbs, vessels, and nerves

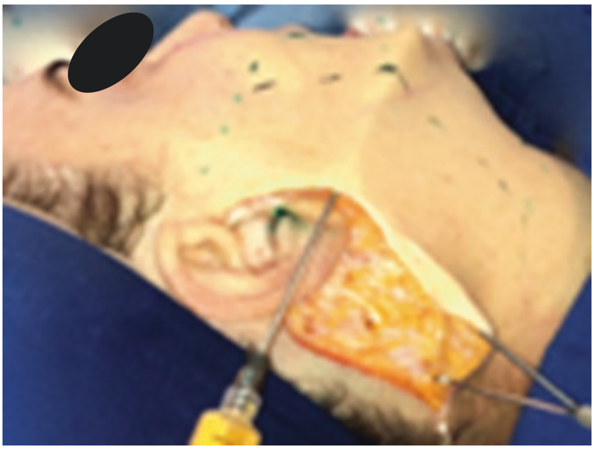


Fig. 18.8 Preauricular dissection at 25 mm of tragus, jowls, and cheek liposuction, tunnels formation

With smooth back-and-forth movements, several tunnels are formed. Each pass must be performed next to the other so that there is no formation of ripples. Through a small incision made with a needle in the skin of the nasolabial fold, at half the distance between the wing of the nose and the corner of the lip, is inserted a 1.5 mm wide and 8 mm long cannula, connected to a 10 ml syringe, and moved vertically in a fan-shaped motion, forming a crossed pattern and thus avoiding ripples. The fat of these regions is aspirated and measured after decantation. The right side should be similar to the left side, unless there are visible differences that determine a larger removal on one side.

After aspiration of the fat, several parallel horizontal tunnels are made with the 2 mm cannula, from the inferior projection of the zygomatic arch to the mandibular arch, close to the deep dermis, in order to facilitate the dissection made by Metzenbaum scissors, at the average distance of 55 to 60 mm from the tragus (Fig. 18.9).

The area of dissection should be completely uniform, avoiding obstacles that can mark the skin externally when the traction is applied.

Two lines are drawn on the SMAS that will determine future incisions and dissections. One going from the projection of the malar bone to the Lore's fascia, with an average length of 40 to 50 mm, will determine the upward force that will pull the SMAS towards the helix. The second line has a vertical direction, going from the Lore's fascia projection to the anterior margin of the sternocleidomastoid muscle 40 to 55 mm in length, which after dissection will pull the SMAS / platysma horizontally towards the cervical region.

Expansive anesthesia makes it possible to safely separate the SMAS from the deeper structures. The dissection is done with scalpel #3 and blade 15, starting at the apex near the Lore's fascia [10] toward the neck at the posterior border of the sternocleidomastoid muscle. Muscle fibers and the fascia of the platysma muscle [9] become attached to the SMAS, forming a thicker and stronger structure when pulled (Fig. 18.10).

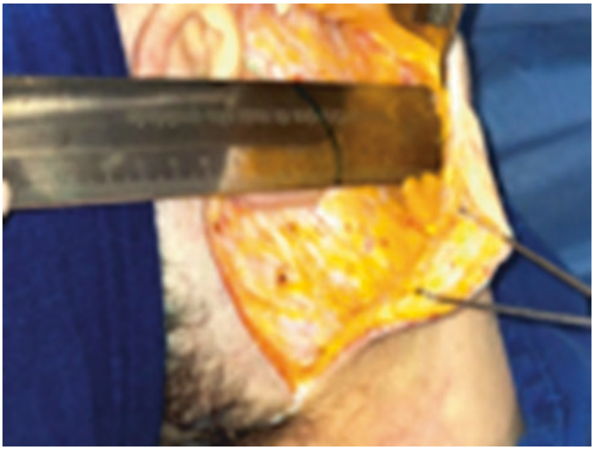


Fig. 18.9 Ear distance 60 mm, without bleeding

Fig. 18.10 Muscle fibers and the fascia of the platysma muscle become attached to the SMAS, forming a thicker and stronger structure when pulled

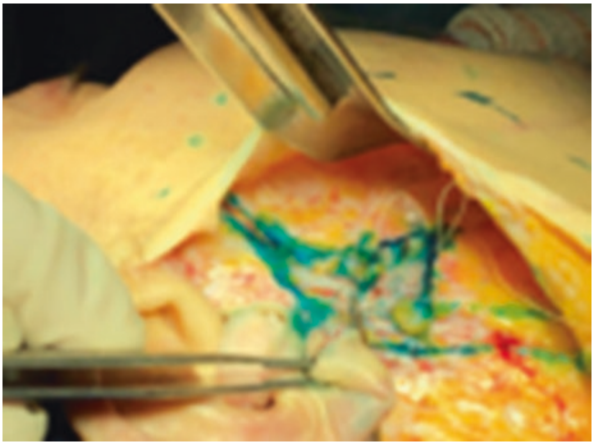


Fig. 18.11 The flap is sectioned in the middle at the apex measuring 20 mm in length, and the suture needle is inserted at 30 mm in the thickness of the flap to be firm

After this dissection [11], the SMAS is separated from the parotid gland fascia [6], forming a triangular flap of 20 mm in average at its vertex, which will be divided into two flaps (Fig. 18.11): one in the posterior cervical direction and the other in the cephalic direction. SMAS-ectomy is routinely done in the excesses of the flaps, so that they fit perfectly into the initial incisions, avoiding placing the SMAS cervical flap in an area that does not exist in the human anatomy in the retroauricular region, as well as the flap that goes from the Lore's fascia toward the outer corner of the eyelid (Fig. 18.12).

The suture starts in the cervical flap. The yarn used is Vicryl 4-0 E-15, which is absorbable, disappearing after a few months without becoming a foreign body.

At the vertex of the flap, the needle should be inserted at 10 mm from the edge and keeping the same thickness of the flap to avoid damage to deep structures. This distance will be reduced as the suture is made toward the extremities. The average distance between each point is 3 mm, which makes the suture resistant to the traction exerted by the movements of the face and the neck (Fig. 18.13).

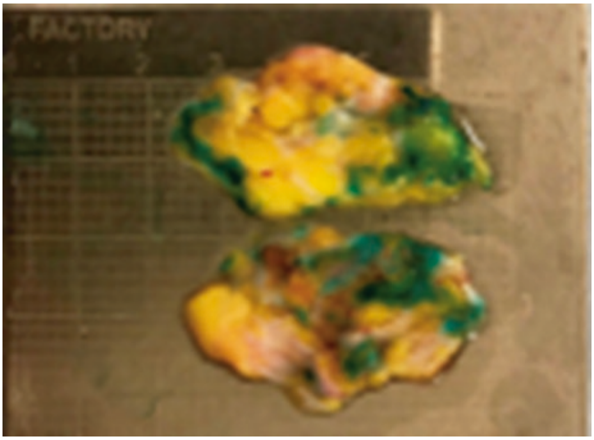


Fig. 18.12 Product of SMAS-ectomy

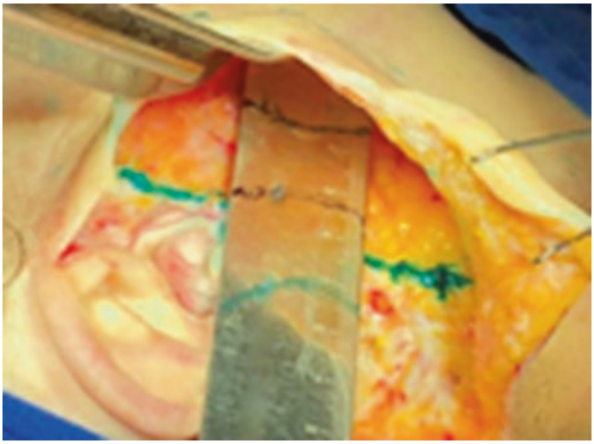


Fig. 18.13 The traction exerted on SMAS promotes an oblique elevation of 20 mm toward the glabrous area

After the end of the SMAS suture, a middle-sized dry compress is placed in the area that has been dissected, and the head is turned to the other side. The same procedures are performed on the other side. At the end of the procedure, the head is returned to its initial position, the compress is removed, the bloody spots are checked, and the skin closure begins.

Two points are fundamental for skin accommodation: The first point is in the insertion of the helix in the glabrous area. Kelly-type tweezers are attached to the protuberance of the tragus skin and pulled up to the glabrous area. A marker draws between the tweezers the measure of the excess skin, around 25 to 30 mm, and in this mark the flap is incised with Metzenbaum scissors, fixed at the insertion level of the helix with a 3-0 Nylon suture (Fig. 18.14).

The second point will be fixed with a 4-0 Nylon stitch at the retroauricular muscle level. With a Kelly, the dermo-greasy flap is turned up and back so that the skin naturally fits around the earlobe and the retroauricular convexity (Fig. 18.15). At this point, the Porto-Vac drains are inserted, needle 3.2.

Fig. 18.14 A marker draws between the tweezers the measure of the excess skin, around 25 to 30 mm, and in this mark the flap is incised with Metzenbaum scissors

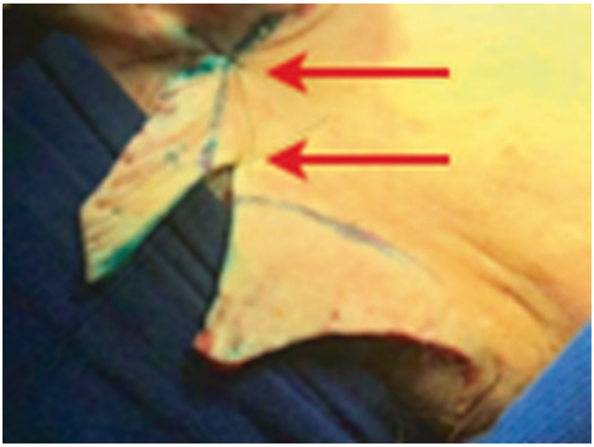


Fig. 18.15 The red arrow indicates the fixation points of the retroauricular flap

The flap accommodation is initiated by the scalp. To prevent narrowing of the hair area, the flap should rise through the vertical traction, slightly oblique. This movement will determine the elevation of the chops, necessitating the removal of a trim triangle to lower the flap, resulting in a horizontal scar on the hair strand line of the chop.

A narrow vertical triangle is removed to accommodate the flap. The 3-0 Nylon suture is continuous and performed at 2 mm from the edge of the wound, just approaching without squeezing, to avoid alopecia. The flap of the preauricular area should be divided into two stages, one for the tragus and the helix and the other for the earlobe. It is important to draw on the flap to match the previously made incision. The Metzenbaum scissors cut the skin from the bottom up, and the subcutaneous fat from this area of the flap is removed from the edge, so that it has the same thickness of the subcutaneous that recovers the tragus and the original helix (Fig. 18.16).

Fig. 18.16 It is important to draw on the flap to match the previously made incision. The Metzenbaum scissors cut the skin from the bottom up

The 5-0 Nylon suture is initiated at the border of the transition between the lobe and the tragus toward the glabrous area. In the helix, intradermal stitches are made to avoid marks on the skin. Points with Monocryl 5-0 are used for horizontal accommodation at the base of the chops, and their presence at the subdermal level allows for continuous suturing.

In the retroauricular region, two reference points are drawn in the flap, one at the level of the retroauricular fold and the other toward the hairline, which will be incised and fixed with Nylon 4-0 after traction on the flap to accommodate over the incision initially made. The skin is incised with a 15-knife scalpel, hemostasis, and suture on two levels in the deep dermis with Monocryl 5-0, and the skin suture can be made with continuous 4-0 Nylon or with VICRYL RAPIDE 4-0 intradermally.

The accommodation of the flap in the retroauricular fold and the earlobe is the last stage to be completed. The repositioning should begin with the lobe. In the preauricular region, a small triangle of the skin of the flap should be removed just below the tragus, with the size of half lobe length, and rounded base to fit the shape of the lobe as the flap is pulled up and back toward the shell. Once the height has been determined, a concave-convex drawing similar to the one in the groove should be made in the flap, and the skin is incised by Metzenbaum scissors and perfectly accommodated inside the fold.

The fat must be removed 5 mm from the flap edge so that it fits neatly into the retroauricular groove. The suture should start at the distal lobe projection, with 4-0 Nylon, which should pierce the skin of the flap, the Lore's fascia, and the lobe, setting in its anatomical position. The suture can be made with 4-0 Nylon or with Vicryl* rapid 4-0. The needle must pass through the skin of the auricle, the groove, and the skin of the flap continuously, with sufficient traction to join the tissues. Excessive traction, in addition to causing pain, may devitalize the edge of the flap. The anterior side of the earlobe is sutured with Monocryl 5-0, in simple stitches with the knot inside. Simple Nylon stitches should be avoided on this skin since the suture marks may remain visible.

18.2.4 Fat Grafting [8]

After the facelift, volumetric replacement is performed using fat grafting in the regions, malar, temporal, mentum, nasolabial and nasojugal groove [5]. In the nose the fat is grafted into the columella and under the wings.

The malar and the temporal fat pads submitted to a fat grafting promote the balance of the upper third of the face. Due to its deep positioning, expansive anesthesia is essential to allow access to them, without the risk of damage caused by fat grafting cannulae of 1.3 and 1.5 mm.

The posterior face of the arm is the area of choice as the donor area for the face, since the fat is soft and passes easily through needles and cannulae.

Expansive anesthesia causes distension and temperature decline. Liposuction is performed with a 2-mm-wide, 150-mm-long cannula connected to 10 ml syringes. The extracted product is decanted in the syringe itself. In the face, the water distension is conducted in the areas of interest and necessity, with volumes determined by the aging condition of the patient (Figs. 18.17, 18.18, 18.19, 18.20, and 18.21).

18.3 Complications

Expansive anesthesia significantly reduces complications. The distension of the tissues makes it possible to see the vessels mostly by transparency, the fluid protects the nerves [12], and there is no fulguration nor excessive heating over cauterized areas. The maneuver of making tunnels preserves blood and lymphatic circulation, significantly reducing the risk of vascular complications in the flaps. Blood pressure control, keeping it within a pattern close to that of the beginning of the surgery, is a common practice. It is necessary to use compresses to absorb excessive infiltration. During suture, the flap still presents distension, which reduces traction tension and ischemia in the edges of the flap resulting from the suture. Liposuction and fat grafting are efficient and safe under the expansive technology.

Figs. 18.17, 18.18, 18.19, 18.20, and 18.21 The result of the described technical care, naturalness, well-vascularized flaps, improvement of skin quality by fat grafting, *wing* preauricular scar with excellent result

18.4 Discussion

Hydric expansion has an easily assimilated learning curve. But those who are still not familiar with it or not skilled enough to use it must take great care. Theoretically, those who use only general anesthesia to dissect the face increased risk of damaging nerves [12] and provoking hematomas. The same happens with those who perform liposuction and fat grafting without distension.

18.5 Conclusions

Hydric distension of tissues is a factor of safety and quality of results, with lower risk in dissection and higher quality and engraftment in fat grafting.

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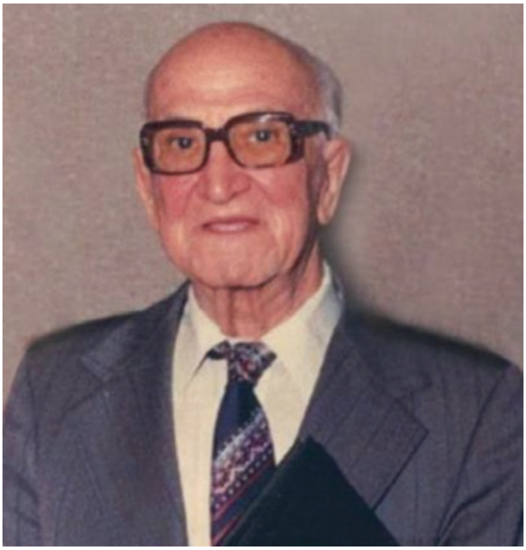
Chapter 19
Tunnelization Procedure: Nonvascular Traumatic Approach on Rhytidoplasty

Juarez M. Avelar



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1909–1991

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19.1 Introduction

Ever since I became Prof. Pitanguy's resident, I followed his surgical principles, which were done with wide cutaneous undermining and provided outstanding surgical results. Therefore, when I started my private practice, my procedure for rhytidoplasty was according to his technique [33, 34]. However, my anatomic research on a cadaver abdominal wall to study that unknown human compartment [3, 4] gave me enough knowledge to publish a new technique [7–9] because I introduced new concepts for abdominoplasty. Subsequently, I presented deep surgical improvement employing similar surgical principles to perform face lifts [12, 13]. In fact, I founded and published new concepts for abdominoplasty [5–9] in which I introduced my surgical principles in other segments of the human body, even for rhytidoplasty surgeries, reducing the high rate of complications [12, 13]. Following and employing my new knowledge that resulted from my research on abdominal panniculus by anatomic dissection, the complex vascularization of the skin is preserved during the operation so there is neither cutaneous sloughing nor necrosis. The possibility of local infection, nerve injuries, and other preoperative and postoperative problems during face lift related to traumatic operations is much reduced in the use of my surgical principles. So far, the basic fundamentals concerning preservation of perforator vessels by the combination of liposuction with minimal cutaneous undermining is useful also in facial rejuvenation procedures. Therefore, in my practice, to perform face lifts without cutaneous undermining with scissors was an important evolution in my basic technique on rhytidoplasty, because anatomic structures are preserved during surgery. Plication of the platysma muscle and superficial musculo-aponeurotic system (SMAS) provides adequate reinforcement of the anatomic structures on the anterior aspect of the neck so that is not necessary to work on any internal underlying elements. I do not recommend performing fat suction below the platysma muscle or even to do any dissection because there is high risk of damaging the complex anatomic structures (Fig. 19.1). Following such concepts, I have achieved good improvement on neck lifts in female and male patients without any treatment on deep structures (Figs. 19.2 and 19.3).

Facial rejuvenation surgery is a very important procedure because aging is a natural phenomenon and everybody may think about the possibility of undergoing face lift surgery someday. Thus, it is one of the most frequent operations in the whole population, because everyone may care about their self-image. Facial operations cannot provide eternal youth but may improve the physical appearance to an image that is more pleasant and more acceptable. Vanity is a normal feeling for everyone but it should not be a product of social competition. It is better to perform a face lift under the surgical limits of updated knowledge and the surgeon's ability than to try to do much more that risks severe complications.

It is well known, and is also described in another chapter of this book, that all tissues of the human body present continuous change during life, and the aging process is more noticeable on facial skin, on subcutaneous tissues, and in skeletal and muscular atrophy. According to age the skin presents its natural structures in

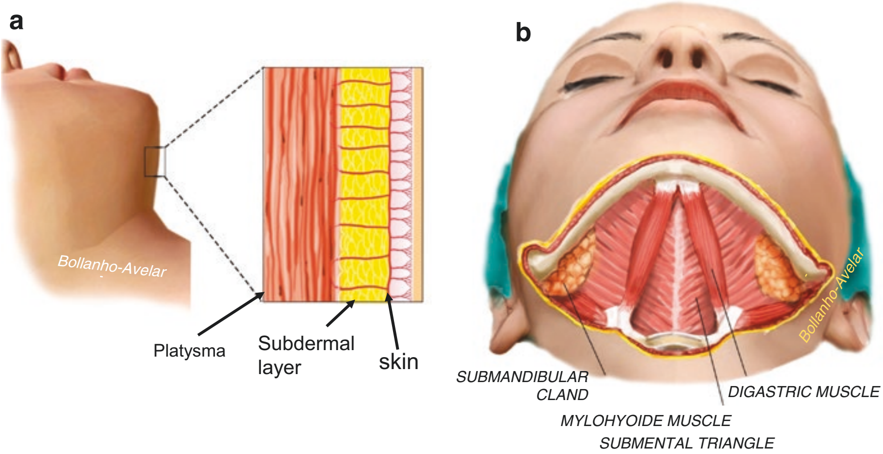

Fig. 19.1 Schematic drawings indicate the level of the liposuction and tunnelization procedures that should be done on submental area as well as in all regions of the face and neck to obtain good thickness of cutaneous flaps. (**a**) Section of the skin flap on submental region with all histological elements preserved after tunnelization procedure. (**b**) Anatomic structures of the deep compartment of the submental region below the platysma muscle, which should not be treated during rhytidoplasty procedure. The profound limit must be the platysma muscle, which is similar to a diaphragm, to avoid any damage to the anatomic structures underneath it

youth and acquires typical alterations of color and surface irregularities in older age. When a face lift is planned, the surgeon should analyze the biological age of the patient as well as the chronological and also psychological aspects.

The aesthetic operations for facial rejuvenation are quite new, as the first one is credited to Passot, who removed multiple elliptical areas of skin of the face at the hairline to remove some wrinkles [31]. As is described in the chapter on "History of Rhytidoplasty," some isolated reports regarding the desire of some persons demonstrate the tentative improvement of facial appearance. Consequently a great number of surgeons introduced deep and important contributions that improved the surgical results as well as minimizing complications. I was quite worried about complications after face lift caused by wide undermining when the liposuction technique was created and introduced by Illouz [18–21]. As I was Prof. Illouz' friend I went to Paris in 1982 to learn his technique, which impressed me very much. I concluded that he had developed a remarkable technique that would be useful to remove localized adiposities in several regions of the human body. I invited him to come to São Paulo several times to teach his technique to all the plastic surgeons from my country, giving lectures and performing some surgical demonstrations. The next year I organized an event (Brazilian Symposium on Facial Contour) and a book was published that included my article [1]. Therefore, in employing the liposuction technique to remove localized adiposity in the submental region, I concluded that a similar procedure could be employed for treatment of fat on the face and the facial rejuvenation procedure as well. However, in the use of a cannula for reshaping the

Fig. 19.2 A 62-year-old male patient before and after face lift performed according to my tunnelization procedure without any treatment underneath the platysma. (**a**, **c**, **e**) Before surgery with excess adiposity on submental and submandibular regions with deep sulcus on submental and nasolabial. (**e**) Surgical planning with cutaneous incisions drawn in front of the ear, around the sideburn, and the *dotted line* on the retroauricular sulcus. (**b**, **d**, **f**) After rhytidoplasty with improvement of facial contour and nasolabial sulcus as well using subcutaneous tunnelization during surgery without any treatment underneath the platysma

facial contour my procedures were limited to removing localized adiposities. Subsequently, I felt the necessity to create new surgical instruments, which are described following.

19.2 Technique

Before performing any plastic surgery procedure, clinical evaluation under careful physical examination is mandatory, and also blood tests and heart examination by a cardiologist, which are routine preoperative steps at my clinic. According to clinical examination in most of my patients, blepharoplasty is combined with rhytidoplasty. Previously, I performed the operation under general anesthesia or with local anesthesia combined with intravenous sedation, always under the care of an anesthesiologist. I feel more comfortable to start my rhytidoplasty by first performing eyelid surgery and then the face and neck operation. Local infiltration is a useful step even when the procedure is carried out under general anesthesia (Fig. 19.4). According to

Fig. 19.3 A 72-year-old female patient before and after face lift performed according to my tunnelization procedure combined with liposuction on submental regions without any treatment underneath the platysma. (**a**, **c**, **e**) Before surgery with excess adiposity on submental and submandibular regions. (**b**, **d**, **f**) After rhytidoplasty with improvement of facial contour. Note normal position of sideburn, nice scars, and normal position of earlobe

Fig. 19.4 Local anesthesia infiltration over all the face and neck, following the surgical planning indicated by *dotted lines*

my procedure, initially I do one side of the face and neck, following the sequential steps: local infiltration, hyperhydration with serum (Fig. 19.5), liposuction (Fig. 19.6), and tunnelization followed by skin incisions with reduced area of cutaneous undermining. When it is necessary, lifting and plication of the SMAS is

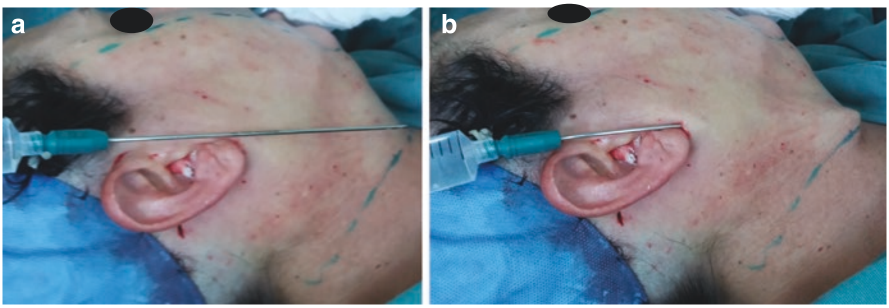

Fig. 19.5 After local infiltration with anesthetic solution, the hyperhydration procedure is done with saline solution on all regions of the face and neck as well as in the submental region. (**a**) A long needle is placed on the right side of the face showing the appropriate position. (**b**) The needle is introduced through a 0.5-cm incision on the base of the earlobe performing hyperhydration to also facilitate the liposuction and tunnelization procedures

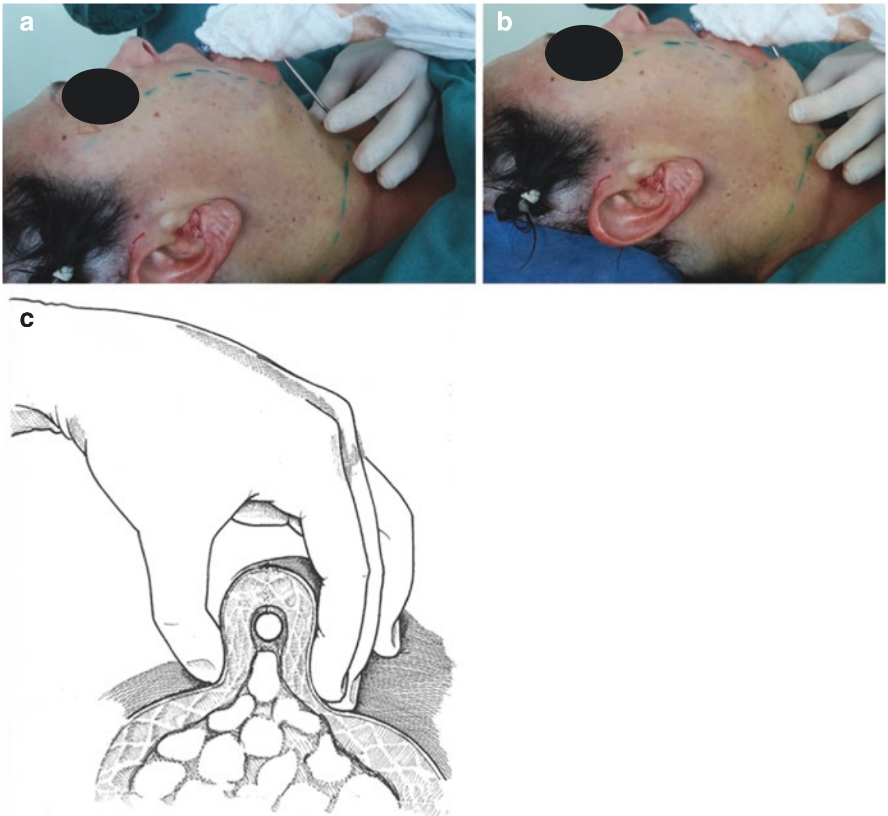

Fig. 19.6 Liposuction technique on the submental region. (**a**) The cannula between my fingers outside the skin to demonstrate the correct position (**b**) The cannula is introduced underneath the skin on the submental region between my fingers. (**c**) A copy of the cover of my book (*Liposuction*) shows correct position of the cannula between the fingers of the left hand of the surgeon

performed, and then traction of the cutaneous facial and neck flaps are done following [33–35]. Finally, the skin incisions are sutured.

19.3 Local Infiltration, Tunnelization, and Liposuction

Whether the operation is performed under general anesthesia or under local anesthesia combined with intravenous sedation, according to my surgical planning two types of infiltrations are done: (1) local anesthesia, even if the operation is performed under general anesthesia (Fig. 19.4); (2) hyperhydration or tumescent infiltration (Fig. 19.5).

My preference is to employ local anesthesia (dilution 1:200,000), using 0.4% lidocaine with epinephrine. A practical formula is 40 ml 2% lidocaine plus 1 ml (1:1000) epinephrine and also 160 ml water, giving a total volume of 201 ml. In the use of this volume of solution, the whole face and neck on both sides may be infiltrated, providing local anesthesia. Then, hyperhydration or tumescent anesthesia is done with serum underneath the skin all over of one side of the face and neck (Fig. 19.5).

Such tumescent infiltration must be done by the surgeon on one side of the face and neck, to start immediately the next steps of the operation, because the infiltrated liquid may be partially absorbed. I do not employ a needle to perform tumescent infiltration because it may change the level of the tissue cleavage [11]. I use a special microcannula that is introduced beneath the skin of the face and neck to separate the skin from the subcutaneous fatty layers and soft deeper tissues as well (Fig. 19.5). Approximately 300 ml serum is used on one side of the face and neck.

19.4 Liposuction Procedure

According to the surgical planning, in case of localized adiposities, liposuction should be performed for removal of the excess fat accumulation in specific regions of the face and neck, following preoperative evaluation and surgical planning (Fig. 19.6). At the end, the thickness of the skin flap is appropriate with all anatomic structures, which provides normal vascularization avoiding any damage postoperatively.

The surgeon must fold the skin while doing forward and backward movements with the cannula with its openings turned toward the depth to perform liposuction all around (Fig. 19.6). If the openings are turned upward to the deep raw surface of the skin flap, it may damage the subdermal fat layer with its small vessels, as recommended by Teimourian [40], which may become very thin. There is a risk of ridges on the skin, even necrosis, postoperatively. When the patient does not present localized adiposity, certainly liposuction is not indicated, but a similar maneuver is necessary to perform the tunnelization procedure.

19.5 Tunnelization Procedure

Following the oper, subcutaneous tunnelization is performed immediately using my surgical instruments (Figs. 19.7 and 19.8). Because of hyperhydration, the cutaneous covering is separated from the subcutaneous adipose tissue beneath the skin, on areas with localized adiposities, even in those regions where the panniculus is very thin as occurs on the retro-auricular regions and mastoid area as well. For patients

Fig. 19.7 Surgical instruments for tunnelization procedure: (**a**) an "S"; (**b**) three straight instruments of different thicknesses to create tunnels without damaging the vessels

Fig. 19.8 Surgical instruments for tunnelization procedure in all regions of the neck and temporal region: (**a**) straight and curved; (**b**) cylindrical and curved; (**c** and **d**) curved with irregularities on border; (**e**) flat with irregularities on both sides

with a thin face without localized adiposities, this procedure is very useful to preserve all anatomic structures below the cutaneous flap [10].

To perform the tunnelization procedure initially, five incisions 0.5 cm in length are done only to introduce my surgical instruments: on temporal region, on preauricular, on the earlobe, and another one on the posterior sulcus of the ear and on the submental region. Back-and-forth movements are done just below the overlying skin all over the face and neck (Figs. 19.9 and 19.10).

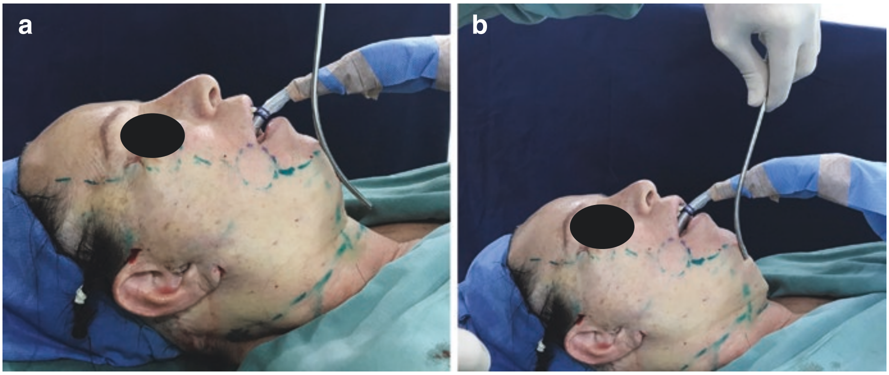

Fig. 19.9 Tunnelization of the submental region employing my curved and cylindrical instruments. (**a**) External view of the instrument showing its curvature. (**b**) The same instrument creating tunnels (tunnelization) introduced through a 0.5-cm cutaneous incision on the submental region

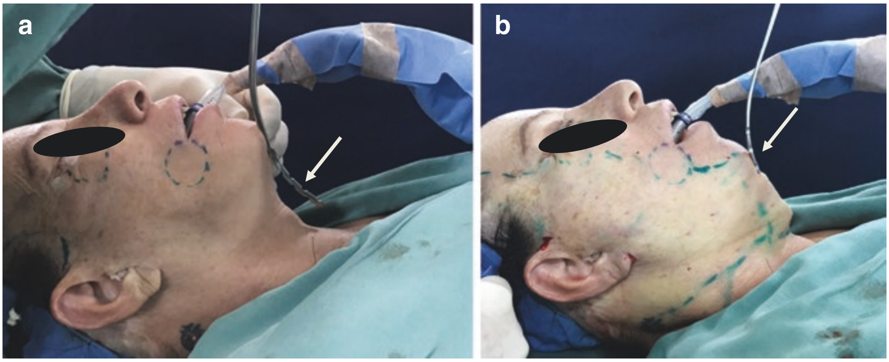

Fig. 19.10 Tunnelization of the submental region employing my curved instrument with irregular borders (*arrows*) to widen the tunnels previously created using cannula and cylindrical instruments. (**a**) External view of the instrument showing its curvature as well as the irregularities on both sides. (**b**) The same instrument widening the tunnels previously created using the cylindrical instrument

19.6 Why and How I Created New Surgical Instruments

Ever since I developed new concepts for abdominoplasty, which is popularized as lipo-abdominoplasty, I believed it was possible to employ similar surgical principles on other regions of the human body, even in face lifts. In my first operations I used Illouz' cannula even when a liposuction procedure was not performed. However, the opening of the cannula works as a local trauma to the fat layers underneath, as I have described in previous publications [1, 2]. I missed the need to create new surgical instruments (Fig. 19.7) to perform my operations without trauma to the subcutaneous and adipose tissues in a similar way as I described in my new abdominoplasty [7–9]. After a long period of brainstorming I suggested to the head of the surgical instruments fabrication company to create a new instrument similar to a cannula, but without an opening as it is located near to its end. After a long period of preparation and expectation, finally my new surgical instruments were made and ready to employ subcutaneously on face and neck during the rhytidoplasty procedure. Since the beginning I had concluded that it was possible to develop the surgical instruments for which I was looking. So, I ordered some straight instruments, previously named a "blind cannula" because it does not have an opening at its end nor an internal cavity with the tip similar to a traditional cannula for blunt dissection (Fig. 19.7). From the beginning I was happy with my instruments, by which it became possible to achieve my purpose of performing tunnels on the subcutaneous level without any suctioning or trauma to the adipose tissues.

Afterward I had some difficulties in performing the tunnelization procedure on the anterior and lateral sides of the neck because of the anatomic curvatures of the regions, as well as on the temporal region, particularly on male patients during rhytidoplasty. So, I designed two curved instruments similar to the straight one, a cylinder to provide tunnelization following the concavity of the submandibular and submental regions (Figs. 19.8, 19.9, 19.10, and 19.11). Finally, I thought to create another flat instrument but with irregular borders on both sides, expecting to facilitate performing tunnels even wider (Figs. 19.8 and 19.10). As far as I developed new surgical dissectors it became possible to perform a wide area of tunnelization

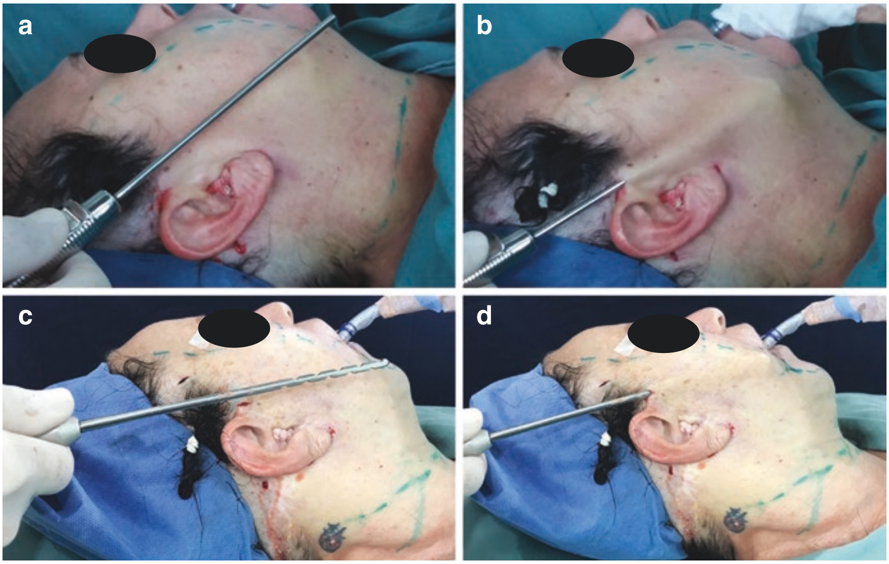

Fig. 19.11 Tunnelization of the facial regions employng my cilinder and straight instrument and another straight one with irregularities on both sides in order to wider the tunnels created by the cilindre ones. (**a**) External view of the cilinder instrument; (**b**) The same instrument creating tunnels (tunnelization) introduced through a 0.5cm cutaneous incision on anterior border of the auricle; (**c**) External view of the straith instrument with irregularities on both sides; (**d**) The same instrument introduced through the same incision working on lateral regions of the face

procedure, attempting in my imagination to reproduce on the face an operation similar to that which I described for abdominoplasty where all perforator vessels were preserved during surgery [5–9]. Therefore, my instruments do not damage the complex anatomy below the platysma muscle (Fig. 19.12). As far as my instruments work above the platysma, all anatomic structures underneath are preserved. My curved instruments work very well on the temporal region to perform subdermal tunnelization above the frontal branch nerve as well as below the temporal fascia underneath the nerve (Figs. 19.13 and 19.14). In the use of my dissectors it even

Fig. 19.12 Preoperative photos showing tunnelization procedure on the lateral region of the right side of the neck employing my cylindrical and flat curved instruments introduced through a 0.5-cm incision on the base of the earlobe. (**a**) External view of the curved and cylindrical instrument on the lateral side of the neck. (**b**) Same instrument creating tunnels (tunnelization) already introduced to widen the tunnels. (**c**) My curved instrument with irregular borders (*arrow*) on the lateral side of the neck working through the same cutaneous incision as the cylindrical instrument

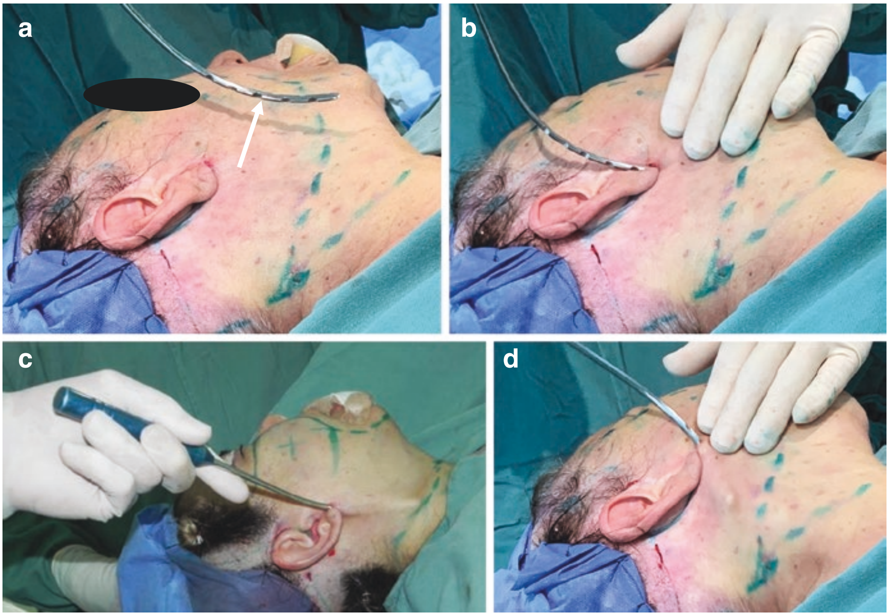

Fig. 19.13 Tunnelization procedure on the lateral regions of the neck employing my curved and flat instruments introduced through an 0.5-cm incision on the base of the earlobe. (**a**) External view of the instrument with irregularities (*arrow*) on both sides. (**b**–**d**) Same instrument creating tunnels (tunnelization) already introduced to widen the tunnels previously created

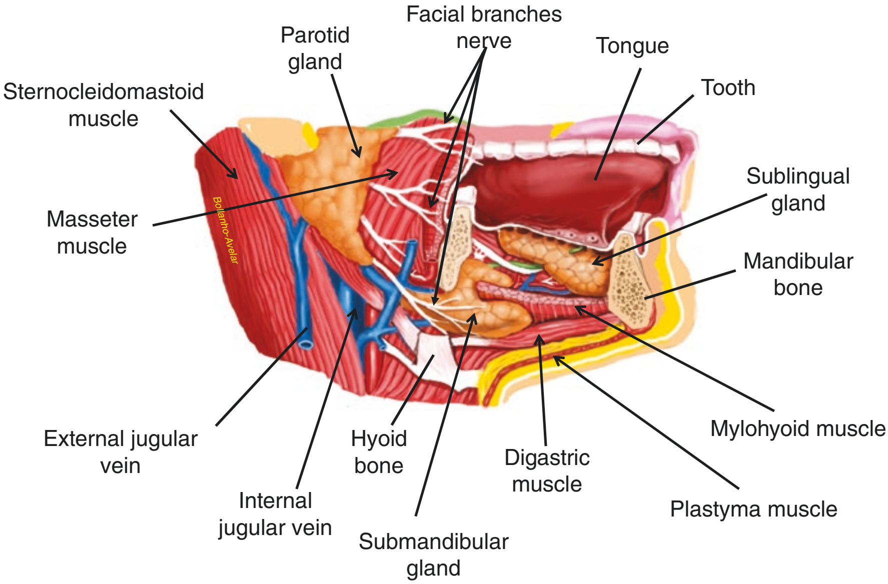

Fig. 19.14 Schematic drawing of anatomy of the right side of the internal structures of the face and neck relative to the tunnelization procedure performed during rhytidoplasty to avoid any damage to these structures

became possible to maintain an adequate subdermal layer and also a very thin layer of adipose tissue just above the platysma muscle (Figs. 19.14 and 19.15). I concluded that the behavior of the adipose layer during the tunnelization procedure creates adequate and smooth surfaces on the deep surface of the cutaneous covering as well as on the platysma muscle, avoiding any retractions, or even irregularities, on the local skin (Fig. 19.16). In my publications regarding lipo-abdominoplasty I mentioned that to perform plication of the *rectus abdominis* to visualize the muscles is not necessary because the presence of the perforator vessels is a good and sufficient indication of the internal borders of the muscles by the thin adipose layer remaining just above it [7–9, 12, 13]. Following the same surgical principles, plication of the platysma muscle is performed during face lift according to the surgical plan (Fig. 19.17). Regarding lipo-abdominoplasty, the internal surface of the remaining abdominal panniculus lies smoothly on the muscular abdominal structures.

In conclusion, there are close technical similarities between behavior of the adipose tissue during lipo-abdominoplasty and my tunnelization procedure for rhytidoplasty. Furthermore, the thickness of the subdermal layer and above the platysma is quite like that achieved when lipo-abdominoplasty is performed insofar as my new concepts are adequately well employed (Fig. 19.15).

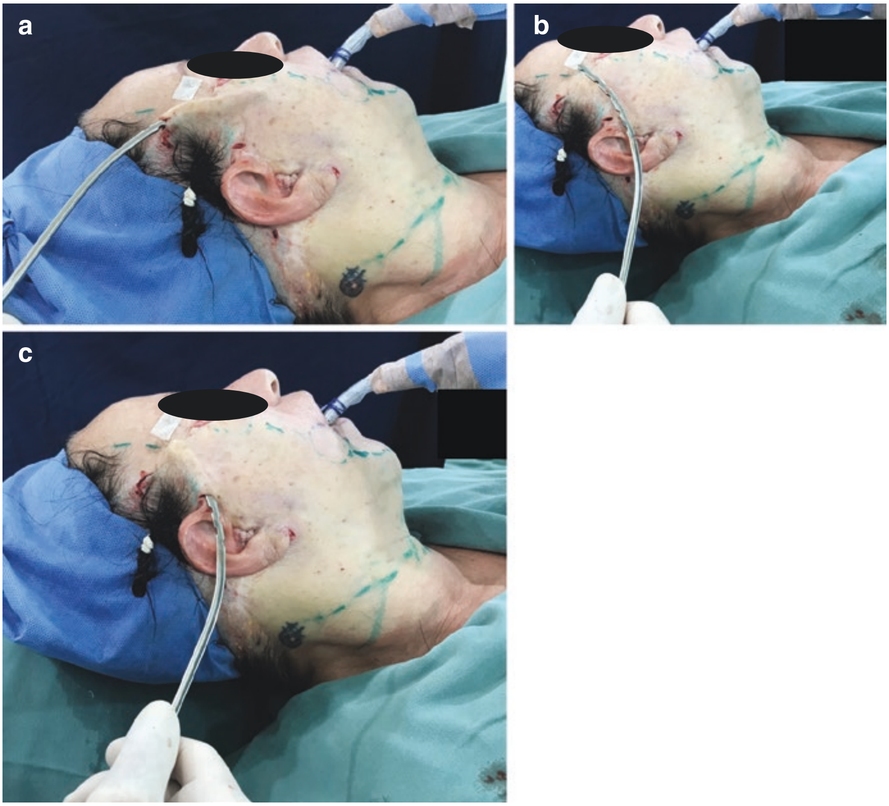

Fig. 19.15 Preoperative photos show tunnelization procedure on temporal region on right side aiming at preservation of facial nerve branches and also the temporal superficial artery. (**a**) A curved instrument is introduced subcutaneously above the facial branch through a 0.5-cm cutaneous incision in the temporal region. (**b**) Curved instrument with irregularities on both sides is placed in the temporal region. (**c**) Same surgical instrument is introduced subcutaneously above the facial nerve branches through a cutaneous incision in front of the ear

My surgical instruments are introduced through the same skin incisions where liposuction was done all over the hemiface and neck and are responsible for the cutaneous dissection without cutting the blood vessels as well as the lymphatics or the nerves (Figs. 19.11, 19.18, and 19.19). All these procedures are done in a closed-pocket system because the cutaneous incisions are done after tunnelization all over the face. In addition, using extensive tunnelization procedure above the platysma it is possible to communicate in the midline, from one side to the other, which makes the skin flap slide over the muscle (Fig. 19.16).

This sort of tunnelization with a "blunt" and flat instrument, with some irregularities on the border of each side, is similar to my new concepts on abdominoplasty [7–9]. This is the fundamental difference between my procedure and the traditional

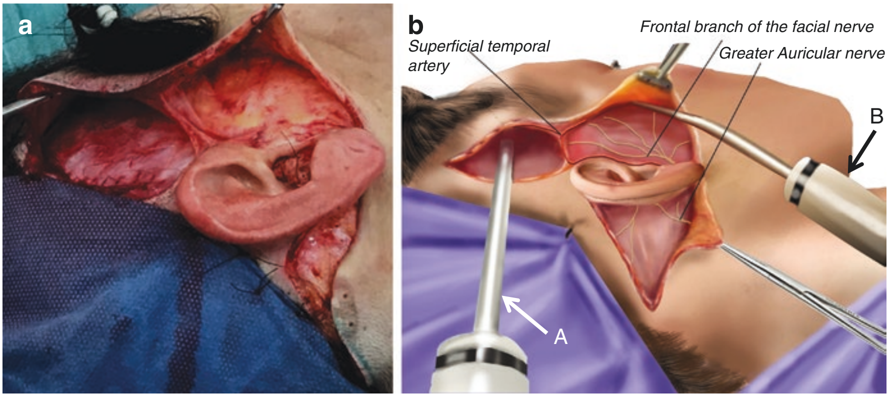

Fig. 19.16 Preoperative photographs and schematic drawing show tunnelization procedure on temporal region on right side aiming to preserve the facial nerve branches and temporal superficial artery. (**a**) Curved instrument is introduced below the temporal fascia and underneath the facial frontal branch nerve and temporal superficial artery. (**b**) One of my instruments (*A*) below the temporal fascia (below the facial frontal branch nerve) and another (*B*) above the facial frontal nerve branch

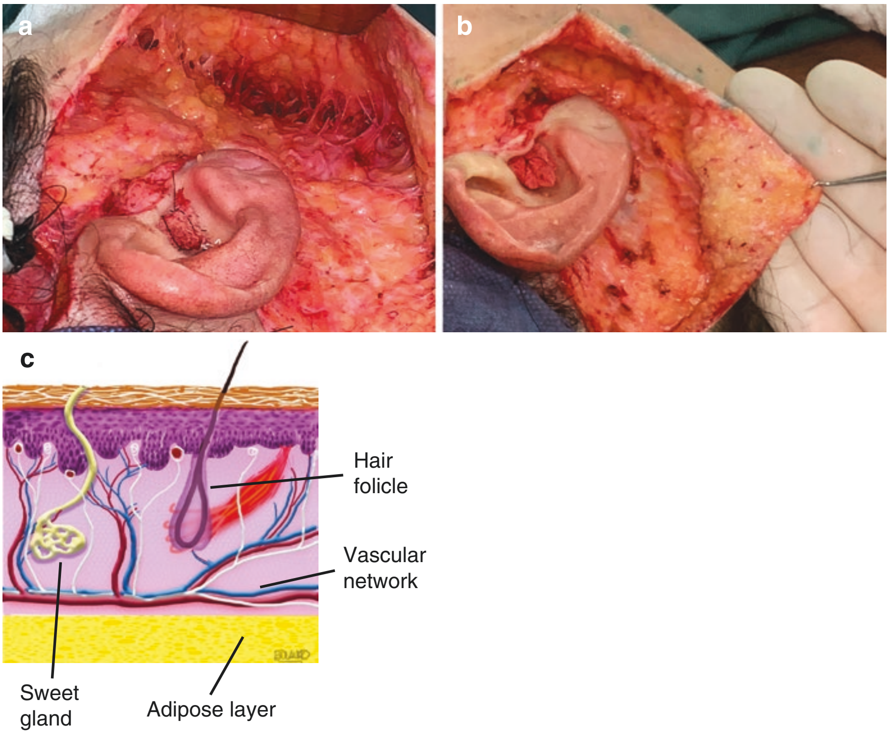

Fig. 19.17 Photographs during rhytidoplasty after tunnelization procedure on facial regions and neck show preservation of the thickness of the cutaneous panniculus with vascular network of subdermal layer. (**a**) Internal view of the facial skin flap after tunnelization procedure. (**b**) Skin flap of the mastoid region on right side is turned on my fingers to demonstrate preservation of subdermal layer after tunnelization procedure. (**c**) Drawing shows histological elements preserved by the cutaneous flap after tunnelization, even a thin layer of fat tissue

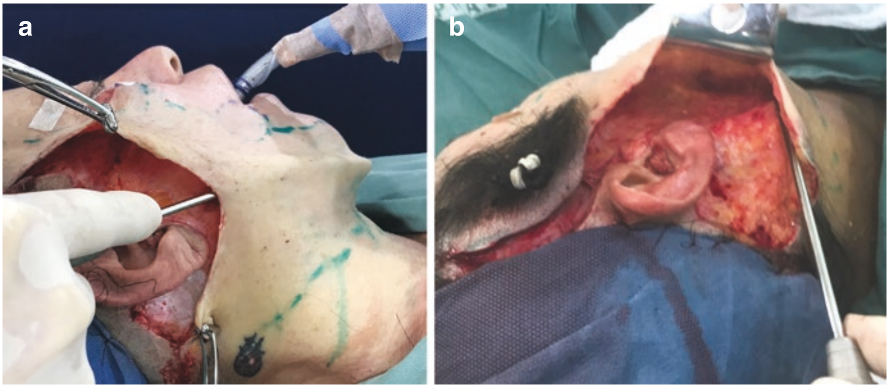

Fig. 19.18 Preoperative photographs of a rhytidoplasty show complementary tunnelization on the lateral side of the face, neck, and submental as well preserving the subdermal vascular network of the skin flap. (**a**) External view of the right side of the face and neck. (**b**) Internal view of the same regions

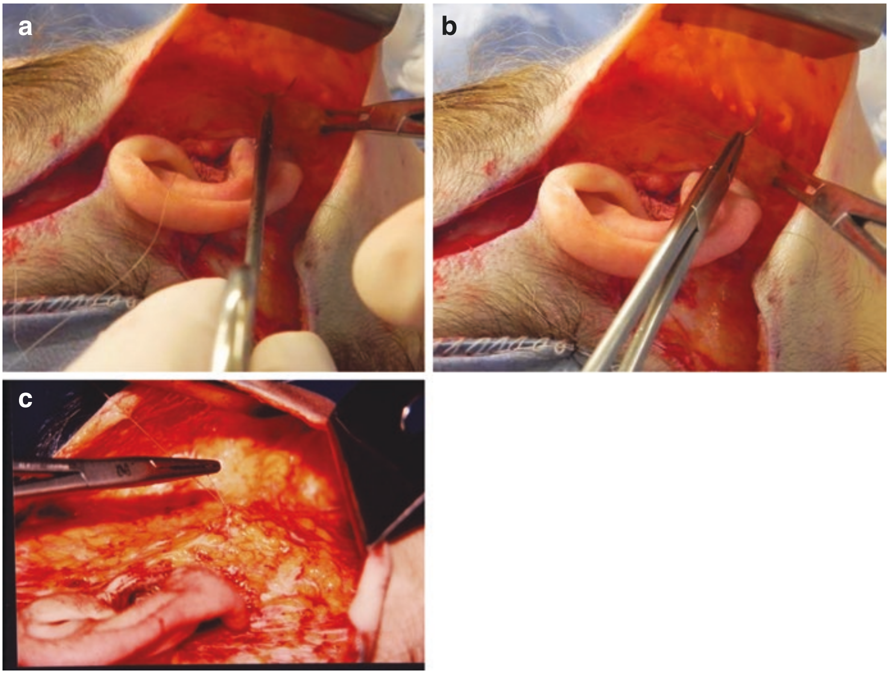

Fig. 19.19 Plication of the superficial musculo-aponeurotic system (SMAS) without undermining or resection. (**a**–**c**) Plication of the platysma muscle

techniques using scissors for cutaneous undermining, which cut all vessels from the depth to the skin flap with abundant bleeding during and after.

The whole area of the skin of the face and neck is dissected by tunnelization with minimal bleeding, as the vessels are preserved. Therefore, most of the vascularization coming from depth to the cutaneous flap is maintained because my surgical instruments do not cut vessels (arteries, veins, lymphatics) and nerves (Figs. 19.15 and 19.16). The tunnelization procedure on the cheek up to the mandible arch goes farther, close to the nasolabial fold, and may cross it to minimize its depression in some patients. On the neck it goes even farther until it crosses over the midline. The skin flap that includes the subdermal layer is quite thick (Fig. 19.15).

I do not perform, and I do not even recommend, any treatment on subplatysmal fat and to the digastric muscles. Anatomically the platysma muscle is like a diaphragm to separate the limit between the superficial and deep compartments on submental region (Figs. 19.1 and 19.12). At the superficial level, the platysma presents only fat tissue underneath the skin with a sophisticated network of microvessels providing adequate vascularization (Fig. 19.15c). For this reason, it is a fundamental technical detail to preserve the subdermal layer, which is commonly damaged when scissors are used to perform cutaneous undermining. The submental region is the most common region of fat accumulation with unlovely aesthetic disturbance. The deep compartment (below the platysma muscle) may present local fat between the digastric muscles with the anterior and posterior belly (Fig. 19.1). The anterior one extends between the posterior surface of the mandible below the symphysis to each side of the hyoid bone. The anterior and posterior belly of the digastric muscle form two sides of the submental triangle. The third side of the triangle is the inferior edge of the body of the mandible. The submandibular gland, the facial artery and vein, the lingual nerve, and the marginal mandibular branch of the facial nerve are located inside each triangle (Figs. 19.1 and 19.12).

Therefore, those complex anatomic structures including digastric muscles, facial nerve branches, and other elements should not be damaged perioperatively during aesthetic procedures, by trying to remove fat tissue deeply located. On the other hand, in the superficial compartment (between cutaneous covering and platysma muscles) there are only fat, connective tissue, and small vessels coming from the platysma muscle and nerve endings.

Considering the complexity of the anatomy of the deep compartment, it is not a safe procedure to perform any treatment, for aesthetic purposes, on the anatomic structures underneath the platysma muscle. I have obtained good improvement on neck lifts without any direct approach to deep structures (Figs. 19.2 and 19.3). For most patients, through suture of lateral borders of the platysma one may achieve enough reinforcement even when its bands are too evident (Fig. 19.20). In selected patients. suture of the medial platysma may be performed through submental incision. Also, sometimes the platysma may present a significant distance between the borders as described by Cardoso de Castros [16]. Such sutures are performed before the lateral ones are done on each side. Following this procedure, it is possible to achieve a harmonious and smooth surgical result with minimal trauma and morbidity (Figs. 19.2, 19.3, and 19.20).

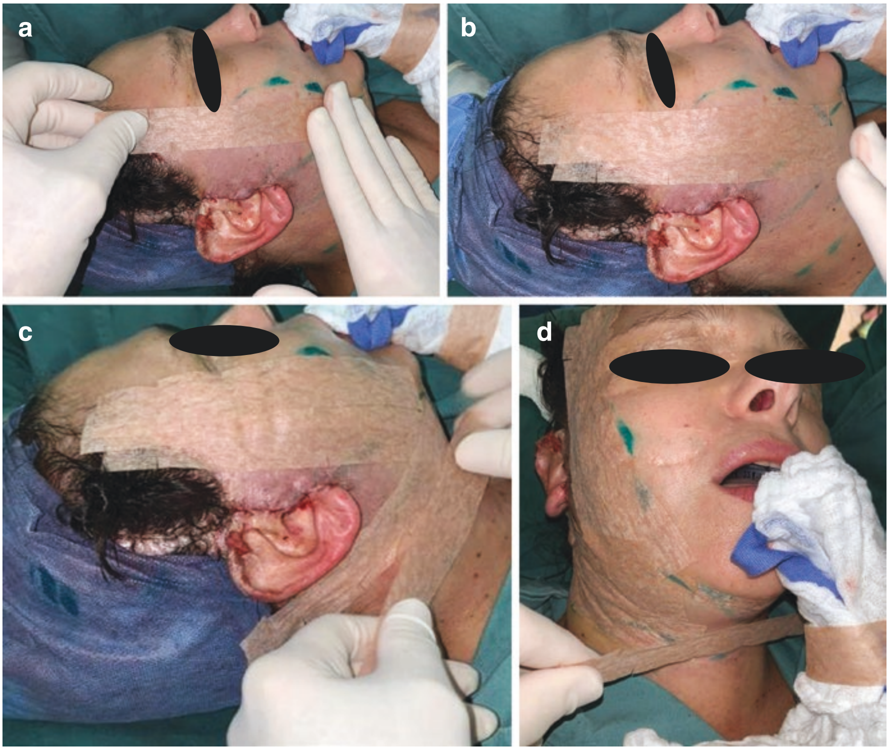

Fig. 19.20 Special dressing after face lift with adhesive tape making slight traction upward of the facial skin flap. (**a**–**d**) How to do the dressing

After liposuction and tunnelization procedures, the next step is to perform the traditional cutaneous incisions with a knife following Pitanguy's technique [37] that I learned from him (Fig. 19.9). Because of tunnelization, the whole cutaneous flap is already loose and some "bridges" may remain between the cutaneous flap and the platysma muscle at depth. Some of those "bridges" may be sawed with my nonsharp S-shaped instrument (Fig. 19.7a), which was specially developed for this procedure without cutting the connective tissue and vessels [11–14]. With the use of a special instrument, minimum cauterization is done. Although there is no bleeding during the operation, careful hemostasis is necessary. Finally, the thickness of the cutaneous flap is formed by the full panniculus, such as skin with all histological elements and subdermal layer with microvascularization providing adequate blood supply to the flap (Fig. 19.15).

The treatment of the SMAS is performed according to the surgical planning when patients present muscular flaccidity. Usually when the platysma muscle is flabby one can see its border laterally and medially. Plication procedure of the lateral border of the platysma is done by pulling with minimal undermining (Fig. 19.21). By traction the platysma is lifted up and backward to be sutured over itself in front

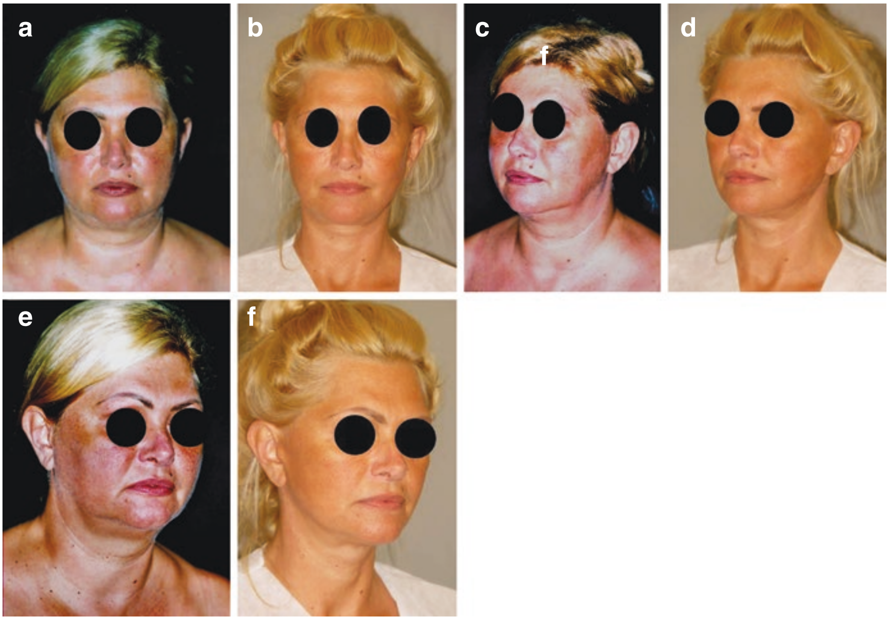

Fig. 19.21 Improvement of the facial and neck contour through combined procedure of liposuction on face and neck with rhytidoplasty. (**a**, **c, e**) Preoperative views show adiposities on face and neck. (**b**, **d, f**) After surgery achieving harmonious facial and neck contours

of the ear and to the aponeurosis of the sternocleidomastoid muscle inferiorly. On the face, in front of the ear, the fascia is grasped with small hooks and also pulled and overlapped so it can be sutured along a line that begins at the lower margin of the zygomatic arch and extends downward around the ear. Clear or colorless stitches are placed. After suture, the soft tissue may be palpable as a bridge over the deeper structures.

In fact, performing only the lateral suture with suspension of the platysma improves the whole area on each side of the neck with a natural and smooth result. The platysma flaps were introduced by Skoog [39] and Guerrero-Santos [17], and 2 years later Mitz and Peyronie [30] described the SMAS. Others may present beautiful results, but my preference is for a single plication and suture to the aponeurosis laterally.

The next step of the operation is done by pulling the cutaneous flap posteriorly and superiorly following the direction and traction of the cutaneous facial and neck flap as described by Ptianguy [33, 34, 36]. (See full description in Chap. 1 in this book.) After performing the operation on one side, the same procedure is carried out on the other side of the face and neck.

Afterward, very gentle micropore tape is placed on the skin of face and neck pulling slightly upward, making a suspension with traction of all thicknesses of facial and neck cutaneous flap and panniculus (Fig. 19.17). Those tapes work as a smooth traction upward during 4 days, leaving the eyes, mouth, and nostrils free.

The tapes are removed at my clinic and others are placed again for the next week. Usually I do not use any kind of drainage, as there is no bleeding during and after a face lift procedure.

19.7 Complications

When nonvascular trauma on the subcutaneous by tunnelization is performed, the thickness of the skin is preserved by the reduced area of undermining. Consequently, the postoperative recovery usually is calm and comfortable for patients, who do not complain about pain. I have employed this technique since my new concepts on abdominoplasty through a closed vascular system were developed and described [7–9]. Although there is minimal bleeding during the operation, careful hemostasis is done and no drain is used. I have not had major complications such as hematoma, such as used to occur in some of my patients previously operated when wide cutaneous undermining was performed using scissors.

Skin necrosis or even cutaneous sloughing did not occur because the vascularity is well preserved when performing tunnelization with a limited area of skin undermining [11–13]. Some years later, Jones and Grover [23] proposed similar tumescent infiltration to avoid complications. Before developing my method I usually avoided operating on smokers owing to the possibility of skin necrosis or any other complications. Nowadays, although I do not like smokers as patients at all, rhytidoplasty is performed on these cases without any major problems.

19.8 Discussion and Conclusions

To preserve the vascular network on the subcutaneous plan, similar surgical principles are employed for lipo-abdominoplasty as I do in my rhytidolipoplasty operations. Employing knowledge coming from my new concepts on abdominoplasty introduced in 1999 [7–9] has been a useful procedure to achieve good results with minimal trauma and complications. For these combined procedures I propose the term rhytidolipoplasty, because it is a useful association. After surgery the subcutaneous panniculus develops a fibrotic scar tissue formation all around the face and neck, which works as a strong suspension. Such fibrotic tissue is the result of healing of two adipose layers: the subdermal layer attached to the cutaneous flap and the thin layer of adipose tissue remaining on the surface of the platysma muscle (Figs. 19.15 and 19.16). In conclusion, through the tunnelization procedure it is possible to preserve those two adipose layers which heal between each other, creating fibrotic tissue that preserves the skin with smooth and harmonious results on the neck. As such structures develop secondarily, it is a normal healing process similar to a reinforcement around the *fascia superficialis* (Fig. 19.16). As far as the tunnelization approach is or is not performed in combination with the liposuction procedure, the connective tissue and vascular network underneath the cervicofacial cutaneous flap are totally preserved. Therefore, those structures heal creating a quite strong fibrotic tissue that is responsible for the long-term results without any intervention on deep anatomic elements below the platysma muscles [4, 6].

I prefer to not perform any treatment in the deep compartment of the submental region (below the platysma muscle); I do not even recommend liposuction or resection of the subplatysmal fat and suture of the digastric muscles (Figs. 19.1, 19.12, 19.15). The subplatysmal fat is located underneath the platysma muscles and superficial to the digastric. Following my procedure, it is possible to achieve a harmonious and smooth facial and neck contour with minimal trauma and morbidity (Figs. 19.2, 19.3, and 19.20).

One must emphasize that facial aging is only a segment of the deep alterations on whole body as time goes by. There is no precise age or date at which such complex and natural phenomena start. The face is the most visible part, but all body contours show evidence of age. Wrinkles are a sign of profound changes in the skin losing its elasticity that are more visible and noticeable on the face owing to physical and psychological aspects that have not been well known until now. Therefore, a face lift is not a definitive surgery, but a palliative one because its results last for a limited period of time, several years or possibly more than a decade [33]. Also, the internal organs and all tissues present significant structural modifications as reported by Malbec long ago [24–26].

When one go back to the history of rhytidoplasty it is noticeable that after 1960 several techniques were developed by several authors in attempts to improve results. In fatty neck, lipectomy [15, 27–29] was performed, which is a very traumatic procedure with bleeding during and afterwards. From the beginning rhytidoplasty has always been a very aggressive and traumatic operation to the cutaneous and subcutaneous tissues. The tunnelization procedure is a combination of liposuction techniques developed and popularized by Illouz [20–22] as one more surgical option to minimize the trauma of the tissues and reducing the rate of complications. Therefore, rhytidolipoplasty is a combination of traditional face lift with liposuction technique.

It must be the goal for all surgeons to achieve a natural facial expression after the operation because the essential of any facial rejuvenation technique is to preserve the facial architecture structures that should not be changed (Figs. 19.12 and 19.15).

On the area above the zygomatic arch, the tunnelization procedure is on two levels: subcutaneously on the temporal area on hairless skin and also beneath the temporal fascia on hairy areas to avoid any damage to the hair follicles (Figs. 19.13 and 19.14). In that area, the vascular network passes parallel to the skin, in the galea blades. Therefore, there are no vessels coming from depth to the cutaneous flap. According to Pitanguy and Ramos [32] the frontal branch of the facial nerves emerges in front of the ear and passes underneath the level of tunnelization without any damage during rhytidoplasty (Fig. 19.14).

Observing rhytidoplasty in male patients, I notice that they have very thick skin and normally abundant bleeding is present, which greatly bothers the surgeon during and after the operation, during which severe hematoma and seroma formation may develop. I do not use any kind of drainage because there is no bleeding during or after surgery. It is quite rare to see any case of hematoma during the postoperative recovery [11–13]. Since I published my new concepts for abdominoplasty as a closed vascular system, I started to employ a similar procedure in rhytidoplasty with similar surgical principles to preserve most vessels in the cutaneous flap. In fact, the arteries maintain a regular blood supply to the skin and the venous and lymphatic circulation works as multiples pedicles [7–9, 38].

Note: To illustrate the technique, some vídeos are supplied and are available to the readers.

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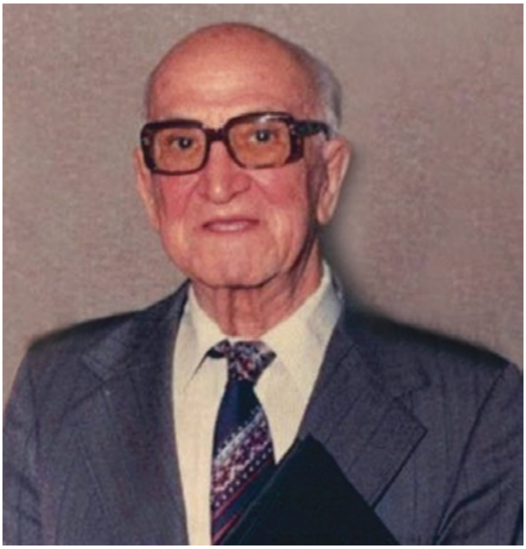
Chapter 20
Aesthetic Facial Surgery: Combined Incisions in Rhytidoplasty-Precapillary and Intracapillary Incisions

Tomaz Nassif and Chang Yung Chia



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20.1 Introduction

The incisions of the first aesthetic surgeries of the face (Hollander, Lexer, Joseph, Noël, Passot, Morestin, Bourguet, Lagard, Miller, and Kolle), more than a century ago, were segmental resections of the skin located in the capillary margins and the natural creases of aged skin without dissection of the skin. Bettman described the continuous incision in 1920. Consequently, Bames in 1927 described the dissection of the subcutaneous plane, traction of the flap, and redundant cutaneous resection. This is how the base for rhytidectomy was established for the next 40 years. Simple traction and resection of the excess skin evolved to the mobilization and structuring of the deep planes like the SMAS and the periosteum in the search to reduce tension from cutaneous sutures and to give the results of the procedure more durability. Currently, rhytidoplasty is also associated with three-dimensional remodelling of the face and neck emphasizing the distribution of deep and superficial volumes with liposuction and fat grafting. It is also associated with the redistribution of cutaneous coverage to obtain more natural results and to minimize the stigma of the surgery.

The incisions have the primordial function of resecting excess skin and of achieving a harmonious distribution of the face and neck. The areas where the incisions are located should be more camouflaged, respecting the aesthetics, and at the same time be functionally effective. The classic scar of the incision along the preauricular line is generally of good quality when there exists no excess tension. Posteriorly, the incision extends itself from the ear lobe to the middle of the concha, behind the ear, and it is directed posteriorly passing through a small extension of hairless skin over the projection of the mastoid inside the scalp of the occipital region. This is due to the anterior-superior temporal extension being located intracapillary.

Although the scar is well hidden, the classic rhytidoplasty technique presents some limitations. The continuous preauricular and temporal incisions result in excessive ascent and posteriorization of the hairline. The retroauricular scar over the mastoid, even if it extends over a small space, can still be visible [1, 2].

To minimize these problems, the author associated techniques of dissection and/or plication of the SMAS-platysma [3] with precapillary, intracapillary, and hairless skin in addition to endoscopic fronto-orbital reposition via videosurgery. Therefore, the accumulation of the skin in the zygomatic-temporal region resulting from the vertical traction of the face will be redistributed without having to elevate or significantly posteriorize the sideburns [4]. A retrospective analysis of the results over 15 years is presented, and the surgical technique is described as follows.

20.2 Method

20.2.1 Retrospective Analysis

Over a 15-year period, between 2003 and 2018, 295 primary rhytidoplasty surgeries were performed in accordance with the following technique. There were 250 female patients (85%) and 45 male patients (15%), and exclusion criteria included those who had secondary rhytidoplasties even though this actual technique was used. Ages varied between 38 and 88 years of age with an average age of 62 years. The blepharoplasty technique that was used in the majority of these patients was not addressed because it was not the focus of this study.

The complications were hematoma, folliculitis, infection, and delay in healing, which are common to all techniques, in small numbers, and which are resolved leaving no sequelae. No cases of cutaneous necrosis or of facial paralysis were observed. There were just three cases of paresis of the temporal branch of the facial nerve caused by manipulation during endoscopy of the frontal region with complete resolution between 1 and 3 months. The paraesthesia and/or hypoesthesia in the areas of dissection of the face, the ears, and the frontal region varied a lot between the patients with partial or total resolution, in the majority of the cases, between 3 and 6 months postoperatively. The results were considered good and effective with average duration of 10 years if the average time frame to search for another procedure is considered.

20.2.2 Surgical Technique

20.2.2.1 The Incisions

The preauricular incision is performed by tractioning the skin of the face anteriorly, and it is marked close to the border of the auricular cartilage, pretragal area, and lobule. At the superior extremity of the ear, the incision goes in an anterior direction to the sideburns following the borders inferiorly to the anterior limit, never passing this point (see Fig. 20.1). Therefore, the pilus area of the sideburns functions between a pivot of rotation of the cutaneous flap during traction and like a blocking mechanism that inhibits the superior and posterior dissection of itself preventing the stigma.

Posteriorly the marking is performed on the border of the lobule and the concha from 3–5 mm above the posterior auricular groove. Instead of making the incision in a posterior direction at the level of the middle of the concha passing through the hairless skin of the mastoid entering the scalp, it continues more above forming a type of skin flap crossing over the hairless area of the mastoid 2–3 cm above the classic retroauricular incision. After ascending, the marking descends along the precapillary margin to the height of the tragus, and it directs itself horizontally within the scalp. In this way, the scar is covered by the superior area of most projection of the ear (Figs. 20.1 and 20.2).

20.2.2.2 The Subcutaneous Plane, SMAS, and Sub-SMAS

The dissection of the subcutaneous plane extends itself through a range of 5 to 6 cm from the preauricular incision above the zygomatic arch to the lateral borders of the orbicularis oris and zygomaticus major muscles, superficially to the parotid fascia. It extends to the anterior border of the parotid gland over the platysma muscle and

Fig. 20.1 A schematic design showing the skin incisions and the area of dissection

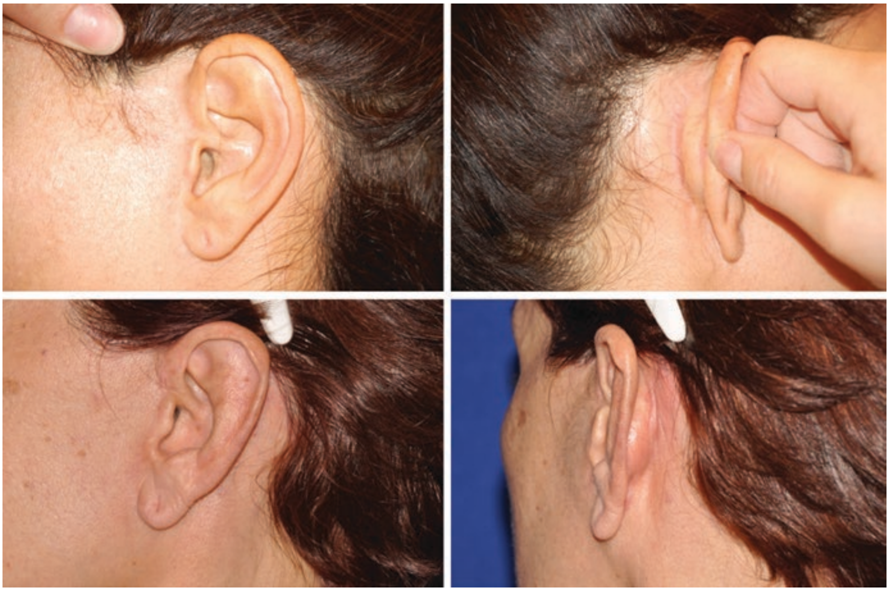

Fig. 20.2 Photographs of the postoperative appearance of the scars that go along the border of the ear, in front of the tragus, and high along the retroauricular transition above the mastoid

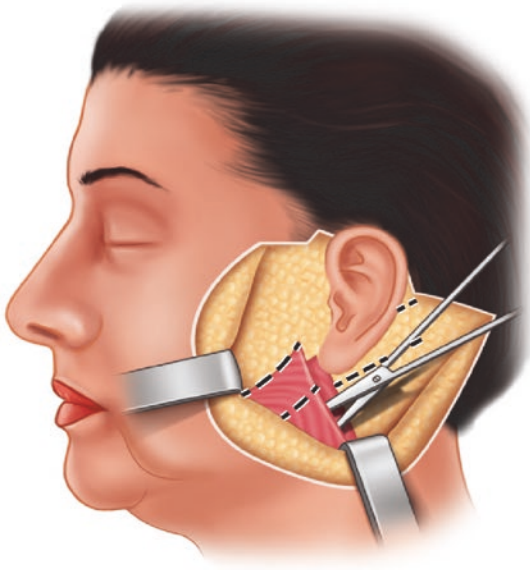

Fig. 20.3 A schematic design showing the dissection of the platysma via the incision with vertical lengthening and which is posterior to this muscle

posteriorly over the aponeurosis of the sternocleidomastoid muscle, in the mastoid region.

The SMAS is treated with a combination of dissection and plication. An incision is performed along the posterior border of the platysma muscle and a sub-SMAS dissection is done that extends from 3 to 4 cm medially (Fig. 20.3).

A vertical incision of approximately 2 cm is made on the superior and lateral extremity of the platysma creating a flap (Fig. 20.3). This flap is tractioned in the superior-posterior direction, and the segment is fixed at the retroauricular mastoid region. The plication of the SMAS at the preauricular region is performed with the original round block technique described by Stocchero [6, 7]. Beginning with the point above and anterior to the pinna, with a 2.0 nylon suture, various sutures of traction of the SMAS are performed in a continuous way going around the edge of the ear and finishing at their origin. The suture is tractioned and fixed with a knot, and the plication of the SMAS is of concentric form with predominance of the vectors in the superior direction. The redundant tissue of the SMAS tractioned by the round block technique is buried with one suture (Fig. 20.4).

An intraoperative photograph showing the platysma muscle already dissected with the SMAS.

20.2.2.3 Forehead Plasty: Video Endoscopy

Forehead plasty not only has the function of elevation and/or repositioning of the eyebrows but also treats the frontotemporal region by distributing the skin that accumulates in the zygomatic region after traction and fixation of the cutaneous flaps of

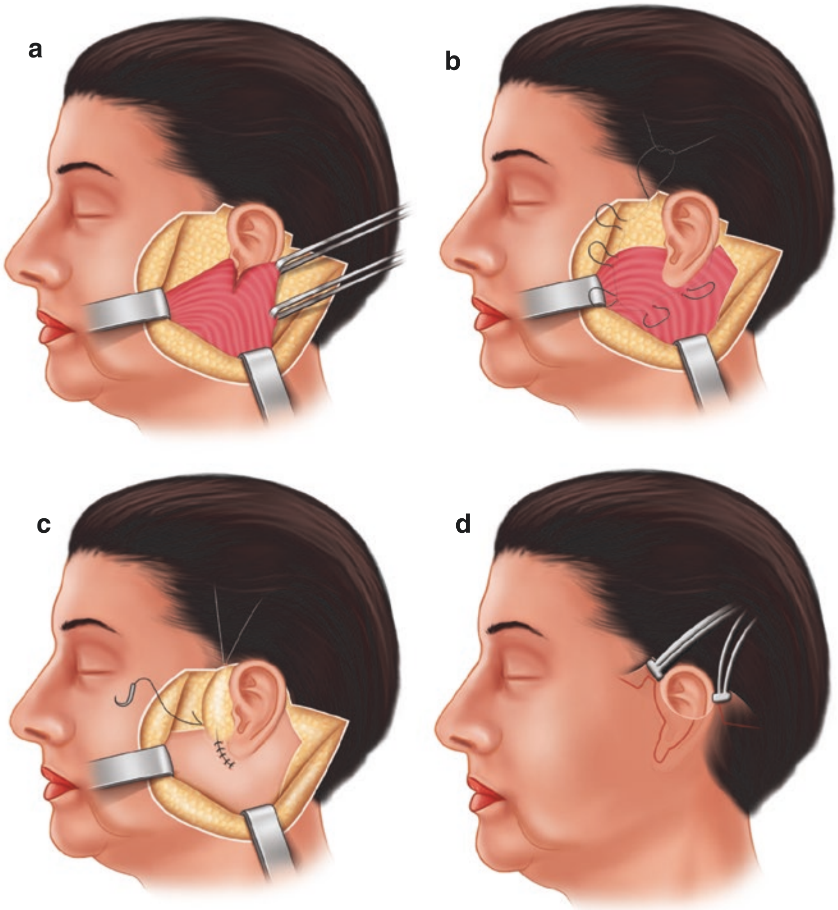

Fig. 20.4 The sequence of the designs showing the platysma flap being tractioned posteriorly; it is fixed to the mastoid region, and the suturing is performed using the round block technique. The excess of the SMAS in the preauricular region is invaginated with a running suture, and the excess of surplus skin will be excised

the face when the incision does not pass the sideburns, not ascending through the temporal region of the scalp.

The video endoscopy technique has the advantage of avoiding big incisions on the scalp when compared to the coronal lift.

With the author's technique, five incisions are performed within the scalp. A median longitudinal one of 2 cm is performed next to the pilus frontal margin. Two

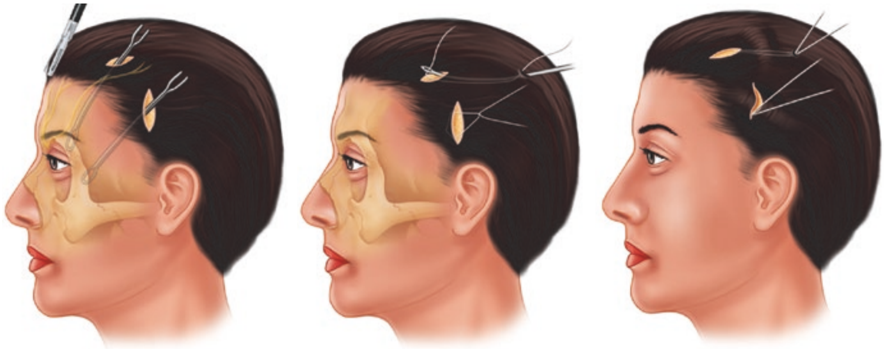

Fig. 20.5 A schematic sequence showing the area of dissection via video endoscopy, the passage of the sutures of fixation in the temporal fascia, and the loop in the parietal region. It depicts the sutures after they are tied with ascent of the tissues in the fronto-orbital region

identical longitudinal incisions of 2 cm, one on each side, medial to the temporal crest are created. Additionally, two vertical incisions are done, subtly arched, measuring 3 cm at the temporal regions over the projection of the temporalis muscles, on each side, located on the scalp, 2 cm away from the line of capillary implantation (Fig. 20.5).

The temporal region, above the muscle, is dissected via the temporal incisions at the level of the deep temporal fascia plane extending to the lateral orbital rim and zygomatic arch. The temporal crest is liberated unifying the frontal-parietal and temporal regions.

In sequence, the frontal region is dissected via the median and paramedian incisions at the level of the subperiosteal plane, in direction to the orbital rim where the branches of the supratrochlear and supraorbital nerves are identified. In this area, the corrugator muscles of the brow are stretched and severed or partially resected.

Finalizing the dissection, the flap is tractioned cranially from the lateral part of the temporal region, and it is fixed with sutures between the epicranial aponeurosis of the flap and the fascia of the temporal muscle. At the end, a pinpoint incision is performed in the parietal region 5 or 6 cm cranially to the frontal paramedian incision to introduce the needle of Reverdin modified by Casagrande for the passage of a mononylon suture 3.0 at the level of the periosteal plane. The needle is withdrawn retrogradely and reintroduced in the subcutaneous plane again toward the frontal paramedian incision to bring back the extremity of the suture, forming a loop. The suture is tractioned and fixed with a knot, lifting the forehead flap. These maneuvers are performed bilaterally except in cases of brow asymmetry where the fixations can be adequately modified from case to case (Fig. 20.5).

20.3 Results

A patient of 68 years of age with accentuated cutaneous cervicofacial flaccidity and eyebrow descent. Post-operative views at 6 months showing the effects of the plication of the SMAS-platysma and the videosurgery for the repositioning of the fronto-orbital region.

Male patient who presented with deep wrinkles and marked cutaneous flaccidity, thick skin, heaviness in facial expression, and hypertrophy of the frontalis muscle secondary to descent of the brows.

Pictured below, after global cutaneous repositioning of the facial structures, in accordance with the technique described, it can be seen that the frontal wrinkles have been improved by reducing the hypertonic reflex of the frontalis muscle.

A patient of 52 years of age, operated by the described surgical technique, showing the right side. Rejuvenation which has been obtained by the repositioning of deep structures, of the tissues from the fronto-orbital region, and of the cervicofacial skin.

20.4 Discussion

The face is made up of various components of unique anatomical characteristics. The surface is continuous, but not uniform, with large variations in cutaneous thickness, intensity of pigmentation, glands, and follicles. The deep plane is divided by septums, ligaments, bony prominences, and a muscular complex with diverse planes and directions.

Currently instead of turning a face around to appear younger, to beautify it, and to correct disharmonies, the demand is now for rhytidoplasty techniques that have a natural result without the stigma associated with having obvious perceivable surgery. Rhytidoplasty is not limited to the neck and the inferior third of the face. It is necessary to harmoniously distribute the skin over the face. For this, the knowledge of the deep anatomical structures and facial physiology is imperative as well as the understanding of the aging process and of facial aesthetics. Additionally, it is necessary to dominate various different techniques in order to apply them to each individual patient.

The incisions in rhytidoplasty are strategically located where they have the most aesthetic effect for the resection of the skin, where they are the most camouflaged, and where they have the best scarring and with better access to manipulate the deep plane. A preauricular and pretragal scar is of excellent quality when there is no tension on the sutures, becoming practically imperceptible. The precapillary incisions at the inferior and posterior margin of the scalp of the sideburns are of the same quality of those camouflaged by the hair. In the retroauricular region, a transverse scar to the mastoid is positioned superiorly and in a curved shape hiding behind the ear. It continues inferiorly and precapillary and to the anterior margin of the scalp where it becomes well-camouflaged and it enters obliquely disappearing between the hairs of the occipital region.

The main surplus of the skin on the face and neck is resected by those incisions, with traction via the most vertical vector possible. The accumulation of the skin in the region of the zygomatic arch and the lateral part of the orbit generated by the vertical ascent of the flap is distributed between the frontal and temporal parts of the scalp with forehead plasty. The wide dissection and the cranial traction of the flap distributes the superior third of the face more naturally and more uniformly, it decreases frontal and periorbital wrinkles, the crow's feet and it elevates the lateral part of the brows. It also treats the glabella wrinkles via partial myotomy of the corrugators. The author prefers video forehead plasty via endoscopy because of the reduced and intracapillary scarring, excellent results, and great acceptance by the patients.

20.5 Conclusion or Summary

The rhytidoplasty procedure is a delicate and complex surgery. To achieve excellence in the results, it is necessary to have a profound anatomical knowledge, knowledge of function, and an understanding of facial aesthetics. A knowledge of diverse surgical techniques is also necessary to make the most appropriate choice for the patient. Therefore, this is indicated in those patients with different grades of flaccidity and facial aging who do not carry important lipodystrophies of the face and neck.

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Chapter 21
Preparation of the Patient and Surgeon for Rhytidectomy

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21.1 Introduction

It is natural that each surgeon unconsciously absorbs substantial sort of knowledge also the routine of organization from his or her boss. That is a valuable experience accumulated during a long period of practice that gradually let him or her consider surgery as a sequential of steps that cannot be represented only by the surgical procedure itself. I have mentioned that it is not possible to transfer experience from one person to another, but one can teach and transfer knowledge to others [9].

This is a wide and deep concept of operation, which the main result is the valorization of the inside self of each patient, with an extra careful analysis of his or her expectations, aiming at a precise operative indication [10].

After a long period of my practice, I may express that a satisfactory result will depend not only on the surgeon-patient relationship but also on the careful observation of coincidently considerations about several technical details along the period of treatment. Consequently, it is very important to consider all stages before, during, and after operation [3, 4, 6].

21.2 Technique

Usually in the beginning of practice, a young plastic surgeon, with its natural anxiety to start in the specialty, may not concentrate enough attention involving sequential surgical steps, which are essential in order to achieve outstanding aesthetical results [12].

I already describe that it is possible to transfer knowledge since it is not our property and it is a noble attitude, but no one can transfer his or her experience since it is an accumulation of information during life [8, 9]. Following such concept, the chief of a plastic surgery unit may transfer to a young surgeon-student his or her knowledge but not personal experience after performing a great number of rhytidoplasty operations. Therefore, a resident during the adequate period of training must repeat what his or her professor does and let him or her to develop his or her own organization and systematization, which provide to achieve personal visibility about the patient and the operation as well. As I had the privilege to be trained by Prof. Pitanguy all my organization, I learned from him and also on his useful publications (Fig. 21.1) [11–14].

So far, it is important mentioning that all fields in medicine are in constant technical evolution and development which require persistent curiosity, desire, and humidity to learn new scientific information [8, 9]. Due to all these considerations, a young surgeon should follow the objective understanding that the technical fundamentals in rhytidoplasty are always opened for new ideas and innovations but under outstanding surgical principles.

I have mentioned that each patient has enough chance to choose his or her surgeon. On the other hand, each surgeon may select his or her patients and must be

Fig. 21.1 A patient's routine preparation of rhytidoplasty operation. Photo (**a**) – a sequential of preoperative photos of the patient strategically hanged up and positioned during surgery to facilitate for surgeon to check some details during operation; (**b**) a anesthesiologist is always in the operating room besides the patient even when local anesthesia is being performed; (**c**) fixation of the tube to the tooth, when general anesthesia is employed, it is a useful procedure which may be fixed to upper or lower incisive teeth using cotton which is done by some one of surgeon's staff

ready to refuse performing an operation on patient who may bring some problems postoperatively. Once again, I may say that it is better to lose a bad patient before operation instead afterward, since there is no way to get ready of him or her [1].

While I am writing this text for my book once again, I refused to perform a face lift operation on a patient because I felt that she presented several signs that some postoperative problems would happen. She was a 56-year-old female recommended by a general surgeon since I performed facial rejuvenation surgery on his wife some years ago with very good surgical result. When she came in to my office, I noticed that she was in hurry without normal attention to our conversation. She tried to speak more about the operation she was looking for than to listing what I could do for her. Suddenly she informed the exact date for the operation. Afterward I heard from my workers some bad information about her that I took the radical decision to not perform the operation.

21.3 Preoperative Preparation

Since the first consultation the relationship between surgeon and patient begins, bond that follow both of them during all the course of treatment. I use to say that there are two groups of patients that are not good candidates to undergo plastic surgery, particularly to rhytidoplasty (Avelar, 2.000b). The first one is formed by patients who do not know anything about the operation that they are looking for. For example, the cases which the patient asks the surgeon what changes should be done on his or her face in order to have a prettier look, as they believe that they are ugly and want a profound change [1]. On the other hand, there is a group of patients that they believe that they know too much about the procedure. From the beginning of the consultation, they explain about the physical problems that have already seen in a magazine or on television even in the Internet about the operation she/he should undergoes. Even those patients talk about meticulous surgical details that the surgeon must do according to that sequential technical approach. Nowadays it is normal that everybody knows something about plastic surgery since it became very popular and everyone talks about. Nevertheless there is a wide space between those two groups of patients concerning indication and the surgery as well. So far, the adequate preoperative conduct for patients who will undergo rhytidoplasty is to ask questions about the procedure and mention what bothers them about their faces, and even accept surgeon's suggestions abd technical information regarding physical abnormalities of each patient.

Once the operation is scheduled, it means that all previous and essential steps were adequately well understood between the surgeon and patient. Always I see my patients on the day prior the operation once more when the pre-operatory exams, clinical evaluation, and pre-operatory photos are checked. More important is to evaluate again the physical problems as well as the surgical planning. It is the right moment to draw some relevant physical abnormalities and to demarcate cutaneous incisions which represent the location of final scars as well. Particularly it is very important to let him or her knowing about the scars around the sideburn which is an essential anatomic point on the face. I have three vertical mirrors articulated between them through which my patient can see in front view and in profile one at the same time. I found such equipment a useful one to demonstrate some surgical details (Fig. 21.2).

Afterward the patient is ready to go to the hospital where the surgeon's team is waiting for direct preparation of the operation.

All those important aspects must converge into patient's satisfactory thoughts, representing the valorization of inner feelings in the process. I wrote previously that: "good surgical result is that when patient's imagination about him or her image is as similar as possible to that can be achieved through operation. The perfect superimposition of the two images: patient's desire and what it is possible to do for her – that is fulfilling the expectation and anxious desire of man, represents the extraordinary physical and psychological achievement" [1, 2, 8].

A young surgeon had the opportunity to follow his or her professor and to understand that once the patient is checked at the hospital the nurse and other

Fig. 21.2 Three vertical mirrors articulated between them to facilitate a patient to see himself in front view and profile one simultaneously

members of the staff do the basic evaluation. Also, the anesthesiologist must be ready to start for the first contact with patient that is the best moment to check all blood tests and cardiologic evaluation previously done according to the routine of each surgeon. This is the main moment for the anesthesiologist does his or her own clinic examination to evaluate patient's conditions for the operation. Several questions must be asked such as any previous allergic reaction to specific drugs, if some unexpected circumstances have happened during other surgeries that patient underwent, if the patient is quite sensitive to pain, and also if some vomits or other uncomfortable circumstances have occurred during or after previous surgery. So, it is the adequate moment for anesthesiologist taking the confidence of the patient [5, 7].

Pre-medication is so useful in order to relax the patient before going to the operating room, which is done according to the routine of the anesthesiologist in combination with surgeon. I used to administrate the pre-medication on the exact moment that patient can sleep and relax before going to the operating room where the ambience is quite estranging for everybody who is not member of the surgeon's staff.

After the pre-anesthesia medication, the patient is taken to the operating room. When general anesthesia or even local anesthesia combined with intravenous sedation is planned, the anesthesiologist must give special attention to the oral cavity as well as to check about the teeth. That is an adequate moment to ask about any previous dental treatment regarding the situation of all them. It is necessary such evaluation since it is useful for the way of fixation of the endotracheal tube (Fig. 21.1). This is done by some member of the surgeon's team using a *n# 0* cotton or nylon suture passing it around the two teeth and tying it to the tube. I find that organization is useful during operation when some movements of the patient's head done by surgeon during operation without any problem related for surgeon and anesthesiologist as well. So far the operation may be performed under general anesthesia or satisfactory sedation when using local anesthesia, thus avoiding an unnecessary trauma.

The trichotomy in the area of the scalp incision may be done in the apartment while the patient is still awake before taking the pre-medication. So when it is done at this moment, it is also a good time for the patient to understand the right location of the future scars after operation. Otherwise the trichotomy may be done in the operating room during preparation before or after anesthesiologist's procedure is done (Fig. 21.3). A perfect organization of the surgical team will allow some members to perform the asepsis, preparing the patient's hair in order to facilitate the surgical procedure (Fig. 21.4).

Before starting the operation, the pictures and the surgical planning are already posted (Fig. 21.1a). I always hang them on the adequate location that during operation it is possible to observe some anatomical details. All surgical ones must be written according to the surgical planning. Even I used to write all those surgical details on my table in my office in front of the patient during consultation.

Local infiltration with anesthetic solution is always performed (Fig. 21.5) no matter if the operation is done under local anesthesia combined with intravenous sedation under care of anesthesiologist or even under general anesthesia.

Fig. 21.3 Patient is already prepared for operation. One can see the right side of the patient with thoracotomy done on temporal and occipitoparietal region adequately prepared

Fig. 21.4 Preparation of the patient in the operating room after first care of the anesthesiologist. Photo (**a**) – patient is laying down on the operating table with her face, neck, and head on the right side already prepared for surgeon's team to do antisepsis since thoracotomy was already done; (**b**) photo taken from the top showing the head of the patient that one can see both side of the face; (**c**) left side of the patient showing the face, neck, and head. One can see the surgical planning: the limits of the area for local infiltration on face and neck. As she presented severe asymmetric face due to local adiposities, it is indicated that on left side present more accumulation of adiposity than on the right side. On top of the surgical planning patient's photos are exposed beside her for adequate orientation for surgeon (Fig. 21.1a)

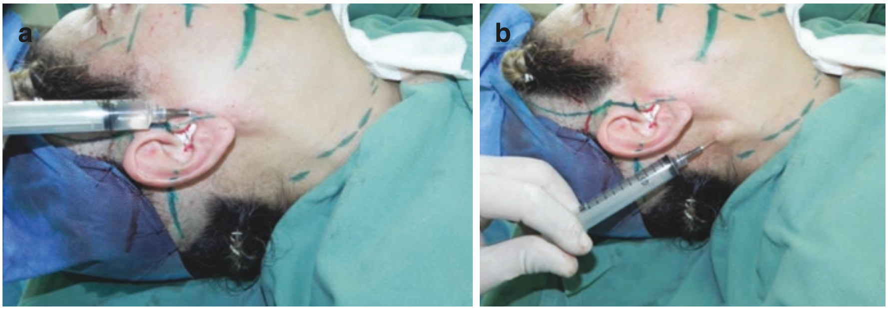

Fig. 21.5 Local infiltration is done inside the area previously planned on anterior limit on the face and on neck as well. Photo (**a**) – one can see the right side of the face with a syringe on the anterior border of the auricle performing local infiltration when local anesthesia or general one is employed; (**b**) local infiltration is done subcutaneously done on lateral side of the neck. Afterward saline solution is employ to facilitate the tunnelization procedure according to my personal operation

21.4 Discussion and Conclusions

Plastic surgery became very popular all over the world, but especially in my country it is due to outstanding results, that came from previous and current generations of well-qualified professionals, a great number of them from my country, and from around the world. Nowadays it is normal that everybody knows something about plastic surgery since it became a dream for everyone to undergo some procedures (Figs. 21.6 and 21.7). Nevertheless, during consultation is the adequate moment starting a good relationship between surgeon and patient in order to reach a good understanding among them (Fig. 21.1).

After all preparation then the surgery is scheduled, and all steps must be followed. Therefore, a young plastic surgeon has an excellent opportunity to learn

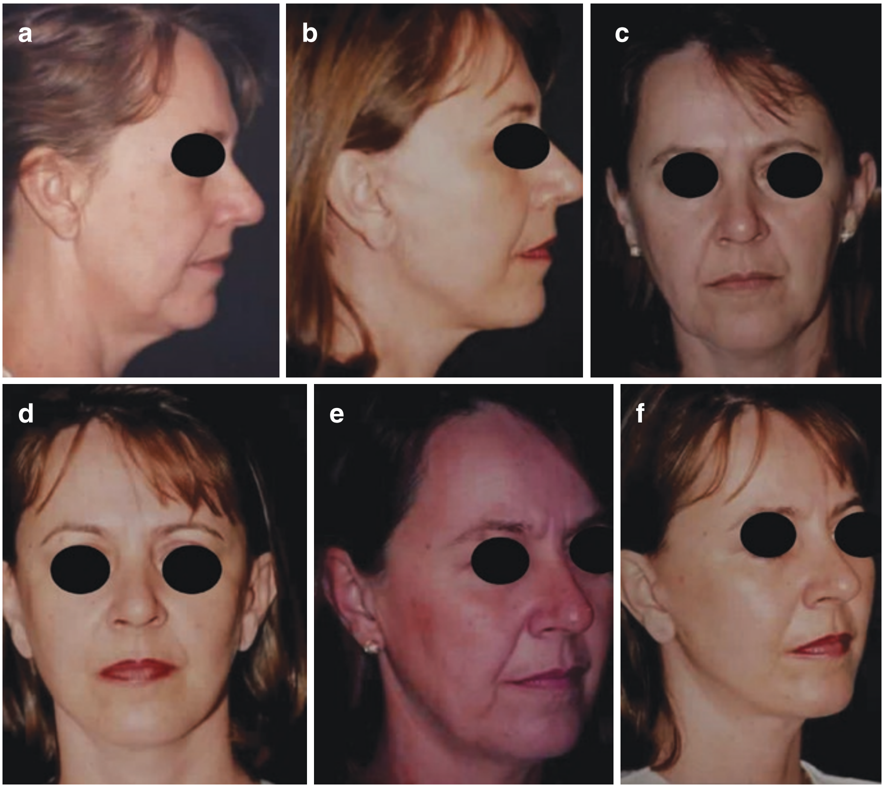

Fig. 21.6 A 53-year-old patient before and after face lifting operation. Photos (**a**, **c**, **e**) – before surgery showing flaccidity of the skin, localized adiposities on regions of the face and neck; photos (**b**, **d,** and **f**) – after face lift procedure with improvement of face and neck

from his or her professor all essential steps before operation, where adequately well understood between surgeon and patient. Since the beginning of my practice, I use to see my patients 1 day before the operation once more when the pre-operatory exams, clinical evaluation, and photos are cheeked. More important is to evaluate again the surgical planning in comparison with physical problems already previously evaluated. It is the opportunity for the surgeon to draw some important signs, even some asymmetry (Fig. 21.4) on the face, and to demarcate cutaneous incisions representing the location of the final scars as well (Fig. 21.2).

In male patients it is very important to let them know about the scars around the sideburn which is a fundamental anatomic reference on face. In front of the mirrors, the patient can follow my demarcations which are quite useful informing again some surgical details.

When the patient does the check in the hospital, the members of the surgeon are waiting for the preparation of operation. Therefore for young surgeons to follow, a routinairely organization is an excellent opportunity to absorb wide field of

Fig. 21.7 A 55-year-old patient underwent facial rejuvenation surgery. Photos (**a**, **c**, **e**) – before surgery showing flaccidity of the skin, localized adiposities on regions of the face and neck; photos (**b**, **d** and **f**) – after face lift procedure with improvement of face and neck

information concerning to perform a rhytidoplasty operation. If someone intends to start the professional activities without a long period of training, definitely the operations have a great possibility that do achieve outstanding surgical results.

In conclusion in order to achieve good aesthetic results, the patients as well as surgeons must be well prepared for successful procedure.

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Chapter 22
Facelifting: The Treatment of the Lower 1/3 of the Face

Jose Carlos Daher and Leonardo Martins Costa Daher

22.1 Introduction

The search for youth by humans found in plastic surgery is one of its main tools: facial plastic surgery. The first reports on the subject date from the beginning of the century; however, the great demand occurred in the 1960s of the last century. This theme had great evolution initially by the development of western capitalism that values and demands the youth of the people for maximum performance and production, and in response, plastic surgery presented more modern and efficient techniques. The great pillar for the development of the techniques and its wide dissemination in Brazilian society and beyond our borders was Ivo Pitanguy, who developed a school which supported and continued his work through his disciples who, from then on, developed other plastic surgery schools. Today, there is a myriad

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of procedures and technical approaches to reach the same goal of facial rejuvenation. A critical analysis of all is necessary, so that it can be defined which combination of resources are most convenient.

22.2 History

The initial technique was performed in the 1901 by the German surgeon, Eugene von Hollander, which consisted of small skin excision strips in the antero-auricular and temporal regions [14]. The results were poor. Such surgeries occurred, and the atmosphere of disapproval by society and the medical profession existed. From that point on, techniques progressed to larger incisions with tissue undermining, already delineating the thought that the rescue of youth and rejuvenation would come from the removal of wrinkles by stretching the skin. For this reason, it is called rhytidectomy or rhytidoplasty, wrinkle excision, from the Greek words rhytides meaning wrinkles and ectomy, excision.

The progress on the technique began with the thinking of larger and larger undermining areas until they interested the whole face, with a "round lift" concept of Pitanguy in the 1960s, communicating both hemifaces by undermining, including the submenton and frontal regions [13]. This tendency of traction and tissue stretching followed in the 1970s, with Tord Skoog in 1974 when he performed a deeper plane traction by undermining a platysma flap [15] and in 1976 with the publication of Mitz and Peyronie which identified and described the superficial muscular aponeurotic system (SMAS) [11].

This rejuvenation way of thinking based on skin traction began to have a new concept bias since the beginning of 1970s decade when the scissors defatting in the cervical region began [8], which showed very effective results when treating the jowls and the submenton, when in 1978 Illouz's liposuction was applied to the face in the early 1980s [10]. Surgeons began to understand that adequate facial volumes were of major importance in delineating a young face, sometimes as important or even more than the treatment of wrinkles. The young faces have well-drawn lines, the borders between the face and the cervical region are clearly defined, and these regions should not communicate. The senile face may show sub-platysmal fat, fallen cheeks, such as those of the bulldog (jowls) that have come to be identified as characteristic of the senile face. In *1988, Daher* published a paper describing the 6-point volume of the face to be treated with liposuction to achieve a facial contour compatible with a young face [5], associated with fat injections in the areas where, in the aging process, fat is absorbed naturally, as example the malar region, which is abundant in young and "melts" with aging. The fat "moves" from place to place with the aging process. It leaves the cheeks and cheekbones and migrates to the jowls, submenton, and other areas.

There was a clear technical and conceptual evolution. Treating wrinkles has its importance, either by some superficial traction (skin) or deep (SMAS), but the main goal became the rescue of the young face by redefining its contours and volumes. In this new stage, the techniques of liposuction and fat grafting evolved. Also, the appearance of the facial fillers (permanent and reabsorbable (PMMA, hyaluronic acid, and other products offered by the industry)) to fill thin wrinkles or as fillers of large volumes, rescuing lost volumes or creating aesthetically desirable volumes, and the various dermatological treatments to improve skin quality are also tools to be added to the surgical treatment.

22.3 Surgical Procedure

Here we present our surgical practice today, after a process of selection among all the techniques that have arisen since the 1960s, being said that we've practiced all of them in these 50 years of experience. The procedure here indicated was selected under a maximum cost-effectiveness ratio and is justified in a critical analysis when we discuss it.

Marking: Surgery begins in the moment of your planning. The patient in orthostatic position will be marked with indelible ink and will persist after asepsis. In this marking, we will identify the points to be corrected, notably in the first place, the volumes to be reduced and increased. The operative procedure begins with the liposuction of the marked areas and the fat grafting at the points where we must increase volumes. This stage may be complemented at the end of the surgery if needed.

Facial Liposuction: With aging there is a migration of facial fat that "changes from place to place," and the young pattern of fat distribution is lost, changing to a senile pattern. The idea is to aspirate the places where fat accumulates and replenish through fat grafting the places where it has decreased.

We have to rescue the contour of the young face, initially aspirating the fat that is accumulated in these six areas, *as illustrated and numbered in* Fig. 22.1. Every liposuction will be practiced with 2–3 mm, 15 cm length cannula, and should always be performed between the surgeon's fingers, to feel exactly what you are aspirating, without trespassing the limits.

- 1 Submenton: By a small incision (2 mm) in the submenton, at the sub-mental wrinkle, we introduce the cannula that will work until reaching the desired volume and without fat excess removal (*illustrated in* Fig. 22.2).
- 2 Jowls: This region will be treated by a small incision behind the auricular lobule that will later converge with the facelift incision. We first aspirate the jowls, which is located below the jawline (the upper jowls locates above the jawline), always between the fingers. When we come to work above the jawline, we need to be careful and aspirate a little less, because if we aspirate more than we should, we may get a very thin face on the frontal view, as well as produce undesirable depressions (*illustrated in* Fig. 22.3).
- 3 Jawlines: The redefinition of the jawline is very important, since it is the rescue of the borders between the face and the supra-hyoid region of the neck. This surgical stage begins when we treat the jowls at the jawline, concluding the

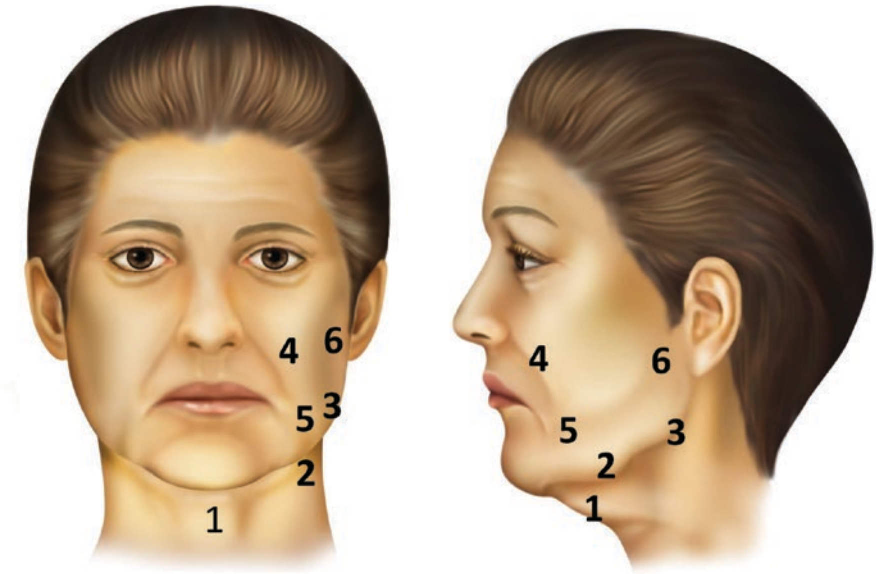

Fig. 22.1 Face zones to be considered for liposuction (Daher, 1988 [5]): 1 submenton, 2 jowls, 3 jawline, 4 nasolabial fold (high part), 5 marionette lines (cranial to the folds), and 6 pre-parotid region. Zones 1, 2, and 3 are most commonly submitted to liposuction while zones 4, 5, and 6 more rarely, only in special cases as in heavy faces

treatment of the entire line along the mandibular branch. At this time the liposuction will define the mandible edge and extend to the lateral parts of the supra-hyoid region of the neck, joining the aspiration areas of the jowls and submenton (*illustrated in* Fig. 22.3).

- 4 and 5 Upper regions: nasolabial folds and marionette lines. These wrinkles are treated primarily by fat grafting or synthetic fillers (facial fillers). However, in the very heavy or round faces, liposuction of the upper regions, cranial to the folds, can be performed gently, facilitating the equalization of the planes and diminishing the wrinkles. In order to access comfortably these areas, we can use a 2 mm incision in the supra-hyoid region of the neck, on the nasolabial fold extension (*illustrated in* Fig. 22.3).
- 6 Pre-parotid region: Also rare, but a possible indication is on very round and heavy faces (*illustrated in* Fig. 22.3).

22.4 Facial Fat Grafts

Fat grafts, along with facial liposuction, have come in an extraordinary way to complement facial contour. The target regions of the grafts are 1. malar region and tear trough, 2. nasolabial folds, 3. oral commissures (marionette lines), 4

Fig. 22.2 A 2 mm incision on the submenton, allowing liposuction of the entire area with a 2 or 3 mm cannula, that can be supplemented with an additional retro-auricular (behind the ear lobule) incision for treating the jowls and redefining the jawline

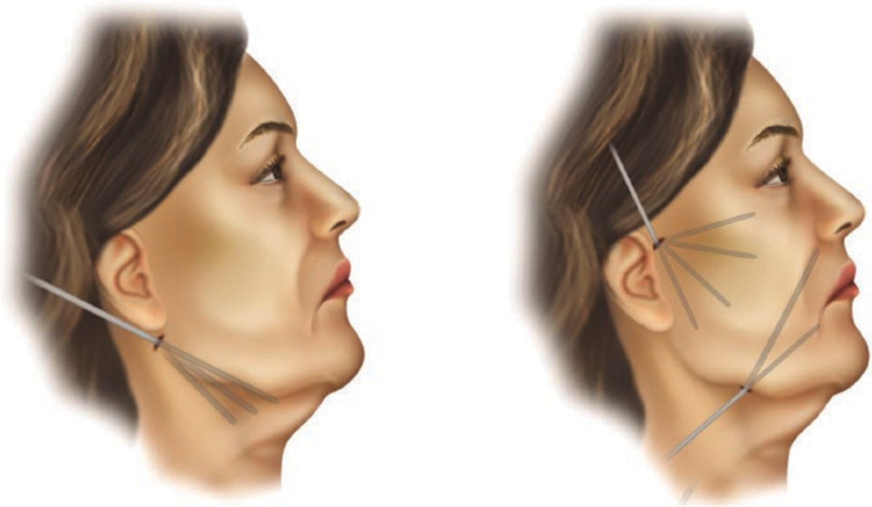

Fig. 22.3 Surgical access through retro-auricular (behind the ear lobule) region for treating the jowls and redefining the jawline. The picture on the right shows rarely done liposuction areas: pre-parotid area with a 2 mm incision near the crux of the helix and cranial part of the nasolabial fold and marionette lines, through a minimal incision on the neck

menton-mandibular fold, and 5 upper and lower lips or even a panfacial grafting which approaches the whole face.

Fat grafts since they are harmless (autologous grafts) and have quite an amount of reabsorption are being used more and more generously. We use today about 20–90 cc of centrifugated fat, at 2000 rotations per minute, for 2 minutes. This fat is transferred in 1 cc syringes and injected with 0.9 mm cannulas, with a drop-by-drop technique, preventing the formation of fat "lakes." The action can be manual or by a pistol that uniformizes the volume of each drop injected.

Skin benefits are evident, and the improvement in skin quality is clinically notable. Therefore, we indicate fat grafts on every part of the face that was not undermined; even though we do not want to gain volume in some areas, a thin fat graft layer may improve the quality of the skin.

22.5 The Platysma Bands

Continuing the surgery, after liposuction, if there is indication, we will approach the platysma bands through closed platysmotomy, a technique published by *Daher 2011* [4].

This indication will be done during the physical examination and surgical planning. Patients who have preponderant and strong bands (which occurs mainly in cases of total or partially separated platysma types 1 and 3 in Cardoso de Castro classification (*Cardoso de Castro* et al. *1980*)) [2] will have the indication of sectioning of the bands. This section will weaken these bands, helping in the treatment lateral plication of the platysma, another operative stage that we will see ahead.

22.6 Closed Platysmotomy: How to Do It

When platysma band deactivation is indicated, we will section these bands, *without opening the submenton.* This surgical procedure, if the bands are identified, occurs after liposuction and before starting the facelift.

Closed platysmotomy is a procedure we published (*Daher JC, Closed Platysmotomy: A new Procedure for treatment of platysma bands without skin dissection: Aesth Plast Surg; 2011 35* [5]*:866–77*) [4] where we are able to place a steel wire loop around the platysma band, which will cut the band using only two small needle holes. How to do it: Mark 3–6 transversal lines of 3–5 cm on each band, where we would like to section it. In each cut to be done, a 1.2 × 40 mm caliber needle will be introduced through the skin behind the platysmal band, transfixing it in its posterior part and coming out along its medial border. Now we pass a soft steel wire (flexible), diameter 0.5. The needle comes out and the wire stays. Afterward, we reintroduce the needle through the same initial hole, but it will follow a different path: it will pass between the skin and the platysma muscle, coming out in the same medial hole, where the wire is already. The end of the wire will be reintroduced into the needle, leaving it back in the initial hole. We remove the needle, and we will now have on the one hand the two ends of the wire and on the other a loop. This loop will be pressed between the fingers, and when it is well closed, we can pull it, and it will easily pass through the needle hole, without enlarging it. We therefore have, under the skin, a loop around the platysmal band and with its two ends coming out through a hole in the skin produced by the needle. These two ends of the loop will be inserted into the simplified platysmotome hole *(illustrated in* Fig. 22.4*, a metal circle like a coin with a 1 mm center hole)* and will be held by strong needle holder. When you begin to rotate the needle holder around itself and leaning on the platysmotome, you will twist the wire which is looped on the platysmal band that will crush the band. This maneuver will be performed three to six times on each side, weakening/deactivating the band completely, for long periods. Indications of closed platysmotomy: a) in cases of facelift where the bands are very present and strong. b), isolated from facelifting, in young patients with early platysma bands. c) in patients submitted to facelifting and who have returning platysmal bands. In these cases, we can easily solve the problem (because there is no more skin flaccidity) without having to reoperate the patient, as we can see in Fig. 22.5.

Fig. 22.4 Simplified platysmotome: The tool we use to lean the needle holder against it and twist the wire loop to crush the platysmal band (represented in this picture by the white tube being crushed by the wire as we twist the needle holder) [4]

Fig. 22.5 Isolated closed platysmotomy case. Closed platysmotomy can be performed independently to the facelifting surgery. In these cases the procedure can be done under local anesthesia. It is indicated in patients who have no skin flaccidity but noticeable platysmal bands or, as demonstrated in this case, in returning bands after a facelift surgery. In these cases the platysmal bands can be treated without submitting the patient to a new surgical procedure. After the procedure under local anesthesia, we only put ice for about 15–30 minutes

22.7 The Facelift Itself: Surgical Procedure

Video 22.3 A brief video of the procedure, according to the following explanation.

We mark the incision lines; it may be larger or smaller depending on the case.

We infiltrate the face with a solution of xylocaine and adrenaline 1/200,000. After liposuction and closed platysmotomy (if indicated), we start the incisions. These incisions begin in the temporal region, extend around the sideburns, and pass through the pre-auricular region, in the exact transition between the ear and face, passing through the tragus anteriorly, preserving its structure. They follow their retro-auricular path up to about 3 cm above the lobule implantation and descend posteriorly along the hair implantation line (Fig. 22.6).

In the scalp zone, we use the trichophytic incisions: the scalpel incises the tissues parallel to the hair follicle implantation, preserving them to its maximum, in such a way that they can regrow inside the scar, disguising it.

The incision is followed by the scissor undermining of the dermal-fat facial flap for about 4.5 cm around the ear, where it will already converge with the undermining made by the liposuction cannulas. We extended this undermining inferiorly to the infra-hyoid region toward the clavicle (*illustrated in* Fig. 22.9*, zone number 2*);

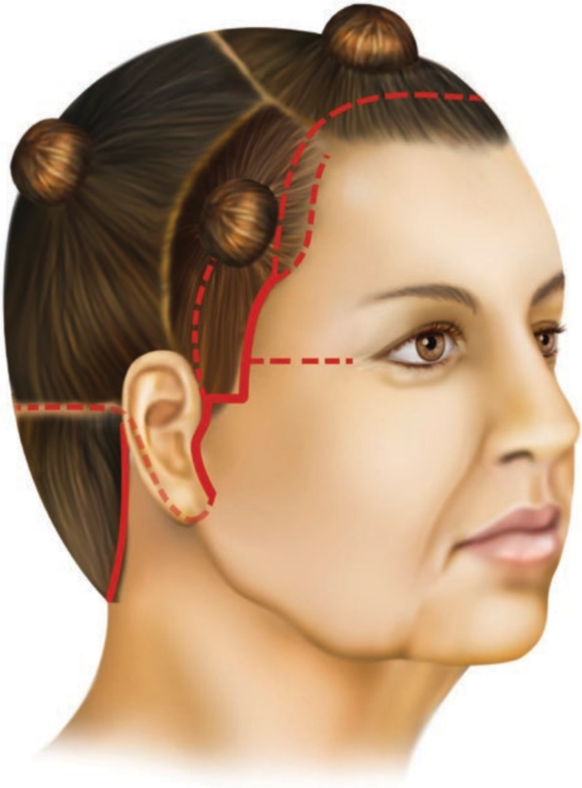

Fig. 22.6 The most commonly used incisions are drawn above on the full lines; it starts on the pre-temporal region ahead of the hair implantation line, follows the pre-auricular region through the tragus preserving it, goes through the retro-auricular region, and descends inside the hair implantation line

we undermine only the necessary to proceed with the SMAS-platysma extended lateral plication.

The intracapillary incision on the temporal region would elevate the sideburns and can only be used in patients with extremely low sideburns. The incision extension transforming it in a coronal incision is only useful in cases of the fontal region approach; indications are rare nowadays. The straight retro-auricular incision inside the scalp limits the neck skin resection, which is why it was substituted by the hairline incision.

The SMAS-platysma plication is the only procedure we do in these structures. We created a vertical incision starting at the ear lobule as a continuation of an auricular pavilion anterior line toward the clavicle until the infra-hyoid zone. This SMAS incision creates a lateral platysma edge. We identify this edge of the platysma and slightly dissect it about 0.5 cm cranially. The lateral platysma line created will continue with the methylene blue marking that follows a parallel line to the nasolabial fold (this is only a reference, because the surgeon will feel pulling the flap with his tweezers that will show the exact direction the tissues should move). The plication consists of separate 3-0 nylon stitches, with a 2.5 cm needle 1/3 of a circle. The neck plication should start below the hyoid bone (depending on the case, it may go to the

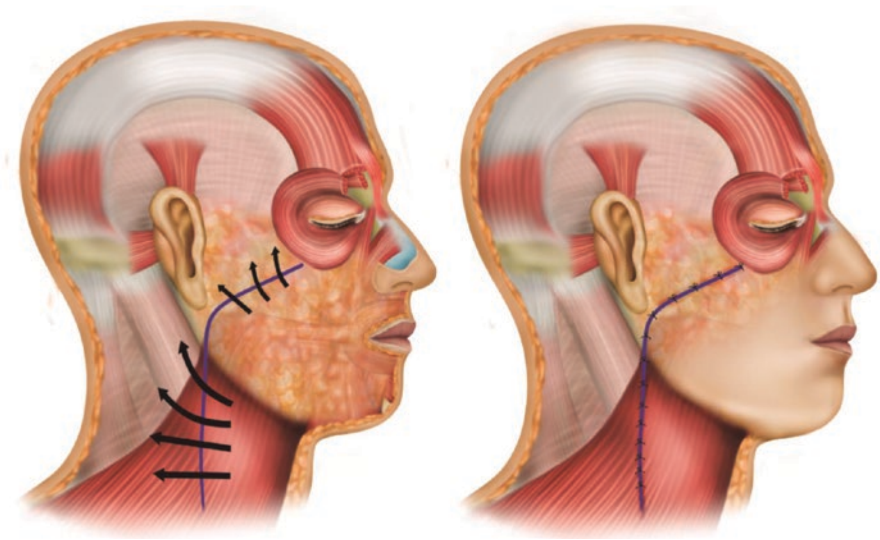

Fig. 22.7 The platysma plication line follows a straight line from the earlobe and advances upward in a parallel line to the nasolabial fold until it reaches the malar lateral zone. The arrows illustrate the different vectors in which the tissues can be tractioned, which are done with 3.0 separate sutures. Normally 15 to 25 sutures are done on each side

clavicle), and cranially the plication continues on the marking parallel to the nasolabial fold, plicating as far as the lateral side of the malar region (*illustrated in* Fig. 22.7).

About 15–25 inverted stiches with a 2-0 or 3-0 will be done for a complete and effective plication.

After plication, we will notice that the skin naturally comes since it was naturally pulled by the strong plication. We remove the skin excess, and the suture line will be tension-free. The skin resection is done in a systematic manner, starting in the temporal and antero-auricular regions, pulling the tissues in a upward/backward direction, having in mind that the tissue itself will follow its natural path. Normally the skin traction coincides with Pitanguy's teaching which advocates an oblique traction, up and back toward Darwin's tubercle (Fig. 22.8).

We will make the first fixation point of the flap above helix implantation. The second point will be retro-auricular, just before the incision passes to the scalp zone. We pull the flap upward and backward, following the direction the flaps "tells" you to go. It's the traction of the posterior flap that "suits" the neck. Afterward, we resect skin excess between these two points, following markings that circumvent the auricular region, sparing the skin next to the lobe avoiding tension that could lead us to a "trapped earlobe." We close the wounds, without tension using intradermal stitching (*illustrated in* Figs. 22.9 and 22.10).

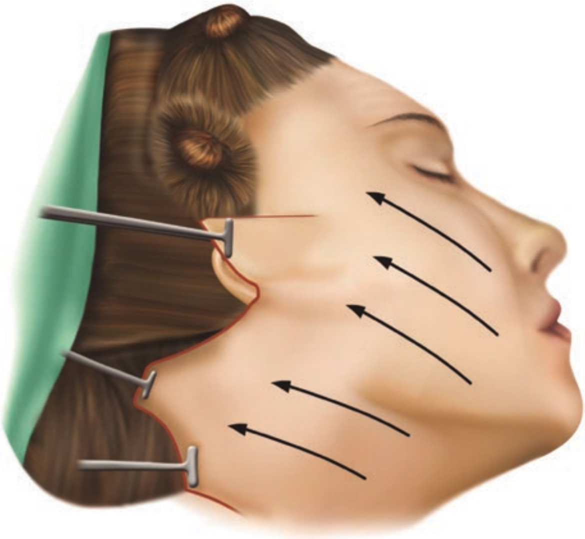

Fig. 22.8 The skin traction is delicate (since the extended SMAS-platysma plication naturally brings the tissues to its natural position). Usually the traction is made in upward, backward vector toward Darwin's tubercle, while the retro-auricular flap is pulled more horizontally to correct the neck flaccidity, which is the main goal of this surgery

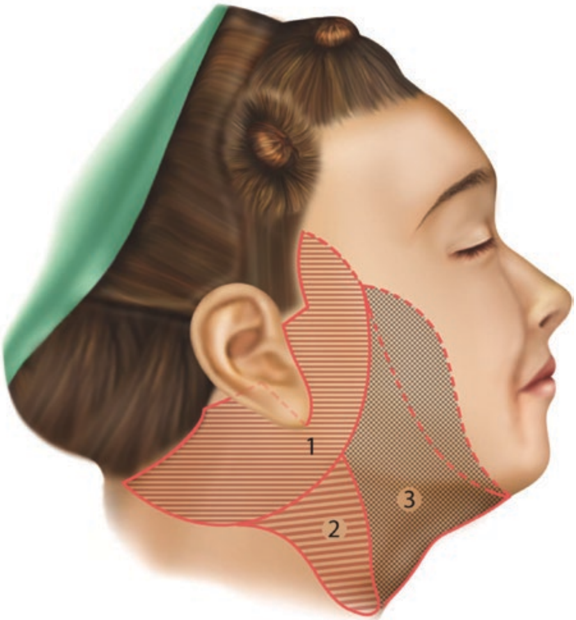

Fig. 22.9 Undermining – Area 1 illustrates the typical undermining area, having a 4.5 cm of width. Area 2 shows a complementary undermining zone for the "extended lateral platysma plication," which goes below the hyoid bone level. Area 3 illustrates the cannula undermining zone where scissors are avoided, preserving the nerves and vessels, permitting the tissue to slide, and reducing complication risks

Fig. 22.10 Pre- and 6 months post-op of patient submitted to the presented technique: facial contouring liposuction, closed platysmotomy, facelift with the extended lateral SMAS-platysma plication (without opening the submenton), and fat grafting

Fig. 22.10 (continued)

22.8 Discussion

Facial Liposuction: The idea of taking out fat may seem contradictory when we know that with age the face "withers," but that is not it. Although the face loses volume as a whole (including bone reabsorption), the distribution of facial fat in the aging process changes, and we have to aspirate it where the volumes are undesirable, on the other hand, use fat graft where most volume reabsorption occurred "cheeks" before were full and with beautiful projections in the malar region, and through the aging process they wither. It is as if the fat of these areas "melted," migrating to the lower positions of the face, accumulating on the jowls and submenton, in the upper part of the nasolabial fold, oral commissure wrinkles, and jawline, erasing the borders between the face and the supra-hyoid region of the neck.

The facelift evolved from a discreet technique to a more and more evasive procedure as the knowledge in facial anatomy deepened *(Ivo Pitanguy, Tord Skoog, Bruce Connell, Robert Peterson, Guerrero-Santos, Daniel Baker, Sam Hamra)*. The face "skin" lifting evolved to the so-called round lifting where the whole face undermined. In addition, scissors defatting was practiced as soon as demonstrated that noble anatomical structures were below the platysma muscle [1, 3, 8, 9, 12, 13, 15].

In the 1970s, surgeons began working the subcutaneous with scissors and felt the importance of taking out volumes (defatting) of the face, specifically in the jawline and submenton, as published by *Guerrero Santos in 1974* [8]. It was only a starting point for volume treatment, since skin traction was still the main goal of facelifting.

In 1976, Mitz and Peyronie described the superficial muscular aponeurotic system (SMAS) of the face [11]. The description of these structures led to a new era in which dozens of authors *(Aston, Baker, Cardoso de Castro, Connell, Daher, Guerrero-Santos, Hamra, Peterson, Pitanguy, Skoog,* etc.*)* [1, 2, 3, 4, 5, 6, 8, 9, 12, 13, 14] published different approaches to these structures, all of them focused on 1) the undermining or not of the SMAS and 2) traction vectors and its intensity, but always converging to a common sense: *traction*. We practiced this routine for face-lifting until (undermining and SMAS traction) the 1980s, when facial liposuction began. The procedures became simplified in rhytidectomies. We adopted facial liposculpture *(Daher, 1988)* [5] and found (as Pitanguy advocated in personal communication) that the firm and well-conducted SMAS plication had as good results as the SMAS undermining, being a much less invasive procedure, therefore with a better cost-effectiveness ratio. The facial liposuction brought us the conviction that the volume treatment, rescuing the young facial contour, was essential, practicing in the deep structures (SMAS) only the efficient plication (instead of having to dissect/undermine them). It is necessary to emphasize the great number of surgeons and authors who still advocate the treatment of SMAS by undermining in its several variables, although there is already a strong movement of more experienced surgeons who abandoned these techniques in favor of plication only, achieving good results and being less invasive.

Submenton: The conventional and still widely practiced treatment is to open the submenton to treat the platysma bands, sectioning them totally or partially and almost always culminating to the medial suture of the platysma muscles (corset technique) [2, 3, 7, 8]. At this time only Peterson was doing the lateral traction. Although attached to the medial suture [12].

Although we have used all of these procedures for more than 30 years, *today we only use the lateral platysma traction with an efficient plication without opening the submenton*, avoiding about 30% of the undermined area.

The treatment of platysma bands has been shown to be efficient simply through plication, eliminating them totally from the midline and achieving our goals of less invasive surgeries with excellent results.

With the aging process, facial structures and tissues tend to fall downward position toward the midline of the neck. Therefore, instead of pulling these structures to the direction they are naturally going (midline), it makes more sense to traction them laterally, returning them to their origins when younger, acting against gravity. This suggests the reason to choose this technique.

We should remember that when we do liposuction, we undermine a large area of the face and that these undermined areas remain attached to the deep planes, by their nervous vascular bundles, but they are loose to move. The areas without liposuction, we undermine with 3 mm or 4 mm cannulas so that the flap can slide.

The scissor undermining will be done in the retro-auricular region and inferiorly on the neck, below the level of the hyoid bone, being able to reach the sternal furcula if necessary. On the retro-auricular and antero-auricular regions, we go up to a two-finger width (approx. 4.5 cm). The areas to be undermined should be the least possible, serving us only to create the surgical field sufficient for the SMAS plication. Remembering that, beyond this limit, the face is undermined through liposuction areas and by the detachers, preserving the nervous vascular bundles that come from the deep planes to the skin as shown by *Marcelo Daher (Daher M, Lipofacelift: facelift with minimal skin undermining. Brazilian Journal of plastic Surgery; 2009, 24:4)* [6]. The closed platysmotomy is a complementary tool that will be used for deactivating very heavy and strong platysma bands, weakening them, and helping their treatment by the lateral traction and without necessity of submenton opening [4].

22.9 General Considerations

As we discussed, there are many techniques and procedures that can be used in facelifting. To those already mentioned, we can add other procedures, such as the sub-periosteal facelift, the approach of the sub-mandibular glands and the support threads, etc. We understand that none of them are wrong. Everyone can lead to good results, each one with its limits, but all of them showing improvements. For example, undermining and tractioning the platysma will surely give the same result as its simple and efficient plication. The question we ask: do we need all this (extensive undermining, SMAS undermining, submenton opening) simultaneously? Or can we choose the procedures that lead us to excellent results, being less invasive and having a good or the best cost-effectiveness ratio? It is up to the surgeon and his knowledge in medical literature to make good judgment and select the best technique. Our suggestion is the technique presented here: a selection of procedures used in our 50 years of facelifting practice.

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Part II
Surgical Fundaments on Rhytidoplasty

Chapter 23
Patient's Psychological Considerations Toward Surgery

Juarez M. Avelar

23.1 Introduction

Facial rejuvenation surgery is the most complex procedure on a legitimate attempt to remove the marks of the aging process of the face. The legitimization of aesthetic approach on the face by our society, in general, and the medical profession, in particular, is quite recent since the first operation is credited to Passot [18].

I have special care on psychological aspects of patients in plastic surgery, so in some of my books when it is an important topic to discuss, I used to write a chapter about it, because every physical abnormality gives patients more or less repercussion in their intimae well-being (Fig. 23.1) [3, 13]. It doesn't matter if the deformity is extensive or not, if the patient is a child or an adult, and if the patient is female or male; each one feels according to their intimae well-being and social, intellectual, cultural, and economic levels (Fig. 23.2). In fact, each patient feels and reacts in such a unique way as mentioned by Pitanguy [23]. Concerning the physical signs on the face to demonstrate the unaesthetic appearance, each patient, female and male, has the right to remove them as far as they were acquired along the life (Fig. 23.3). Even when congenital anomalies present minor or severe physical abnormalities of the face, or in other regions of the body, it is a normal desire for a patient to look for its correction. Each one wants to have a normal appearance among every one inside the social group (Fig. 23.3). However, quite often some facial marks are related to a special moment in life that may remind sufferings or unpleasant circumstances which bother the patient and motivates him or her to remove them (Fig. 23.1) (Frances C. Macgregor, M.A.) [14].

I used to say that usually when a patient goes to a physician in any other specialty, she or he looks for a clinical treatment, instead of surgical procedure. For instance, if a male or female presents a dysfunction on the stomach, even with so

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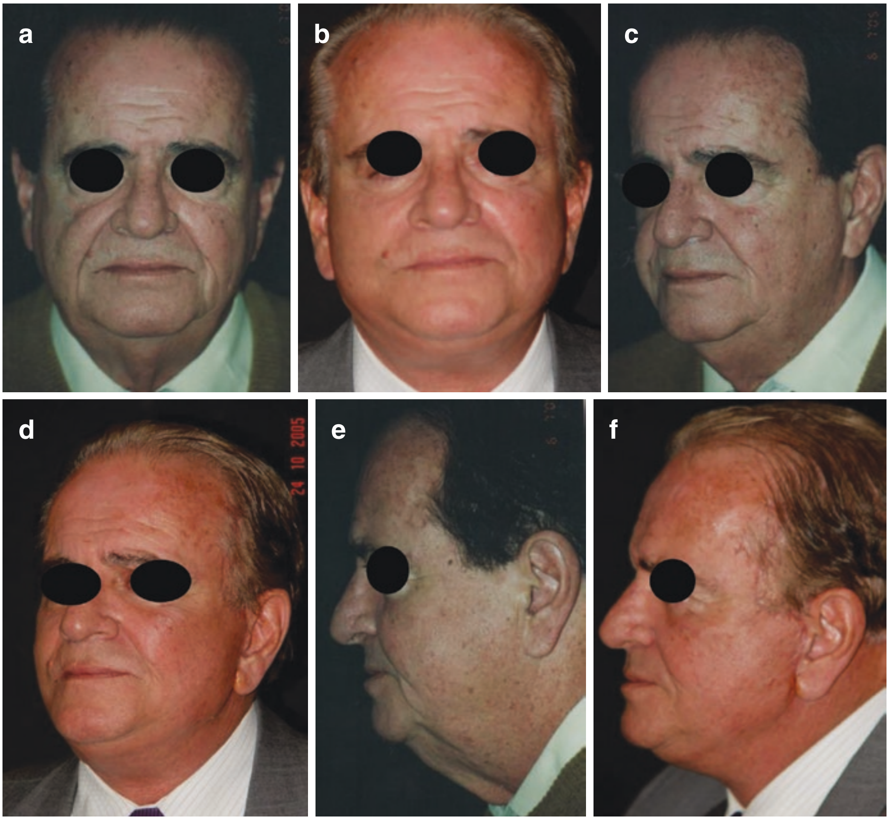

Fig. 23.1 A 68-year-old male patient before and after facelift with improvement of the nasolabial folds which were treated by subcutaneous tunnelization during rhytidoplasty. Photos (**a**, **c**, **e**) – before surgery with excess of adiposities on submental and submandibular regions with sulcus on submental and severe nasolabial folds. Photos (**b**, **d**, **f**) – after rhytidoplasty with tunnelization and liposuction above the platysma without any treatment underneath the muscle achieving improvement of facial contour and nasolabial sulcus as well. Before operation he used to color his hair, and afterward, he became confident that he does not do it anymore

much pain, he or she goes to one, two, three, or even more physicians expecting to hear from someone that it is not necessary to undergo an operation. About 8 years ago, my nurse, who belongs to my staff for the last 32 years, had a problem on her knee; she told me that after consultation to two orthopedists, both indicated prosthesis operation. She was quite afraid to undergo such complex procedure. I told her go to other professionals until she find someone who does not indicate prosthesis surgery on her knee. Later she told me that two other orthopedists did not want to perform such large operation. Until today my nurse is still working with me without any prosthesis surgery.

However, when a patient comes to a plastic surgeon's office, she or he previously did his/her own diagnosis of the physical imperfections as well as suggests the

Fig. 23.2 A 64-year-old female patient complains about aging face and wants facelift operation. Photos (**a**, **c**, **e**) – before surgery with excess of skin flaccidity on the face and neck with accumulation of adiposities. Photos (**b**, **d**, **f**) – after rhytidoplasty with tunnelization and liposuction above the platysma without any treatment underneath the muscle achieving improvement of facial contour

surgical treatment. It doesn't mean that a plastic surgeon should accept all patient's suggestions, but he must consider all physical and psychological point of views in order to evaluate the physical imperfections for further operation (Fig. 23.3).

23.2 Psychological Study

No matter if the defect on the face is minor or major, it may cause some sort of psychological repercussion to the patient. Each person feels the effects of the imperfection with a peculiar intensity [23]. Modern life constantly demands from each one to maintain good physical conditions. It is a normal aspiration for a patient to look for reparation of any physical abnormality of his/her body, because it is an

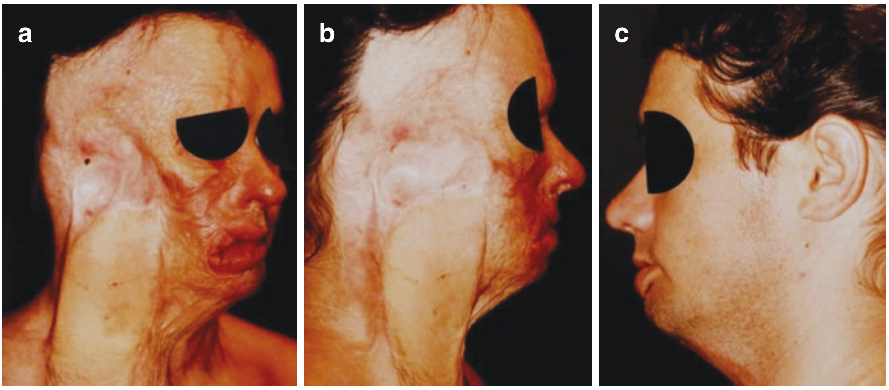

Fig. 23.3 A 28-year-old male patient had his right hemiface destroyed by car accident followed by burn. Photos (**a** and **b**) show the right side of the face; (**c**) – the left side normal, without any deformity creating a great contrast on his facial expression. He was so unhappy due to his physical appearance that he tried several times to kill himself. He was rejected by his social group; even he could not get any job caused by his physical appearance. He felt so bad emotionally that he did not wait for any reparation procedure and finally he killed himself. This is an extreme example of deep emotional disturbance caused by facial disfigurement due to abrupt accident

unbalance according to his/her concept of harmony and beauty. So far, the concept of beauty is not a pattern and there is no standard model. This concept changes from one period of life to another and also according to the social, cultural, and economic levels. Even such concept of beauty changes from one period of the history of mankind to another. Nevertheless, there are some symbols of beauty which cross long period of life even many centuries. In addition, there are some concepts which are a creation of one's self-identity in life. In fact, the physical appearance must be in good balance with the external image which one creates about oneself. The position in the social group and even success in the professional activity may depend on self-image (Fig. 23.1). We are able to correct some abnormalities of the face and body in order to reinstate the harmony of both, face and body contour; however, it is not possible to create the beauty (Fig. 23.3).

23.3 Concept of Beauty

Success in life is closely related to physical appearance. Therefore, the search for a natural appearance in accordance to the social group is a normal desire of each person. Nevertheless, sometimes patients with deep psychological disturbances may develop unrealistic images of the surgical results of the facial operation, which are far from our surgical possibilities (Fig. 23.2). Furthermore, in order to perform any physical correction in human beings, it is mandatory that plastic surgeons penetrate into the patient's psychological field to search for the motivation, the individual factors, as well as the self-interpretation of the abnormality. As I already mentioned above, no matter whether the physical imperfection is severe or not, if it is evident or not, since the patient only refers to it, the surgeon must understand how deep the repercussion of the deformity goes. I have already mentioned that when a patient comes to a plastic surgeon's office asking what she or he needs to be done on the face in order to look more beautiful, it means that definitely he or she is not a good candidate to undergo a plastic surgery procedure. A plastic surgeon should not tell a patient about any operation if he or she did not complain about any physical imperfection even if the abnormality is evident on the face such as a large and unaesthetic nose. Sometimes an abnormality on the surgeon's point of view may not correspond to the patient's desire.

So far, the presence and facial integrity surface are very important to the harmony with the body, as well as to the aesthetic balance of the appearance. Any imperfection gives unbalance or any anomaly which may modify the self-image of the patient, which is the main reason that motivates a patient to seek help from a plastic surgeon (Figs. 23.1, 23.2, and 23.3) [25, 26].

Regarding such subject Pope Pio XII (from March 2, 1939, to October 9, 1958) said at the Open Ceremony of the V International Congress at Rome in 1957: "The plastic surgeons' work with art and feelings bringing balance and intimae well-being with spiritual piece to patients, are the elements that make them closer to God" [7]. So it is time to emphasize that the fundamental importance of the surgery is not only the reconstruction of the physical image. In fact, the self-image that each person creates is the essence of his or her individuality, knowledge, culture, and criteria of personal realization. Therefore, a plastic surgeon is much more than a surgeon; he is a person who creates conditions for the patient's personality to emerge.

When patients have facial abnormalities due to aging process and wonder about undergoing aesthetic facial correction, they might not be looking for a perfect conception of beauty, but they may expect to look normal among people of their social group and to develop their activity in accordance to their physical and mental capacity (Figs. 23.1 and 21.3). There is an interesting comparison between reconstructive surgery and aesthetic surgery – "Reconstructive Surgery is a field of Plastic Surgery which makes a divine person to look normal appearance (Fig. 23.3) and Aesthetic Surgery is a field that makes a normal person to look divine appearance" (Fig. 23.2). Regarding such concept Pope Paul VI (from June 21, 1963, to August 6, 1978) once said that "Plastic Surgery cannot create beauty where it does not exist" [7]. Although Pope Paul VI was not a plastic surgeon, he expressed a fundamental principle of our specialty which is a main way to achieve a good surgical result, without any fantasy or artificial compromise of physical transformation.

To reach success patients need a good balance between the body and the inner world. It is well-known that to understand beauty is a complex field where the visual communication must be in accordance with the self-image. Due to all such circumstances, it is quite difficult to define beauty. Among several authors, Pitanguy [7] used to say that: "I am able to see and recognize the beauty, but it is very difficult to define it." Also, Illouz Y.G. [16] expressed that: "Beauty is symmetry, harmony and emotional reaction." At the same time, [1] said: "It is impossible to define beauty but you know it when you see it." I do not intend to push my position, but I can describe my own definition which represents my feeling about it as it is published in some of my books: “Beauty is a pleasant and smooth sensation originating from anatomical and physiognomic information combined with balance and harmony which fulfils all the expectation of the observer” (Fig. 23.2) [7]. In fact, I consider that beauty is always related with physical appearance combined with intimae well-being [4, 5, 11].

As I am writing about this subject, it is useful to repeat here what I wrote in my book *Liposuction*, published in 1986:

“When I look at Medicine as my profession and at Plastic Surgery as my specialty, I see through an angle capable of translating the exact meaning of the human potential, producing very deep effects which are more important and meaningful than the body itself. They materialize the sublime essence of the imaginary transformation of the human being. The surgeons’ creativity in relation to the image of the patient has a humanistic significance, while the surgery is the road in search of the spatial conception of a new being. In spite of this, the patient’s self-image is as important as his or her own body. The mysterious effects of the surgery enable the adequacy of the physical image to what they desire to achieve. The perfect superposition of these two images fulfilling the expectation, dream and motivation of Mankind, represents a fantastic and extraordinary physical and psychological realization.” (Figs. 23.2 and 23.3) [2]

Related to that concept, there is a remarkable work reported by Pick [19] after he performed the reparation of facial disfigurements in prisoners, that a significant number of them were social recuperated, representing the importance of aesthetic facial appearance. Those delinquents became more confident to find new job to work and to take part of the social life among other people. I used to say that one does not see many patients with ear deformities (congenital and traumatic imperfections) on the streets and among normal people, because they avoid exposing the deformity, since they hid at home (Fig. 23.3) [6, 12].

23.4 Asymmetry of the Face

I have already described above about the essential characteristics of each person, physically and mentally as well, which is the individuality that must be considered and is not possible to reproduce on another person. Therefore, each patient is a unique self all over the world since nature does not reproduce two people exactly alike; even twins always present some sort of difference between them [9, 10]. On top of this facial (Fig. 23.4) and body asymmetry is another peculiar situation concerning the anatomy and physiognomy of the human body. Nature cannot create a symmetric human body since our organic constitution presents important asymmetry: there are only one heart on the left side of the chest, two different kidneys, one liver on the right side of the abdominal cavity, one stomach, one pancreas, one spleen, and so on. Such anatomic characteristics are not peculiar to the human body, but it happens in all kinds of other animals and vegetables as I already described about asymmetry [9, 10].

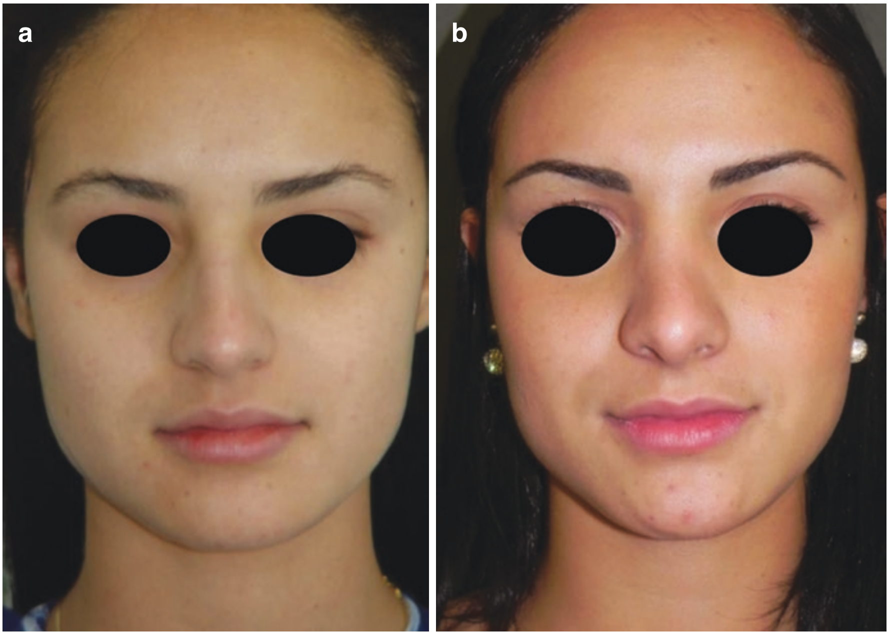

Fig. 23.4 Facial asymmetry caused by irregular localized adiposities on the right side of the face. Photo (**a**) – preoperative view of a 20-year-old girl complaining about her facial asymmetry presenting more adiposity on the right side; (**b**) – same patient 1 year after isolated liposuction on both sides of the face to achieve well-balanced facial contour

Regarding particularly the face when one of my published book was directed to present important information and orientation to legal professionals, lawyers, judges, and others, I printed my own photo of my face created with peculiar attention to demonstrate how severe is my facial asymmetry. I divided the photo of my face into two parts: the left and the right ones. Afterward, I jointed twice of the left side in order to create my image using only the left side. Also I jointed twice of the right side which creates my image utilizing only the right one. Afterward, I had three photos: my natural photo similar to that seen in front of a mirror and another two photos, one created with the left side and another with the right one. After that I identified three different faces [10]. Besides the asymmetry of the anatomy, there is the physiognomic expression which gives very important conception on each person. Due to such facial asymmetry, it is not possible to intend to create a final surgical result before surgery. It is prudent to employ all effort and technical knowledge to repair some defects, looking to reinstate the facial contour with natural appearance. However, it is not possible to create a new person changing all facial expressions of a patient in order to be similar to somebody else.

Therefore, such sort of asymmetric constitution must be evaluated before indicating and even performing facelift. A surgeon should examine carefully each side of the patient's face, pointing out and showing them preoperatively (Fig. 23.4). Quite often patients do not notice such asymmetries before performing

Fig. 23.5 Surgical demarcations prior to the operation showing to patient all about it. Photo (**a**) – surgical incisions were done with the patient in front of a mirror to demonstrate where the final scars will remain; (**b**) – three vertical mirrors articulated between them where patient can see her or him in front and profil as well

rhytidoplasty, but after operation they may find some and complain about them. I have in my office an useful three vertical wall mirrors well-articulated in between which is adequate for a patient to see the front and to look both sides of their face simultaneously (Figs. 23.4 and 23.5). As I perform frequent correction of ears, my mirrors are quite useful to demonstrate to a patient about the asymmetry between both sides. Besides to identify some sort of asymmetry of the face is very important to show to a patient and even to write on a surgeon's medical chart.

To take pictures of each patient must be an obliged preoperative procedure. My nurses take photos just after consultation which is quite useful when I see my patient again, one day before surgery. At that time I examine the patient once more and show the evidences of some kind of asymmetry, and some drawings are marked on face: projections of platysma bands, local adiposities, position of the lips, nasolabial folds, position and height of eyebrows, position of sideburn, hairline implantation, and all anatomical details which need to be identified (Figs. 23.1 and 23.2).

Originally, plastic surgery of the face for aesthetic purposes was not well acceptable until middle of the last century when our specialty received substantial scientific contributions of several outstanding plastic surgeons from many countries. In Brazil among many of them, Pitanguy became a special one due to his superb scientific contributions coming from his creativity as well as a significant popularized improvement. In fact, due to his personality, charm, charisma, courage, deep scientific improvement, and remarkable participation through the media in my country and all over of the world, more and more people in all social and economic levels became so much concerned about plastic surgery. Ever since I was his resident at his international clinic in Rio de Janeiro, I used to say to my closest friends that after his death plastic surgery in Brazil would present a big change and a new era would come in the future. Unfortunately, he passed away in August 2016 and really now we are living in a new generation in my country.

Nowadays patients look for orthodontics or reparation of any other severe abnormalities of the face, in order to achieve normal appearance. No longer it is regarded as a luxury reserved for the vanity of some women or aging actors, but rather as a social or economic necessity, or both (Figs. 23.1 and 23.2) The medical profession's acceptance of aesthetic surgery as a therapeutic procedure is reflected in the growing number of plastic surgeons all around the world. Fortunately the Private and Public Health Care Plans in my country do not make it possible for anyone to obtain partial or complete correction for facial rejuvenation. Many patients take the advent of Medicaid, for clinical or surgical treatment in any other specialties, but when the same patients intend to undergo aesthetic procedures on the face, they know that it can be achieved only under private practice. Maybe in other countries a person on relief can obtain a facelift without charge under the Medicaid which is not a good behavior for the future of our specialty.

The increasing demands for aesthetic surgery of the face have resulted from several factors. Dominant among these are the high premium on physical attributes and the cultural pressure to conform. As the role of visual impression grows in importance, appearance becomes of major concern. But the most important fact is the outstanding surgical results achieved by our colleagues with suitable and smooth appearance of the patients, excellent final scars, and natural expression which encourage other persons to look for improvement on facial rejuvenation surgery (Figs. 23.1 and 23.2). To expose the face is now a formula for getting ahead as new job or any other motivation, since the aesthetic facial appearance is of great importance. Since what we see often takes precedence over what we hear, even a politician's fate may hinge upon the art of the make-up man. Anyone who presents on television has to show his/her face under good appearance; otherwise, his or her message may not be well understood. Undoubtedly when one sees a person on television presenting unaesthetic signs of aging process on the face, unconceitedly, the observers do not give credit to him or her. Therefore, it is a matter of good communication. Another factor is the current consideration of the middle and older age groups in what has become a youth culture. Aesthetic facial surgery is unable to achieve definitive and forever youth, but it may provide a palliative result which may last for many years and decades giving patient intimae well-being (Figs. 23.1 and 23.2). With respect to employment, this trend, coupled with the traditional view that as a man ages he becomes incompetent, has created problems of such proportion that signs of aging such as wrinkles, baggy eyes, jowls, or a double chin are impediments that prevent many people from getting or holding jobs, regardless of their capability.

The great demand for aesthetic surgery has been given by scientific research findings on the social and psychological consequences of improvement of facial contour. I use to perform quite often ear reparation and reconstruction, that existing stereotypes - mostly negative or stigmatic about the personality or character of a

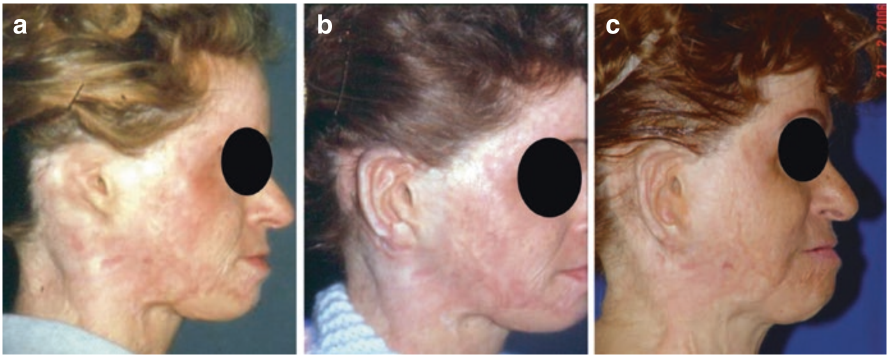

Fig. 23.6 Reparation of the face and reconstruction of the right ear caused by burnt. Photo (**a**) – a 21-year-old girl with unaesthetic scars on her face and total amputation of the right ear; (**b**) – same patient 2 years after two-stage ear reconstruction using rib cartilage and some improvement of the scars of the face and neck; (**c**) – same patient showing the result of the reconstructed auricle 21 years later

person with a deformity on the chin, nose, malformed ears or facial scars can adversely affect his mental health and chances for success in life (Fig. 23.6).

Since, in many ways, beneficial to patient and surgeon alike, legitimization of aesthetic surgery has nonetheless accelerated its hazards and complications. The public today is much more exigent about medical care and in evaluating its competence. When unsatisfied patients are unhappy about their surgical results, they have the rights and do not hesitate to seek legal aid. Nowadays plastic surgeons, therefore, are much more vulnerable than ever. His difficulties are not necessarily related to surgical skill, but lie in the area of human relations and communication. He must deal with a heterogeneous patient population, representing a wide range of sociocultural differences, and the matter of correct evaluation and selection of candidates is essential to achieve good surgical results for both, for him and for his patients.

Because the final result of plastic surgery's procedures is mostly on the external surface of the body, for such reason, friends as well as any members of the family may see and make their own evaluation. Thus our work is exposed to judgment of everyone to criticize the surgical result which made it a difficult situation [10].

23.5 Unexpected Surgical Results: Selection of Patients

Unfortunately there exists no "personality profile" or statistical chart, as some plastic surgeons have been heard too long for, by which – computerlike – one could learn in seconds whether a patient will be a psychological risk. The surgeon would like to be able to determine the patient's real motivation for surgery, whether he will cooperate or propose a management problem, what his subjective expectations are, whether he will be punitive or litigious if things go wrong, and so on. So far, a personality profile is a concept that rests on normative assumptions. While statistical frequency may be interpreted as statistically "normal," it does not follow that the patient with personality characteristics that correspond to a statistical norm is "normal" in a mental health sense. Even if one had a chart covering all types of personalities with mathematical weighting of characteristics which, when submitted to statistical analysis, would indicate or contraindicate surgery, other variables (social class and ethnic background, e.g.) would still make such an instrument one of dubious value.

Due to the nature and complexity of human relationships, the possibility of mistakes cannot be eliminated; the more aware the surgeon is of factors that affect his decisions or color his judgments, the greater the potential reduction in unhappy surprises or outcomes for himself and the patient. More frequently it is not really a mistake during surgery but may be a misunderstanding of what is the patient's expectations and the possibilities plastic surgery may achieve.

As each patient presents peculiar characteristics of personality and mental conception of his/her physical abnormalities, the final surgical result is also different for each one, as I described about individuality [9].

Since lack of relevant information is one of the major causes not only of errors in evaluation but also of misunderstandings in the management of soundly selected patients, the importance of knowing the individual cannot be overemphasized. To know him or her well enough, even to decide judiciously whether or not to operate, often requires more interviewing time than many surgeons feel is either possible or essential. Though some surgeons supplement their direct contact with the patient by chart reading and consultations with colleagues, these patients, too, may receive insufficient attention because of daily pressures and priorities. Neglect is not implied, but unawareness of certain pertinent facts is often apparent. For instance, it is generally assumed that when an unaesthetic defect about which a patient complains is evident and operable, it is both unnecessary and unprofitable to investigate or discuss with him his problems, motives, and expectations. This assumption is erroneous. In contrast to the conspicuously disfigured patient, whose needs are obvious, the one who presents a "minor" defect requires particular attention. The former's complaints are situational real, whereas with the latter, one cannot be sure. He poses special problems.

When a patient presents any facial imperfection, even severe deformities caused by trauma, he or she should look for a balance between the anatomical segments of the face and never try to look more beautiful than the others in the social group (Figs. 23.3 and 23.6) [8]. Our surgical possibilities have well-known limitations of knowledge, ability, and creativity, and it is not possible to do more than what the updated scientific and technical refinements offer. According to Pitanguy [20–24], Tagliacozzi in [27] already described the great psychological changes in patients after reconstructive surgeries, with the moral exaltation and evident reintegration in social life. Regarding ear deformities, Malbec [17] wrote about psychological and psychiatric aspects, making some relation between organic dysgenesis of the auricle and mental disease. He cited a phrase from his patients: "they are new people as they were born again." For this reason he emphasized that even minor defects of the ear should be repaired during infancy, to avoid psychological trauma in adult life. I agree with such position in my publications about ear reconstruction considering the deep modifications on the internal world of the patients with major or minor ear imperfections (Fig. 23.6) [6]. As the auricles are important organs on the composition of facial contour, any alterations may damage physically and mentally as well. Each person perceives his or her own body in detail, according to his or her sensibility (Figs. 23.1, 23.2, 23.3, 23.4, and 23.6). No matter where and how severe the deformity is, each patient cares about the corporal perception. Therefore, patients with slight deformities evaluate themselves according to their own feeling. They demand from the surgeon as much as those with major imperfections. Sometimes they seem to magnify the physical problems, but they show clearly how they feel about the deformity.

23.6 Discussion and Conclusions

While social acceptance for facial aesthetic surgery and growing demands for it have proved eminently beneficial for patient and surgeon as well, selection of an ideal candidate requires assessment of his physical defect in the context of his emotional state, sociocultural background, motivations, and expectations (Figs. 23.1, 23.2, 23.3, 23.4, and 23.6). Persons with apparently "minor" deformities may refer to special problems and should be carefully evaluated. Physical examination must be done under peculiar surgeon's criteria, considering his or her motivations for accepting or rejecting patients. Sometimes mutual satisfaction cannot be guaranteed, even when surgeon employs the adequate procedure which achieves good surgical result.

A source of problems in aesthetic surgery is the dichotomy between the surgeon's concept of a satisfactory result and the patient's expectations. The surgeon's training is basically concerned with reconstruction or correction that rebuilt the shape of the segment of the patient's body that the patient has similar objective. So, there is an important cultural variation in concepts of the final surgical result. The surgeon must be confident in his judgment about what can and what should be performed, and he may be puzzled when a patient views technically successful results as disappointing.

Preoperative consensus is based on understanding well what the patient perceives and wants and what updated technique the surgeon can recommend to achieve the natural surgical result. Knowledge of the orientations and limitations of the procedure can enable the plastic surgeon to use their services in making psychosocial evaluations and managing behavioral problems. Most of the cases when the patient is not happy with the good aesthetic result, surely it means that another professional presented some unnecessary comments about it. During the physical examination, the surgeon must evaluate the defects that the patient complains as well as some others which she or he previously did not recognize, such as facial asymmetry and some suitable imperfections (Fig. 23.4). A surgical demarcation preoperatively is a good opportunity for the surgeon to explain once again some surgical detail in order to demonstrate some physical abnormalities in front of three vertical mirrors articulated between them (Fig. 23.5). To take photos before operation is a mandatory procedure even for the surgeon to identify some anatomical details during surgery.

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Chapter 24
Anesthesia for Facelifting

Juarez M. Avelar

24.1 Introduction

Anesthesia is an important step when facial rejuvenation procedure is planned to be performed. To publish this book concerning aesthetic surgery of the face, including a chapter dedicated to anesthesia is an important topic. The purpose of this chapter is not to teach how to perform the anesthesia, but to emphasize that each surgeon may chose the adequate procedure during operation [4]. Ever since my training with Prof. Pitanguy, I observed that all his facelift surgeries were done under the care of an anesthesiologist, even those local anesthesia combined with intravenous sedation (Fig. 24.1). Therefore, ever since I started my practice, I have followed his safe systematization regarding anesthesia during rhytidoplasty. So far, I have published my book *Local and Regional Anesthesia in Aesthetic Plastic Surgery* [2, 3] in which I did not encourage plastic surgeons to perform facial rejuvenation or any other aesthetic procedure without anesthesiologist in the operating room. Meantime, aesthetic facial surgeons were fascinated to perform local anesthesia combined with intravenous sedation under the care of an anesthesiologist (Fig. 24.1).

Undoubtedly to perform an aesthetic operation requires surgeon's ability, creativity, knowledge, mental concentration, and adequate ambiance in the operating room. Therefore, besides all those surgical steps, I consider that it is not appropriate that he or she takes care about patient's conditions of life: fluctuations of blood pressure, pulse, irregularity of respiratory depth and rate, bucking and coughing, and increased bleeding in the wound. Moreover, some movement of the patient during operation may cause bleeding and some other consequences.

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Fig. 24.1 An anestesiologist is always in the operating room taking care of the patient during rhytidoplasty procedure under general anhestesia or local anesthesia combined with intravenous sedation

24.2 Method

24.2.1 Preoperative Evaluation

Before the patient goes to a hospital to undergo facelift operation, their surgeon already examinated them during previous consultations for surgical indication and planning, as well as surgical pre-demarcation, as per the routine of each surgeon.

My preference is to demarcate the reference points 1 day prior surgery and once more to examine the face and take some more photos. It is useful to do pre-demarcations at my clinic to provide essential orientation, since the patient is awake and follows my work which is done in front of a mirror. Quite often some sort of asymmetry on the face and neck may be once more emphasized and written on the surgical planning. So far, if the borders of the platysma muscles are evident, they must be demarcated, as well as local adiposities on the face or on submental and submandibular regions. Also, the incisions are again demonstrated in order to show to patient the location of final scars in front and behind the auricles. Consequently, each patient sees my pre-demarcations and confirms all information about location and type of incision I will do. After pre-demarcations, my patients will sign a consent informing about the routine to be performed.

As always, routinely blood tests, heart examination, and other specific examinations according to the surgical planning are done when they are once again observed.

24.2.2 At the Hospital

All my operations are performed at the hospital where my patients go in the morning. The anesthesiologist will visit and examine the patient before any premedication in order to gain the confidence of the patient and to relieve any fears and anxieties. In fact, that is the first time they will meet each other. During that short moment, they have the opportunity to talk and understand each other. Also, the patient's medical history, like heart problems, lung or kidney chronic disease, unstable blood pressure should be approached and other circunmstances should be considered for the surgery's anesthesia. Because of the increased risk involved, elective surgery should not be attempted following any previous diseases. The patient who is accustomed to a daily alcohol intake or who routinely takes sedatives for insomnia and who has, most likely, higher concentrations of anesthetic agents must be well evaluated before premedication to produce a satisfactory anesthetic state. A detailed oral examination is mandatory because of the many delicate dental restorations commonly observed today. Most potential errors in the management of anesthesia can be avoided by careful preoperative evaluation and planning. Finally, patient may be confident to the anesthesiologist before undergoing facelift operation.

Gentleness is an art when inducing and sustaining a pain-free unconscious state. Administering an anesthetic means applying a measured physiologic insult to a patient under precise pharmacologic control. The choice of premedication and anesthetic agents is made at this time according to anesthesiologist's decision.

24.2.3 Premedication

This optimal condition usually is achieved by a combination of drugs. The patient who has been properly premedicated arrives in the operating room in a drowsy, amnesic, and cooperative estate, with no circulatory or respiratory depression. Because of its pharmacologic activity, each drug plays an important role in the final result. Drugs used for premedication include barbiturates, belladonna alkaloids, tranquilizers, and narcotics. All these decisions and drug administration are under the anesthesiologist's control. If the anesthesiologist decides not to administer any drug as premedication, it means that it is an appropriate condition for patient who will undergo operation. Such circunmstance occurred sometimes with my patients, and I did not meddle in the decision-making, as long as the operation is going well [5].

24.2.4 Facelift Operation

The choice of the anesthesia technique is a matter of good understanding between the plastic surgeon, the patient, and the anesthesiologist. I do not feel comfortable to decide which method must be done. In fact, each surgeon should choose the anesthesia method in accordance with the anesthesiologist and patient, because having in mind that the patient's life is abolve else, the surgeon can comfortable in performing the procedure. Sometimes a patient shows preference for this or that anesthesia method, which may be previously well evaluated during consultation at the clinic, as well as during premedication. As far as the patient's suggestion is well understood and accepted by surgeon and anesthesiologist, it is reasonable to do that.

Nevertheless, it does not mean that surgeon and anesthesiologist may follow patient's suggestion, since he or she does not know exactly what the best is for him or her. Quite often, some patient says that she does not wonder to see anything in the operation room, but some other prefers to accept local anesthesia under intravenous sedation [1].

24.2.5 The Choice of Anesthesia

There are three kinds of anesthesia to perform facelift surgery:

1. General Anesthesia
2. Local anesthesia combined with intravenous sedation
3. Local anesthesia without participation of anesthesiologist

24.2.5.1 Anesthesia

Most of the facelift operations I performed were under general anesthesia, since the patient's conditions are under the control of the anesthesiologist, making me work comfortably (Fig. 24.1). Even if associated surgical procedures are scheduled, general anesthesia provides adequate and safe conditions. Nevertheless, local infiltration is always done in order to avoid too much bleeding during operation. Patient's breathing (through the endotracheal tube), heart control, drug administration, as well as all aspects during surgery are under rigid control by the anesthesiologist who must provide to surgeon peaceful conditions to carry out all surgical steps.

Usually I perform the operation with elevation of patient's chest about 30° up position with the arms along the body laterally on each side of the torso. When combined procedures of facelift with mastoplasty are scheduled, I always start the operation performing first mastoplasty due to semi-sitting position of the patient on the operating room. I consider safer to perform the operation with patient in a semi-sitting position in the beginning of the combined procedure instead of doing that after another one. Meantime, blepharoplasty is the most frequent combined procedure with rhytidoplasty. During my useful period of training with Prof. Pitanguy, I observed that he always performed facelift first and afterward eyelid operation. Nevertheless, a couple of years after I started my own practice, I changed the sequence of procedures – I do first blepharoplasty and afterward rhytidoplasty. To me it is more reasonable to perform eyelid operation first because it is a more delicate procedure, and just after rhytidoplasty the bandaging around the face is immediately done. It is important to emphasize that I do not do more than one operation associated with facelift on a patient at the same time, except when the patient presents good health conditions and the anesthesiologist accepts to perform both procedures.

After endotracheal intubation and all activities concerning of the anesthesiologist's medications providing good condition of anesthesia, the patient is then prepared for operation according to the routine of each surgeon. I prefer to bend the table about 35° in order to elevate the head and torso of the patient [4]. I had the privilege to be trained by Prof. Pitanguy who used to perform combined procedures as well as to do mastoplasty with patient in semi-sitting position as he described [6]. Technique for infiltration of the solution (without anesthetic - lidocaine).

After the patient is under the effect of general anesthesia, local infiltration may be done with vasoconstrictor agents in order tor deuce bleeding during surgery (Fig. 24.2). These agents, by causing local vasoconstriction, reduce the rate of absorption of the local anesthetic agent, if it is added to the solution in accordance with anesthesiologist, and so reduce the incidence of adverse reactions. They also prolong the duration of the anesthetic. The dangers of these agents, particularly epinephrine (which is the best), are in the use of unnecessarily high concentrations. The solution I am used to employ is 1:200,000. For preparation, I use 160 mL of sorum plus 40 mL of lidocaine (2%) plus 1 mL of epinephrine (1:1000). So the total is 201 mL which produces proper degree of vasoconstriction. Stronger solutions will increase the vasoconstrictor effect and will only invite the complications of epinephrine intoxication – which are nervousness, cold sweats, hypertension, and tachycardia – and severe arrhythmias. Errors in the preparation of local analgesic agents containing epinephrine should be avoided. Usually a volume of 201 mL of solution is enough to perform local infiltration on both sides of the face. Infiltration of the solution is done on the subcutaneous level on one side first followed by face-lift operation afterward:

(a) Firstly using short needle infiltration is done all around the auricle: in front and behind it (Fig. 24.2).
(b) Afterward a long needle with blunt tip, similar to a cannula, is used for infiltration all over the face and neck on subcutaneous level for hyperinfiltration (Fig. 24.3). When using this type of needle, it is easy to keep it in adequate plan which is just below the subdermal level. Caution is necessary to avoid deep infiltration inside the muscle which provides massive absorption of the solution with undesirable consequences. With the left hand, the surgeon can be sure that the needle is passing just below the skin and above the facial anatomical struc-

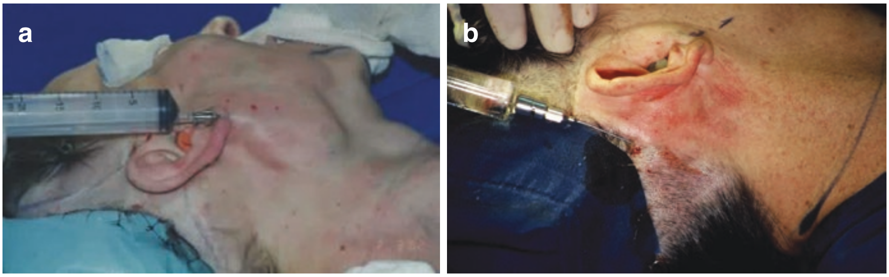

Fig. 24.2 Local infiltration with lidocaine plus epinefrine solution is done on subcutaneous level all over the face and neck regions. Photo (**a**) infiltration starts on the base of earlobe; (**b**) following the same level in all area of the face and neck

tures. After infiltration, it is useful to wait about 10 minutes before to start the operation which provides good conditions for surgery, since there is no bleeding and adequate absorption of the solution.

Through this infiltration, good anesthesia is achieved during and after operation, since nerve branches are adequately infiltrated.

Afterward skin undermining is performed following surgical demarcations and according to the surgeon's technique.

24.2.5.2 Local Anesthesia Combined with Intravenous Sedation

This is my favorable choice as far as the anesthesiologist can do good sedation in order to provide comfortable conditions. Once again, pre-demarcation as well as premedication follow the same way as it is described above. Pre-demarcations are done previously at my clinic on the day before operation.

At the operating room, the anesthesiologist administrates more intravenous sedation according to his criteria and decision. Afterward, the patient is prepared for surgery as it is described for general anesthesia.

Local infiltration following previous description above is done. In this kind of local anesthesia combined with intravenous sedation, it is mandatory to add anesthesia (my preference is lidocaine) at the solution which I call 201 [2, 3] since it is easily prepared on this method:

160 mL of sorum + 40 mL of lidocaine (2%) + 1 mL of epinephrine (1/1000)

The technique of infiltration is similar to that one previously described, that is, all around the auricle using a short needle and afterward using a long needle with blunt tip, similar to a cannula (Fig. 24.3).

When this kind of anesthesia is done, all conditions for operation may be organized according to surgeon's necessities: position of the patient on operating table,

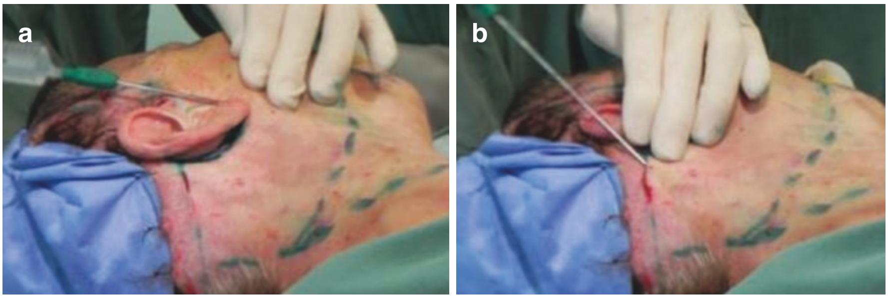

Fig. 24.3 Hyperhydratation after local anesthesia infiltration is a useful procedure before to start tunnelization on my rhytidoplasty approach. Photo (**a**) a 0.5 cm incision is made on base of the earlobule to introduce a long neddle to perform hyperhydratation; (**b**) another incision is done on mastoid area to introduce the long neddle

position of the table, local infiltration to avoid too much bleeding, and so on (Figs. 24.1, 24.2, and 24.3).

24.2.5.3 Local Anesthesia Without Participation of Anesthesiologist

I consider this sort of anesthesia as the worst one for rhytidoplasty operation, since my favorable choice is with the presence of an anesthesiologist (Fig. 24.1). There was already some sort of complications during such anesthesia with severe problems to patients and surgeon as well. It is mentioned here only to demonstrate such possibility, but I do not at all recommend to anyone. I have heard about some sort of complications during operation which may damage the procedure. Even the infiltration may not be regular all over the face if some injections do not achieve the nerve ends. Therefore, the effect of the anesthesia will not be satisfactory. If other injections are done during surgery, it may spoil the ambience of the operation.

24.3 Discussion

In order to have no interference of anesthesia effects in the final surgical result, the surgical plan should include an useful combined procedure of local anesthesia with general anesthesia or intravenous sedation performed under the anesthesiologist care (Fig. 24.4). The safe administration depends on some conditions, such as (A) proper dose of premedication, (B) application or injection of the adequate concentration of the selected agent, (C) avoidance of intravenous injections of solutions, (D) well-balanced vasoconstrictor drugs, and (E) constant vigilance to treat adverse reactions:

A. Proper dose of premedication.

   It is not usual that a surgeon performs facelift operation by him ou herself just with the staff, without the anesthesiologist participation (Fig. 24.1). The concern in avoiding patient's potencial discomfort during local anesthesia leads the surgeon to prefer the state of general anesthesia, and turns his or her attention to managing heavy premedication. The presence of anesthesiologist who has enough knowledge gives adequate support for surgeon to perform aesthetic surgery on the face and other types of surgery as well to achieve good aesthetic results (Fig. 24.5).

   Premedication is designed merely to produce a state of calm relaxation while unusual or uncomfortable situations occur. The patient should sustain all vital functions, including responsiveness. It is much safer to under medicate than to risk iatrogenic complications.

B. The application or injection of the adequate concentration of the selected agent.

   The surgeon must remember that it is almost impossible to predetermine the exact amount of premedication that will be effective on each patient. Continuous

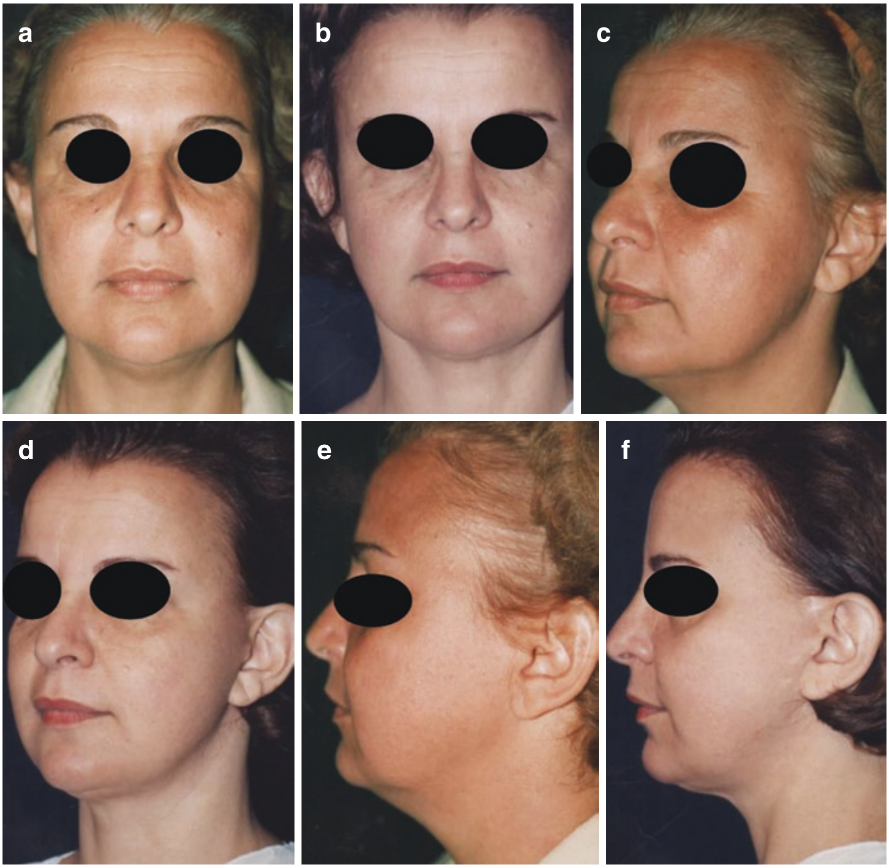

Fig. 24.4 A 51-year-old female before and after facial rejuvenation associated with liposuction on submental and submandibular regions, plication of the lateral borders of the platysma muscles, without any treatment underneath, under local anesthesia combined with intravenous sedation. Photos (**a**, **c**, **e**) before surgery with accumulation of adiposities on lateral and anterior sides of the neck. Photos (**b**, **d**, **f**) postoperatory one year after face-lift

injection of small doses intravenously may do not produce adequate degree of control.

C. Avoidance of intravenous injections of solutions – such circumstance – may happen accidentally during surgery with unexpected patient's reaction. For this reason, it is not proper for a surgeon to perform any operation without the participation of anesthesiologist (Fig. 24.1).

D. Well-balanced vasoconstrictor drugs – each surgeon must have as a matter of routine the adequate solution to use during surgery in order to avoid bleeding. In my practice, I used to employ local infiltration during facelift surgery under general anesthesia with anesthesiologist's care. My preferable solution is 1:200,000 (1 mL of epinephrine (1:1000) and 200 mL of sorum) which produces proper degree of vasoconstriction.

Fig. 24.5 A 53-year-old female patient before and after face lift operation associated with liposuction on submental and submandibular regions, suture of the lateral borders of the platysma muscles, without any treatment underneath under local anesthesia combined with intravenous sedation. Photos (**a**, **c**, **e**) before surgery with accumulation of adiposities on lateral and anterior sides of the neck. Photos (**b**, **d**, **f**) postoperatory one year after face-lift

Nevertheless, when rhytidoplasty is performed with local anesthesia combined with intravenous sedation under the care of anesthesiologist, my solution is: 160 mL of sorum + 40 mL of lidocaine (2%) + 1 mL of epinephrine (1/1000). By using such volume, it is possible to infiltrate both sides of the face.

(E) Constant vigilance to treat adverse reactions. This is the main reason that a surgeon must work with an anesthesiologist during operation (Fig. 24.1). If there are some unexpected reactions due to injection of solution, the surgeon is not adequately prepared for immediate treatment, since he or she is concentrated on the operation (Figs. 24.2 and 24.3).

The use of vasoconstrictor is useful to avoid bleeding during operation as well also to prolong the duration of the anesthetic. The dangers of these agents, particularly epinephrine, are in the use of unnecessary high concentrations. Each surgeon

Fig. 24.6 A 51-year-old patient underwent face lifting combined with blepharoplasty and liposuction of the submental regions, under general anesthesia. Photos (**a**, **c**, **e**) before surgery showing adiposities onf submental and facial regions; photos (**b**, **d**, **f**) postoperatory views where one can see graceful facial contour following the direction of traction of facial and neck skin flaps. Also the natural position of sideburn, the nice scars in front and behind of the auricle and normal position of earlobe

may have a routine solution which all members of the staff are used to it in order to observe the preparation as well as the volume during administration to achieve good surgical result (Fig. 24.6).

24.4 Complications

Some sort of complications related to anesthesia during facelift surgery may happen due to:

A. Dose of drugs administrations
B. Metabolic unexpected reactions
C. Allergenic reactions

D. Postural imbalance
E. Respiratory depression
F. Cardiac arrhythmias

As far as an anesthesiologist is in charge of the anesthesia, he or she must take care of the patient all the time from the premedication until after operation while she stays in the operating room.

In case of circulatory depression, as indicated by hypotension, the anesthesiologist immediately must check the respiration, pulse, and blood pressure, since tachycardia, tachypnea, and hypotension are the adverse signs most frequently encountered.

The anesthesiologist must check if inadvertent intravenous injection was done or if there is incorrect dose of drug concentration, such as exceeding the toxic dose of an agent, as these are some common errors.

Patient should never be left unattended: means of monitoring the patient's vital signs must be used all the time. Such essential monitoring must be done by efficient electronic devices all the time during operation.

Regardless the anesthesia method, local anesthesia combined with general anesthesia or intravenous sedation, or epidural anesthesia, or even use the intercostal block anesthesia; The final step for the anesthesiologist is when the patient goes out of the operatory recovery room.

24.5 Conclusions

Any breast operation must be well evaluated preoperatively by the surgeon based on the patient's complaints. The operation to be performed at the hospital must be well planned and must be under the care of an anesthesiologist. Blood tests, heart examination, and others must be done preoperatively according to a routine of each surgeon. Premedication is an important step before surgery since it is the first time that the patient talks with the anesthesiologist. The choice of the anesthesia is a matter of good understanding between the surgeon and the anesthesiologist, which may be general anesthesia, local anesthesia combined with intravenous sedation, or epidural anesthesia combined with intravenous sedation. There are other possibilities to perform mastoplasty, but they are not safe ones.

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Chapter 25
The Anatomical Basis for Neck Lift

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25.1 Introduction

In this chapter we will discuss the several anatomical structural conditions that change with the age and affect the neck's appearance, with more detailed descriptions regarding the anatomy of the platysma muscle and its relations with the superficial musculature aponeurotic system (SMAS).

25.2 Method

In 1980 [1], 100 cadavers prepared for anatomical dissection were examined. The initial purpose of the study was to observe the mandibular ramus of the facial nerve. When we were studying the photos, we noticed different types of distribution of the medial fibers of the platysma muscle [2] in the midline. We noticed the fibers were joined or separated, and then we classify them. The importance of this knowledge extended the choices when treating neck deformities.

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25.3 Anatomy

25.3.1 *The Skin*

The skin ages differently depending on our genetics and lifestyle. As the years go by, the tissues of the neck become flaccid and show the consequences of gravitational forces. Intrinsic changes of the skin may be seen in the aging face and neck: fine lines and wrinkles, abnormal pigmentation, a loss of elasticity, or atrophy.

Thin lines usually appear first, followed by wrinkles, and, over time, we experience a loss of volume and a loss of elasticity. The firmness and brightness of the skin diminish and the wrinkles deepen. The general aging of the skin begins to affect our appearance from the age of 40, and by the age of 50, the subcutaneous tissues atrophy, contributing to the formation of increased wrinkles and skin sagging [5]. Because it is not a support structure, but a covering organ, the skin participates in the final result of the neck lift in direct reason if its quality and appearance (Fig. 25.1a–c).

Fig. 25.1 (**a**–**c**) Changes observed in the appearance of the aging neck: platysmal bands, laxity of cervical skin, frown lines, and jowls

Skin aging is a natural process, and much of it is brought about by factors we cannot control (such as our genetics). There are, however, external factors at play too, and many of these can be influenced positively. Certain lifestyle choices (such as the amount of sun we expose our skin to and our diet) can speed up skin aging and cause skin to age prematurely.

Making sensible decisions, and giving skin the protection it needs, can help to keep it looking younger for longer.

Currently, aesthetic treatments have contributed to the improvement of skin quality, but when we analyze the exposed factors, the degree of skin flaccidity, and the accumulated fat distribution in the submental and submandibular regions, it is clear the importance of the surgical treatment with the objective of adapting the tegument to the structure of the face and cervical region in obtaining a good aesthetic result.

25.3.2 Bone Structure

The bone structure participates according to its conformation. The ideal neck configuration has been described as having a cervical angle of 105 ° to 120 °, with a distinct mandibular border. A well-positioned and delineated jaw allows better results [6]. Prominent mandibular also provides brighter results.

The hyoid bone is found in the anterior portion of the neck, between the mandible and the larynx, at the third cervical vertebra. Its location is important in the preoperative evaluation. The high hyoid bone limits referent results to the neck lift.

25.3.3 The Subcutaneous Tissue

The subcutaneous tissue is basically composed of adipose cells. Of variable thickness, it involves the superficial muscular aponeurotic system (SMAS), the mimetic and cervical muscles, superficial vessels and nerves, having an important role in the definition of the volume, and contour of the face and neck. Its quantity and distribution act indirectly in the result of the elevation of the neck, and we do not advise the liposuction above the mandibular line.

25.3.4 Platism and Its Anatomical Relations

The platysma is a broad flat muscle located in the anterolateral region of the neck, under the skin and subcutaneous tissue, and over the sternocleidomastoid muscle (Fig. 25.2a, b).

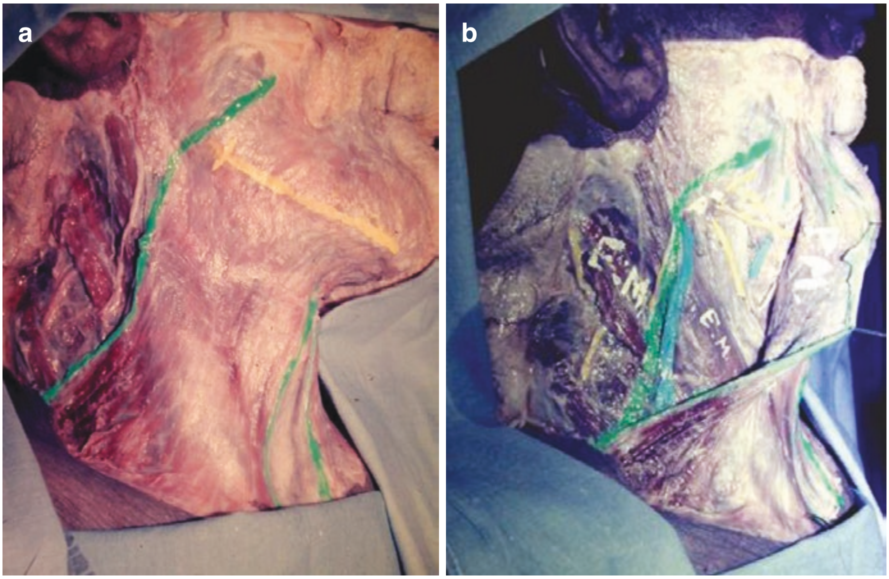

Fig. 25.2 (**a**) Dissected anatomical piece of the platysma muscle (PL) and (**b**), platysma muscle (PM) folded showing sternocleidomastoid muscle (EM)

Inferiorly, it inserts in the subcutaneous tissue of the subclavicular and acromial areas. Then the fascicles run upward and medially, crossing the lateral portion of the neck obliquely and ending in the inferior border of the mandible and lower face. The medial fibers interlace with the opposite fibers just below the chin; the posterolateral fascicles insert in the lower third of the oblique line of the jaw and interlace with muscles that insert in the corner of the mouth [4].

It has action in the mimic of the face, helping to lower the lateral corners of the mouth. It is important in certain animals like horses and bois and in some fish, where then they are developed, unlike the man who would have the atrophied muscle. According to some anatomists, it may even be absent in some people. Fact not observed in our studies.

In our dissections we noticed that the distribution of platysma fascicles shows variations. Sometimes the fascicles are underdeveloped and sometimes there are extra numbers of them.

We found three different distributions of medial fibers of the platysma muscle in the submental area. These variations were classified into three types: type I, which is the most common, muscle fibers are separated at the suprahyoid region interlacing at about 2 cm below the chin (Fig. 25.3a, b). In type II, fibers decussate at the level of the thyroid cartilage behaving as if they were just a single muscle at the submental area (Fig. 25.4a, b). In type III, the platysma medial fibers insert directly at the cutaneous muscle of the chin without interlacing (Fig. 25.5a, b).

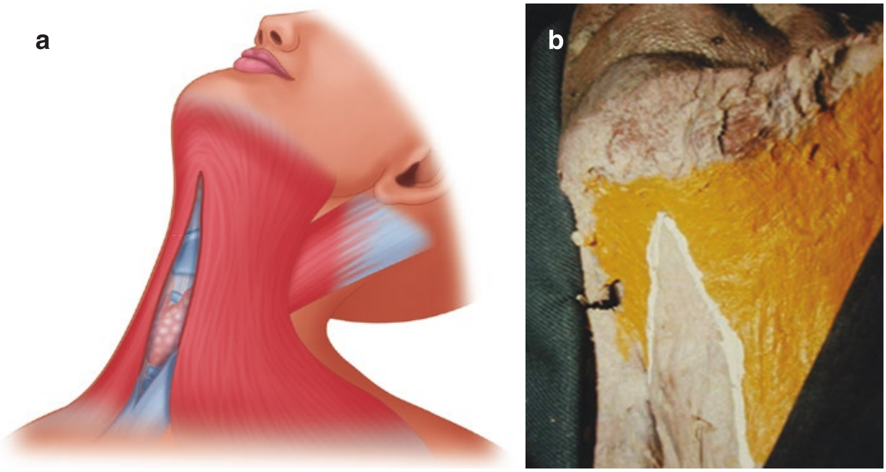

Fig. 25.3 (**a**, **b**) Schematic representation and cadaver dissection of distribution of platysma fibers in the suprahyoid region: Type I

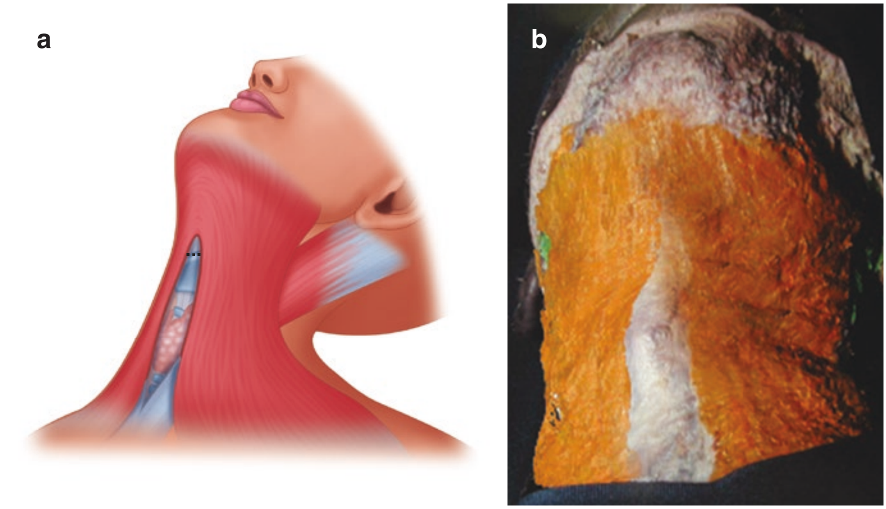

Fig. 25.4 (**a**, **b**) Schematic representation and cadaver dissection of distribution of platysma fibers in the suprahyoid region: Type II

Evaluations of dissection studies show that the platysma muscle and SMAS form a unique anatomical entity. SMAS is a continuous and organized mesh of fibrous interconnections on the face, which connects the facial muscles to the dermis, consisting of a three-dimensional architecture of collagen fibers, elastic fibers, fat cells, and muscle fibers. Superiorly the SMAS has important insertions in the zygomatic arch. Inferiorly,

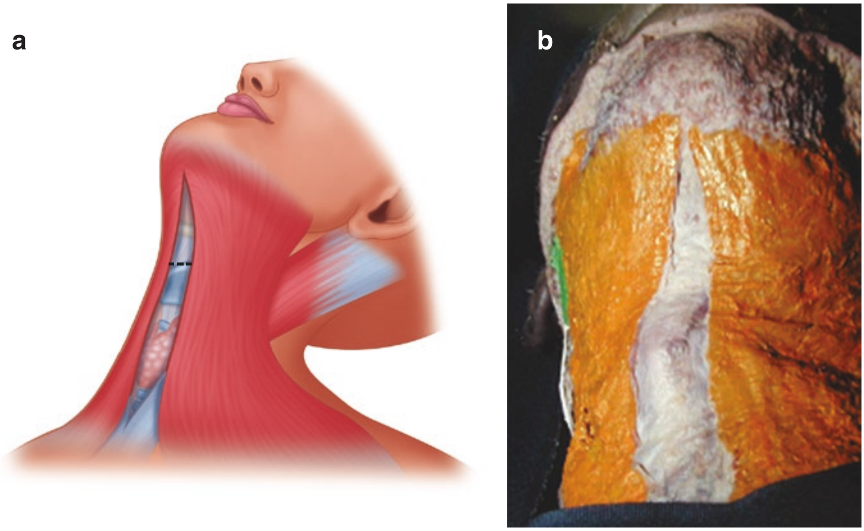

Fig. 25.5 (a, b) Schematic representation and cadaver dissection of distribution of platysma fibers in the suprahyoid region: Type III

Fig. 25.6 Anatomical relationships of SMAS

toward the neck, the SMAS continues with the fascicles of the platysma muscle (Fig. 25.6). The insertion of this structure into the cutaneous musculature of the face explains the efficacy of certain surgical procedures. SMAS allows the human face to express many different nuances and gradations of expressions [7].

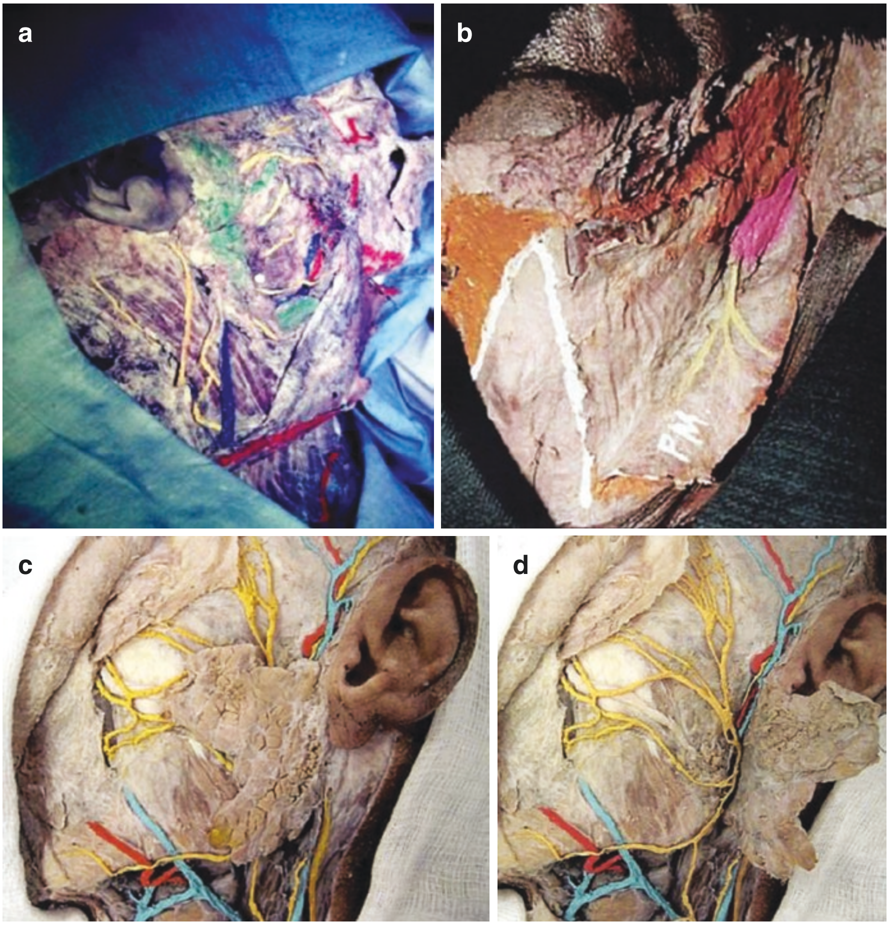

Fig. 25.7 (**a**) Dissected anatomical piece showing: the external jugular vein (blue), the main cutaneous branches of the cervical plexus, and mandibular branches (yellow). (**b**) Dissected anatomical piece showing the cervical branch penetrating the platysma muscle (PM). (**c**) Dissected anatomical piece exposing the terminal distribution of the branches of the facial nerve and its relations with the parotid gland. The cervical branch leaves the inferior pole of the parotid gland in the company of the marginal mandibular branch, but they are always separated at the level of the angle of the mandible. (**d**) Dissected anatomical piece with the parotid gland folded. The marginal mandibular branch presents superficial position to the artery (red) and facial vein (blue) and is located about 1 or 2 cm below the lower edge of the mandible body

When one elevates the platysma muscle, one finds the sternocleidomastoid muscle, the external jugular vein, the main cutaneous branches of the cervical plexus, the lower portion of the parotid gland, the submandibular gland, and branches of the facial nerve – among them, the mandibular branch [3] (Fig. 25.7a–d).

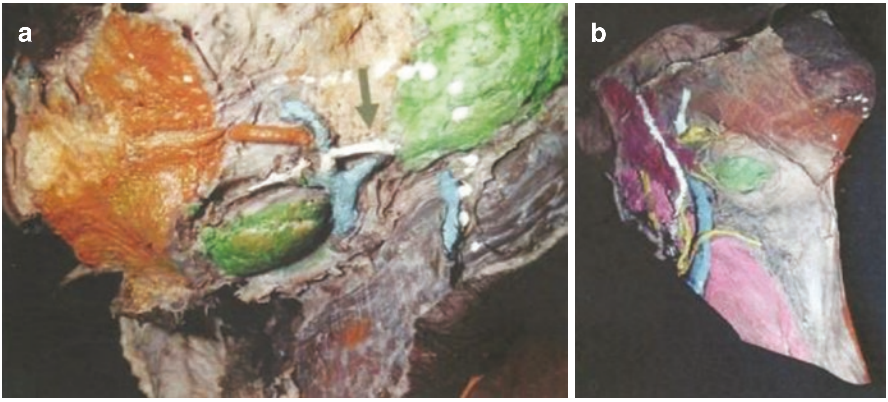

Fig. 25.8 (**a**, **b**) Anatomical pieces showing submandibular glands (green) and parotid gland (grey)

Based on these anatomical observations and on clinical analysis, types I and II can be changed into type III with the proper muscle removal. This procedure is performed after skin undermining and submandibular lipectomy.

25.3.5 Glands

In the neck, the submandibular glands can be prominent and have their contour apparent. They are partially covered by posterior half of the base of the mandible. The hypertrophy of the gland is multifactorial, and its variations in size and shape suggest that these elevations in some patients cannot be eliminated but rather attenuated (Fig. 25.8).

During rhytidectomy, it is common to see ptosis of the same by loosening the platysma muscle and the deep cervical fascia, leading to the loss of the contour of the mandible. The different platysma suspension techniques should be effective in correcting this ptosis.

25.4 Conclusions

It can be concluded that the success of cervical lift surgery is based on the importance of the anatomical study of the platysma muscle and its anatomical relationships. It is of extreme importance that the plastic surgeon has a solid anatomical knowledge of the supra-hyoid region.

25.5 Abstract

Neck lift has become a very popular surgical procedure, and several are the anatomical elements involved in this procedure, some altering and others influencing the result. Several papers about techniques have been published, and much has been discussed about the several anatomical structural conditions that change with the age and affect the neck's appearance. We will analyze individually each anatomical element involved with more detailed descriptions regarding the anatomy of the platysma muscle and its relationships.

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Chapter 26
Anatomic Considerations of the Facial Nerve and Their Relevance to Facial Surgery

Antonio P. Pitanguy and Eduardo B. Pantoja

26.1 Introduction

Injury to the facial nerve during a facial surgery is a rare but serious complication. Most of the types of facial surgery (congenital, reconstructive, and cosmetic) present a risk to one or more branches of the facial nerve [12].

Avoiding facial nerve injury during an elective procedure, such as facelift, is of paramount importance, as evidenced by a large body of literature on understanding the anatomical course of the facial nerve and its relative danger zones. Pitanguy and Ramos in 1966 conducted an important study that is still relevant. It was noticed that in spite of the great variation in number and disposition of temporofrontal branches, the direction was consistent. Using the knowledge of the course of the nerve projected on the skin, the authors described a line, known today as the Pitanguy line, that is still helpful to guide plastic surgeons to safely perform a facelift [11].

Most of the prior reports have focused on identifying the location of facial nerve branches based on the trajectory of the nerve, mostly in two dimensions and rarely in three dimensions. This third dimension, the depth, and the relationship of the facial nerve to soft tissue planes are the most relevant for the surgeon in today's world. The knowledge of the anatomy at the time of the first reports, considering the dimensions, guided the authors to advocate the subaponeurotic dissection, in all its extension, above the frontal branch [12, 16]. Although the precise location of facial nerve branches is variable, its relationship to soft tissue planes is relatively constant.

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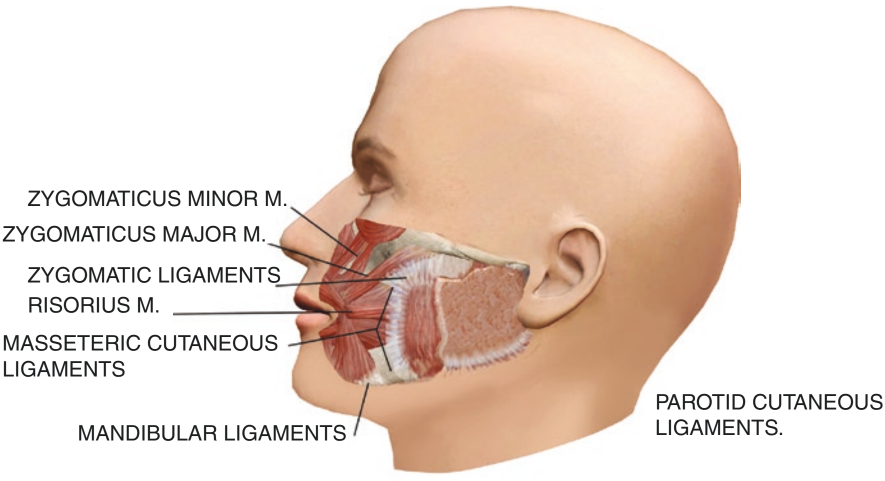

Fig. 26.1 Facial ligaments and facial muscles

Therefore, besides understanding the nerve's trajectory, the surgeon must know its location relative to fascial planes to determine the appropriate depth of dissection for the nerve to remain protected. Probably, the facial nerve is at greater risk of injury where nerve branches sit most superficially and are adjacent to retaining ligaments (Fig. 26.1).

These ligaments often require release for proper redraping of soft tissues and can push the dissection into a proper plane, creating greater risk of nerve injuries.

26.2 Topographic Description

The facial nerve is the seventh cranial nerve. It includes both motor and sensory fibers, besides parasympathetic fibers. Its motor fibers are responsible for innervating the following: muscles of facial expression, stapedius, stylohyoid, the posterior belly of digastric, and occipitofrontalis, while the sensory fibers are responsible for taste from the anterior 2/3 of the tongue. The parasympathetic fibers, on the other hand, provide innervation to the submandibular, sublingual, and lacrimal glands as well as the mucous membranes of the nose, palate, and oropharynx.

The origin of the facial nerve lies in the central nervous system in the lower portion of the bridge in the brainstem, and it shows a short intracranial path before it reaches the internal acoustic meatus in the temporal bone. Once inside the bone, it merges with the intermedius nerve forming the geniculate ganglion, and, from this point, it gives rise to the intracranial branches (large petrosal, stapedius, and chorda tympani). The facial nerve is subject to lesions in the abovementioned area in the case of fractures of the skull base at the level of the temporal bone. Soon after

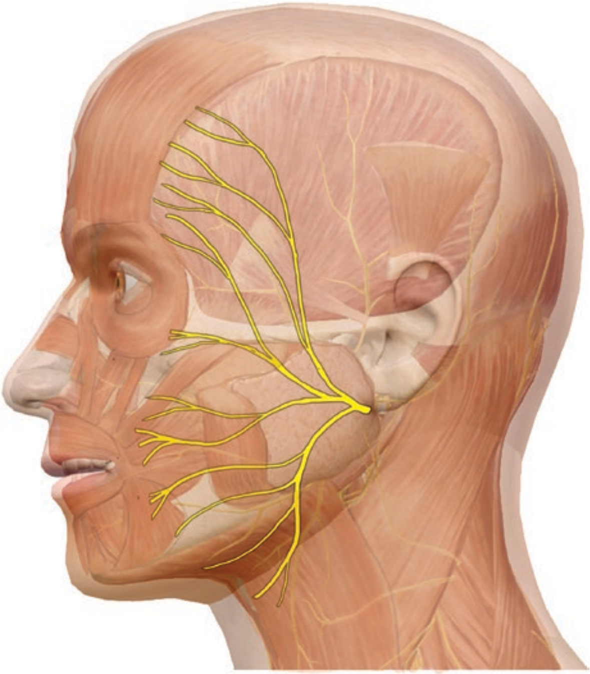

Fig. 26.2 Distribution of the facial nerve

exiting the stylomastoid foramen, the facial nerve gives rise to small branches which are the posterior auricular nerve, the nerves to the posterior belly of the digastric and to the stylohyoid.

Then it moves forward as the main branch and, from this point on, the facial nerve enters the parotid gland where it forks into two main branches: zygomatic-temporal and cervical-facial, which, in turn, divide themselves into five main branches that are extremely relevant to the esthetic surgery of the face: frontal, zygomatic, buccal, marginal mandibular, and cervical (Fig. 26.2).

The zygomatic and buccal branches show a significant variety in terms of position and branch patterns as well as a reasonable overlap in the muscles that they innervate – most of the time they are grouped together and referred to as "zygomatic-buccal." The frontal (temporal) and the marginal mandibular branches are, perhaps, the ones that pose the greatest risk of iatrogenic lesion, especially when the muscles they innervate show little or no cross-innervation, which makes the nerve lesion less forgiven [1].

Frontal branch. The frontal branch has long been considered one of the more vulnerable facial nerve branches, given its fewer number of branches, lack of significant arborization to other facial nerve branches, and relatively superficial nature [12]. Early reports on the anatomy of the frontal nerve, starting with Furnas and later Pitanguy and Ramos, described the frontal branch as a single ramus crossing the zygomatic arch, with some variation [7, 11, 14] (Fig. 26.3).

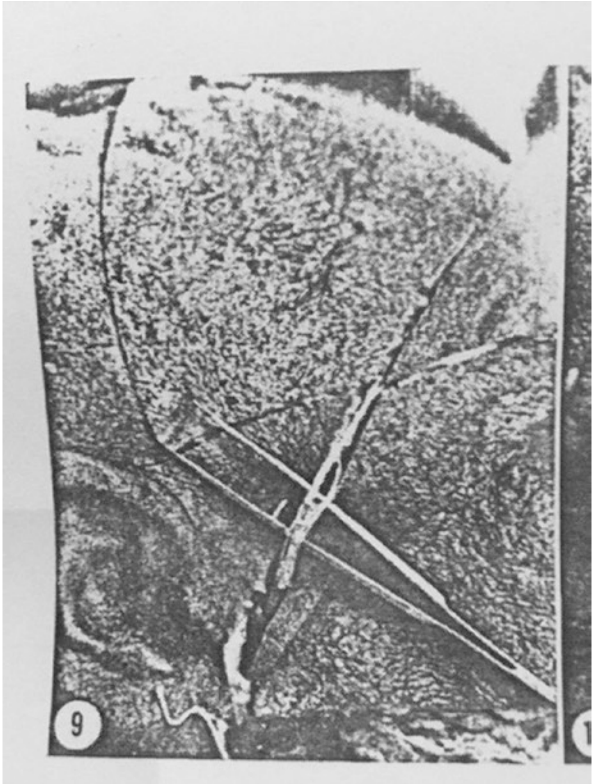

Fig. 26.3 Trajectory of the temporofrontal nerve – and its projection on the skin on cadaver dissection – Pitanguy archive

This early reports from the pioneer was a great contribution for the field and a benchmark for further data and investigation searching patient safety. More recent reports, however, have confirmed the frontal branch to have between two to five rami crossing the central third to half of the zygomatic arch [8, 14, 19]. Some of these reports have found that there is arborization between the various rami of the frontal nerve but not with other branches of the facial nerve [8, 12].

The course of the frontal nerve was perhaps first best described by Pitanguy and Ramos, where they found that the frontal branch typically follows a trajectory from 0.5 cm below the tragus to 1.5 cm above the lateral brow [11]. This study remains valid till nowadays, although Tzafetta and Terzis, more recently, found the trajectory of the nerve to be slightly inferior to that described by Pitanguy at the level of the lateral brow, averaging 1 + – 0.5 cm [19]. Trinei et al. described the sentinel vein as an important landmark in proximity to the frontal branch. The frontal branch lies cephalad to the sentinel vein by a mean distance of 6.8 mm [18].

For the surgeon, more important than knowing the distance of the frontal branch from surrounding structures is understanding its course relative to adjacent fascial layers. Stuzin et al. found the level of the nerve to be just deep to the temporoparietal fascia when cephalad to the zygomatic arch. It is important to note that the frontal branch becomes more superficial as it moves superiorly. It always remains deep to the temporoparietal fascia layer, however, as it will ultimately innervate the frontalis muscle along its deep surface, which is in a plane contiguous with the temporoparietal fascia/SMAS [15].

Therefore, the safe plane of dissection when working above the zygomatic arch is superficial to the temporoparietal fascia or, when dissecting deeper, directly on or beneath the superficial leaf of the deep temporal fascia (Fig. 26.4) [11, 12, 15].

The sentinel vein can be used as a landmark indicating proximity to the nerve while dissecting within the temporal region [12]. It is also important to be aware of traction- or pressure-type injuries, particularly with endoscopic technique where there can be injury to the nerve when dissecting the tissue bluntly adjacent to the frontal branch [12].

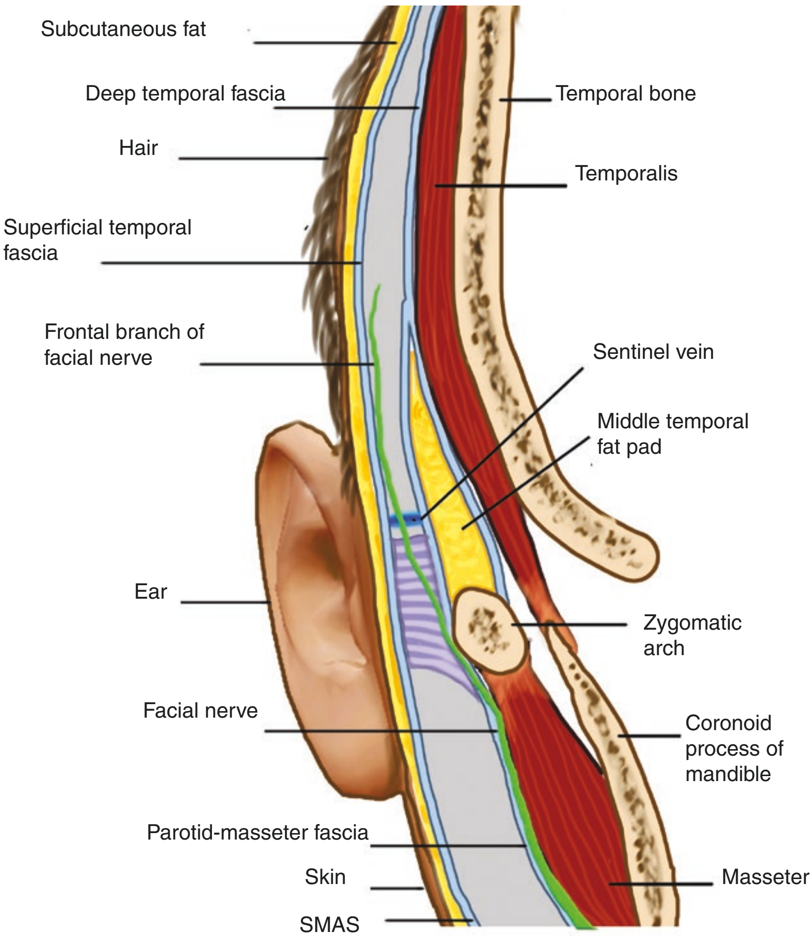

Fig. 26.4 Relationship of the frontal beach and the fascial planes

26.3 Zygomatic and Buccal Branches

The buccal branch is considered the most commonly injured facial nerve branch [17]. However, because of its significant arborization, the injuries are typically short lived and often less clinically significant compared with other facial nerve branches. Davis et al. described a total of six different branching patterns [4]. Consistent decussations between zygomatic and buccal branches were noted within this most common branching pattern [4]. These interconnections and overlapping branching patterns of zygomatic and buccal branches likely explain the spontaneous recovery of motor function following most injuries [12]. Given the proximity to a high density of retaining ligaments, which can tend to lead to dissections into a deeper plane as mentioned above, the zygomatic and buccal branches have specific regions at relatively higher-risk injury. Perhaps the greatest risk area is the region just inferior and lateral to the zygoma. In this area, the zygomatic branches lie relatively superficially and are adjacent to a high density of zygomatic and upper masseteric retaining ligaments. The mean distance of this nerve from the upper masseteric retaining ligament was 1.42 + − 1.56 mm and was located 1.41 + − 0.95 mm beneath the deep fascia [12].

The key to preventing injury of these branches is to be aware of the relative danger zones adjacent to retaining ligaments. Once the ligaments are encountered, it is helpful to dissect both cephalad and caudal to the retaining ligaments to establish the proper plane of dissection superficial to the SMAS. Only then the remaining zygomatic and upper masseteric ligaments can be more safely divided as needed. As said before, some of these branches can be less than 1 mm deep to the SMAS in the region adjacent to the upper masseteric ligaments, and therefore this region must be approached with extreme caution [2]. A relatively safe area of dissection is directly over the zygomatic eminence [12].

The marginal mandibular branch similar to the frontal branch, due to its assumed lack of decussations and fewer numbers of rami, led most surgeons to consider the marginal mandibular nerve at higher risk for permanent injury [9]. Dingman and Grabb in their study found two or greater rami in nearly 80% of their 100 facial halves dissections [5]. They also found that this branch, anteriorly to the facial vessels, was above the lower border of the mandible in 100% of their dissections. Tzafetta and Terzis also found at least two branches (mean, 2.3 + − 0.48), and in 30%, the branches ran along the caudal mandibular border, in 40%, approximately 2 cm above; and in 30%, 1 cm below [19].

The nerve exits the anterior caudal margin of the parotid and remains deep to the parotid masseteric fascia and deep cervical investing fascia. In the submandibular triangle, it runs across the surface of the posterior digastric muscle and the submandibular gland [10]. The nerve is deep to the platysma and superficial to the facial vessels through its course. It is in this region, where the marginal mandibular nerve crosses the facial vessels, that the nerve is at relatively high risk for injury as it moves into a more superficial position [12]. The lower masseteric retaining ligaments along the caudal border of the masseter are a useful landmark and should likewise be a point of caution when being released from either a medial or a lateral approach. These ligaments form a fibrous tissue between the platysma and the skin, and is a region where it is easy to dissect deep to the platysma and injure the underlying branches [12].

To prevent injury to this branch, one can ensure safety by always staying superficial to the platysma-SMAS. The platysma can be particularly atrophic, thin, and lax, making the dissection at times difficult. During subcutaneous dissection in the neck, the platysma can be tented superiorly when retracting for exposure, especially along the caudal border of masseter. This makes inadvertent dissection deep to the platysma with scissors or a liposuction cannula possible, thereby putting the underlying nerves at risk. The prominence of the mandibular body, and the fibrous adhesions of the lower masseteric ligaments, can obscure tissue planes and force difficult angles of dissection, making it easier to go deep to the platysma in this region [12]. When dissecting SMAS plane laterally in the cheek, the marginal mandibular nerve remains encased in sub-SMAS fat after exiting the tail of parotid. In this region, blunt dissection under direct visualization should be used whenever possible, as there tends to be a looser areolar relationship anterior to the parotid, with less dense attachments [3]. It is safest to limit release of ligaments only until adequate mobility of facial soft tissues is achieved. Special care should also be taken around the region where the facial vessels cross the mandible anterior to the mandibular tuberosity, because this is where the nerve becomes more superficial. Excessive cautery should also be avoided in this area.

Cervical branch. This branch has received less attention in the surgical literature despite likely being one of the most commonly injured branches of the facial nerve [3]. The high risk is because of its relatively superficial nature and intimate attachment to the platysma. Many have reported an injury to the cervical branch as a marginal pseudoparalysis because of the effect of the platysma on lip depression [3, 6]. Cervical branch injury can still be distinguished from the marginal mandibular nerve, however, based on the ability to pucker the lower lip with intact orbicularis oris and mentalis function. Complete return of function has been reported in nearly all cases of cervical branch injury. The cervical nerve exits the parotid gland and passes 1–15 mm behind the angle of the mandible. It then passes forward, in the subplatysmal plane 1–4.5 cm below the border of the mandible [13]. Generally, it has more than one branch and it may communicate with the marginal mandibular nerve. Based on the anatomical findings, to avoid injury to the cervical branch, one should place SMAS incisions laterally along the platysma at least 15 mm posterior and 45 mm inferior to the mandibular angle [1, 12]. Subplatysmal dissection closer to the mandibular body should be performed under direct vision, taking care to stay superficial to the sub-SMAS fat that encases the nerve branches. Blunt dissection should be used when dissecting beyond the tail of parotid to avoid injury to the cervical branch. Sharp dissection is unnecessary, given the lack of dense ligamental attachments and overall adequate mobility of the soft tissues. Staying superficial to the platysma will protect the cervical branch [12].

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Chapter 27
Anatomy of the Upper and Lower Lids

Marcelo Chemin Cury and Roberto Sebastiá

27.1 Surface Anatomy

The eyelids tissue layers are divided into two lamellae, the anterior lamella, constituted by the skin and the orbicularis muscle, and the posterior lamella, constituted by the ligamentous and conjunctive tarsal structures, besides the capsulopalpebral fascia (CPF) in the lower eyelid. Some authors, such as Mark Codner, also consider a third lamella, the medial one, consisting of the orbital septum, which separates the anterior and posterior lamellae (Fig. 27.1).

27.2 Skin and Subcutaneous Tissue

The eyelid skin is very thin, being considered the thinnest one in the body, in its medial portion. This enables excellent healing when the scars are well positioned on the eyelids. The subcutaneous tissue is a sparse cellular tissue in the septal and orbital portions, and it is absent in the pretarsal portion.

27.3 Orbicular Muscle

Below the skin and subcutaneous tissue, the orbicular muscle is located, which is divided into three portions: pretarsal portion, pre-septal portion, and orbital portion (Fig. 27.2). The orbicularis muscle's function is closing the eyelid, and its

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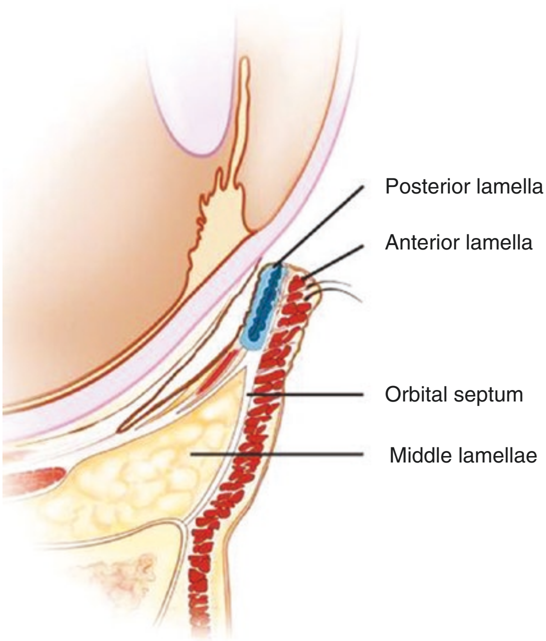


Fig. 27.1 Sagittal section of the lower eyelid showing the posterior lamellae, tarsus and conjunctiva; medial lamellae, orbital septum; and anterior lamellae, orbicularis muscle and skin

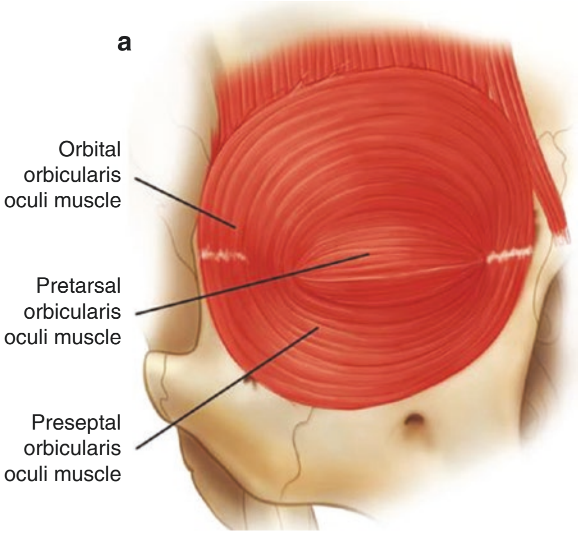


Fig. 27.2 The orbicular muscle and its pretarsal, pre-septal, and orbital portions

pretarsal portion contributes to the functioning of the tear pump mechanism. Their innervation is due to branches of the zygomatic facial nerve that crosses their fibers perpendicularly and also by some branches of the facial nerve's buccal branch.

27.4 The Orbital Septum

Immediately below the orbicularis muscle lies the orbital septum, which consists of a thin fibrous layer surrounding the orbit. Its connections with the orbital margin form the arcus marginalis (Fig. 27.3). The orbital septum acts as an important barrier to the deep structures of the orbit and also confines the bags of eyelid fats. A thin fascial layer also called septal extension continues from the septum, covering the pre-aponeurotic fat and the entire tarsal plate to the ciliary line [3].

27.5 The Septal Fat Bags

The septal fat bags of the upper and lower eyelids are commonly involved in aesthetic eye surgery. In some conditions such as Graves' disease, they may be altered. In the upper eyelid, these fat bags are distributed into two compartments, the central compartment or pre-aponeurotic, where it has a more horizontal distribution, often touching the lacrimal gland's palpebral portion laterally (Fig. 27.4), and the nasal compartment, which can be easily identified in the blepharoplasties, making a slight pressure on the eyeball and opening the nasal septum. This fat has a paler coloration than the central compartment, which is more yellowish (Fig. 27.5).

In the lower eyelid, they are divided into three compartments, the nasal, central, and lateral (Fig. 27.6). The nasal compartment's fat is separated from the central compartment's fat by the inferior oblique muscle, which must be identified and spared in transconjunctival blepharoplasties.

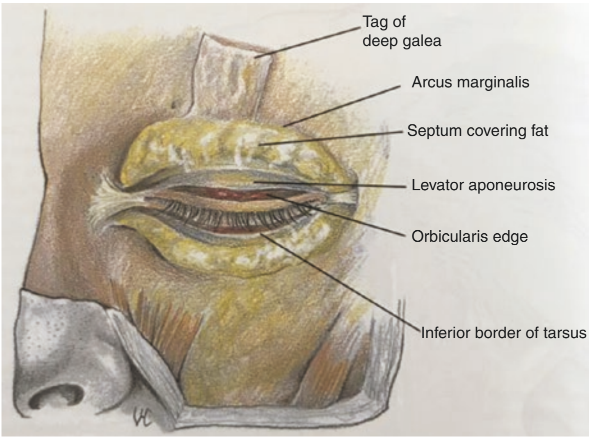
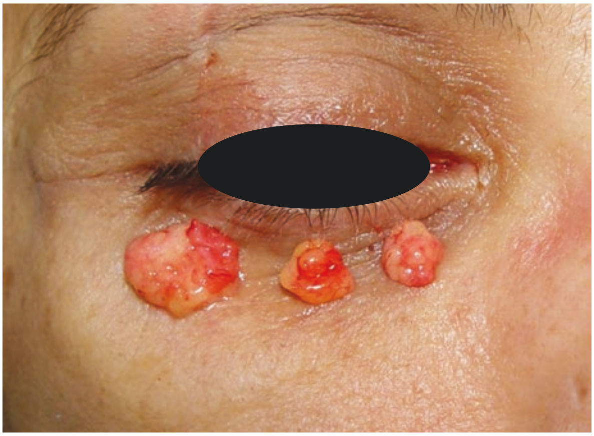


Fig. 27.3 The orbital septum and its relations with the arcus marginalis, the tarsal plate, the orbicularis muscle, and the levator muscle of the upper eyelid

Fig. 27.4 The central septal fat bag of the upper eyelid

Fig. 27.5 The nasal septal fat bag of the upper eyelid

Fig. 27.6 Lower post-septal bags already resected by transconjunctival access



27.6 The Upper Eyelid Levator Muscle (UELM)

The UELM is a striated skeletal muscle that originates from the minor sphenoid wing and inserts into the anterior portion of the tarsal plate. Its innervation is due to the superior division of the third cranial pair, the oculomotor nerve. It is the main muscle involved in lifting the upper eyelid. The UELM has two portions, one muscular and the other aponeurotic (Fig. 27.7). This delimitation usually occurs 8–10 mm below the Whitnall ligament, which consists of a transverse fibrous condensation supporting the function and stabilization of the upper eyelid. Previously, the UELM aponeurosis merges with the orbital septum above the upper tarsal border and emits fibers that cross the orbicularis muscle and enter the palpebral dermis, thus forming the upper palpebral sulcus that is usually 8–10 mm from the ciliary margin. This insertion varies with gender and ethnicity, thus varying the height of the palpebral sulcus.

27.7 Muller's Muscle

Muller's muscle is a smooth muscle, which is also known as upper tarsal muscle. It originates from the posterior surface of the UELM, walks posterior to aponeurosis, and inserts itself into the upper border of the tarsal plate (Fig. 27.8). It is closely adhered to the conjunctiva in its posterior portion and contributes to the excursion of the upper eyelid. Its innervation is by the sympathetic nervous system.

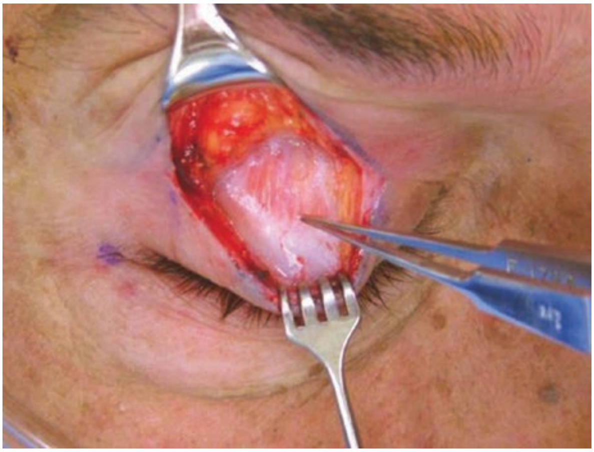


Fig. 27.7 The levator muscle of the upper eyelid and the forceps showing its aponeurotic muscle junction

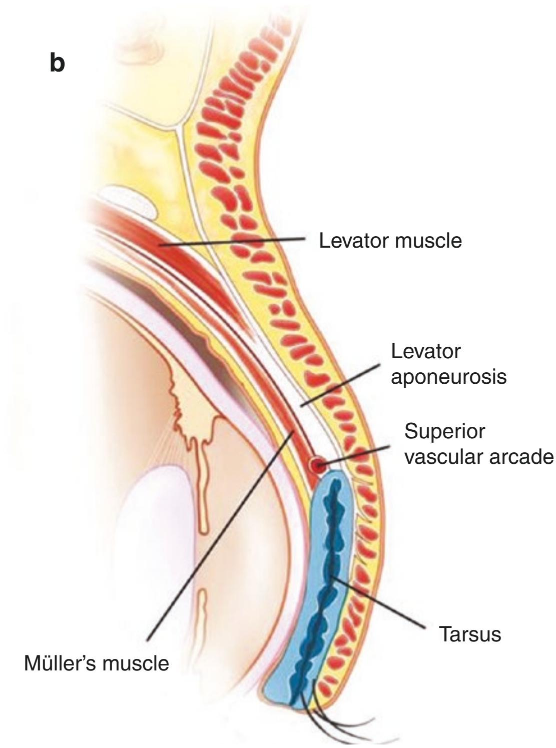


Fig. 27.8 Sagittal section showing Muller's muscle with its origin in the posterior part of the levator muscle of the upper eyelid and insertion at the upper border of the tarsal plate

27.8 The Tarsal Plate

It is formed by dense fibrous tissue and promotes eyelid stability. Their measurements are usually 25 mm long, 1 mm thick, 10 mm high on the upper eyelid, and 4 mm to 5 mm high on the lower eyelid. Medially and laterally, they emit fibrous connections that are inserted in the orbital border, contributing to the formation of the medial and lateral canthal tendon.

27.9 The Capsulopalpebral Fascia and Retractors Muscles of the Lower Eyelid

The capsulopalpebral fascia (CPF) is analogous to the UELM in the upper eyelid. It consists of the lower rectus muscle fascia and a fascial layer of the lower eyelid. CPF forms the Lockwood ligament, which is analogous to the Whitnall ligament and functions as a support structure of the eyeball. The function of the lower eyelid retractor muscles is to slightly retract the lower eyelid in the down gaze.

27.10 The Lateral and Medial Canthal Ligaments

The medial canthal ligament is a fibrous structure with an anterior and a posterior portion. The anterior portion is inserted anteriorly to the lacrimal crest and posteriorly to the posterior lacrimal crest, which is behind the lacrimal sac. The posterior portion is an extension of the medial part of the tarsal plate.

The lateral canthal ligament is also subdivided into anterior and posterior portions, having their origin on the fibrous lateral extensions of the tarsal plaques (Fig. 27.9). The anterior and posterior portions are inserted into the anterior surface of the orbital border and into the Whitnall tubercle, 5–8 mm into the lateral orbital border, respectively. Immediately anterior to the ligament's posterior portion, there is a layer of fat known as Eisler's fat pad. In the fixation surgery of the canthal tendon Eisler's fat pad is an important anatomical reference, because it coincides with topography of the Whitnall tubercle, where the ligament must be fixed.

27.11 Orbito-malar Ligament

Originally described by Kikkawa et al. in 1996 and later described by Mendelson et al. in 2002, this important peri-orbit ligament consists of an osteo-cutaneous ligament that originates from the inferior orbital margin periosteum, through the Superficial Muscle Aponeurotic System (SMAS) and the orbicularis muscle, and

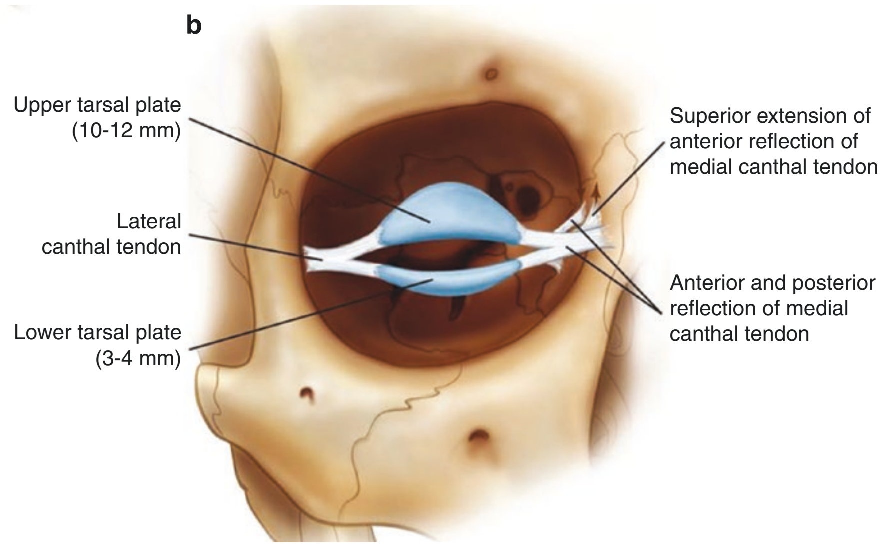


Fig. 27.9 The upper and lower tarsal plates and the medial and lateral canthal ligaments with their respective posterior and anterior reflexes

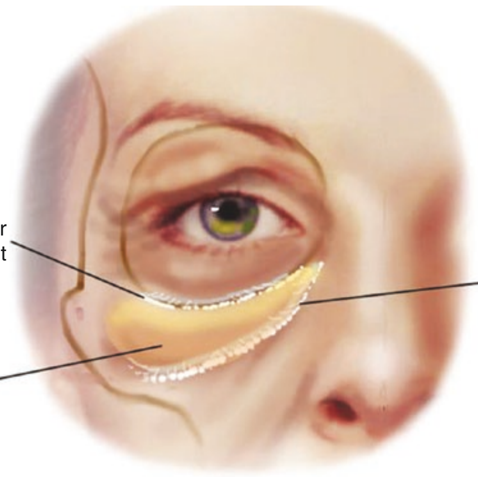


Fig. 27.10 The orbito-malar ligament, the zygomatic skin ligament, and the pre-zygomatic space

inserts into the dermis of the lower eyelid. It delimits the floor of the palpebro-malar junction and also the roof of the pre-zygomatic space, where is located the malar festoon. Its release during palpebral surgery allows a wide vertical mobilization of the lower eyelid (Fig. 27.10).

27.12 Cutaneous Zygomatic Ligament

Also described by Mendelson, this strong ligament originates in the periosteum at the level of the facial zygomatic foramen, extending medially to the level of the zygomatic muscles origin in the malar region and inserts into the skin. It represents the floor of the pre-zygomatic space. It has characteristics of being strong and not distensible.

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Chapter 28
Aesthetic Anatomy of the Face

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28.1 Concept, Philosophy, and History of Beauty

The concept of beauty consists of a set of aesthetic qualities which is evaluated and judged as attractive. It is associated with symmetry, proportion, and balance. Beauty possesses a subjective and abstract component, varying according to the judgment of the evaluator as it is interpreted and influenced by personal preferences.

Historically, beauty presents itself as a mutable concept that is influenced by the customs and cultures adopted, being closely related to different artistic expressions in the cultural context of certain eras.

From ancient Greece, interest in beauty was already sought after and evaluated. Mathematical calculations and explanations for beauty were developed and maintained until the present day. A calculation called the golden ratio from an algebraic constant resulting in the so-called golden number, Phi, was developed whose numerical value was rounded to three decimal places which is approximately 1.618. This number is

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considered the perfect number and therefore the symbol of harmony. The golden number inspires poetry, music, and fine arts by their harmonious forms. Examples of these feats are the Mona Lisa and Vitruvian Man of Da Vinci and Gaudi's Holy Family, among many others. They all have in common the search for symmetry, harmony, and perfection, and therefore they reach the pinnacle of what is considered beautiful.

28.2 Face Architecture

The human face is composed of the joining of numerous anatomical structures arranged in various depths and proportions. It presents a high complexity in its configuration due to three-dimensionality, with the overlap of structures in different contents and consistencies, ranging from soft and elastic tissues to hard bone [1].

Stephen Marquardt studied the human face in detail. He used the Phi golden number as the basis and development of the so-called golden mask, in which he uses a set of pentagons and decagons as an architectural base to compose the various structures of the face, having the Phi number in common in all its dimensions. In it, the configuration of the structurally perfect face is obtained.

Structurally, the face is anchored onto a craniofacial skeleton rigid enough to support and be highly resistant. The human facial skeleton consists of 14 bones, all closely connected, serving to support and, in synergy with the other structures, work together in movement that can be used for facial expression. This skeleton has bones in even numbers, the maxilla, the inferior nasal concha, the zygomatic bones, the palatal bones, the nasal bones, and the lacrimal bones, and bones in odd numbers, the mandible and vomer bones [2].

Under the bony structure rest the muscles, ligaments, cartilage, joints, fatty and subcutaneous tissue, arteries, veins, and nerves. The soft tissues that make up the face are divided into five layers: the skin, subcutaneous tissue, musculoaponeurotic layer, areolar tissue, and deep fascia/periosteum. The most important in relation to the maintenance of face shape is the fourth layer, which includes the face-retaining ligaments and the soft tissue compartments, which are directly influenced by the aging process. This layer also presents great anatomical prominence because it is where the important structures of the face pass: sensory and motor nerves with their branches.

Any change in this conformation breaks the integrity of the set and alters the appearance and can disfavor it in terms of harmony, symmetry, and beauty. Such studies serve as the basis for the constant search for symmetry and harmonization, thus bringing more beauty to the face.

28.3 The Aging Process

The aging process occurs in all structures and facial layers and begins subtly after the second decade of life. However, the early signs and the time of evolution of these changes vary between different structures, different individuals, and different ethnic groups and are influenced by external factors such as lifestyle, diet, physical activities, amount of sun exposure, and comorbidities. Bone remodeling, soft tissue ptosis, loss of fat volume, and ligament flaccidity lead to the loss of volume in the three-dimensional structure of the face. All these factors can evolve into some of the classic stigmas of the aged face.

Aging is mainly caused by the ptosis of the fatty fibrous layer firmly adhered to the skin, with its facial fat compartments determined by septal boundaries and to a lesser extent by bone atrophy. There are also muscular, aponeurotic, and periosteal changes. This combination of gravity, acting in conjunction with the process of global loss to the face, generates excess skin and loss of contours and gives an aged appearance [3].

Areas with a strong predisposition to reabsorption include the skeleton of the middle face, particularly the maxilla, the piriformis of the nose, the superomedial and inferolateral aspects of the orbital border, and the anterior area of the mandible.

Deficiencies resulting from the foundation of the skeleton contribute to the stigmas of the aged face. In patients with a congenitally weak skeletal structure, the skeleton may be the main cause of the manifestations of premature aging. These areas should be specifically examined in patients undergoing facial rejuvenation and taken into account to obtain superior aesthetic results [4].

The sum of all these events makes visible anatomical alterations of aging more evident from the fourth decade of life, such as deeper expression lines, palpebral ptosis, and loss of facial contour volume. It is here where the search for rejuvenation procedures normally begins, whether invasive or noninvasive and ambulatory or surgical. The more advanced stages of aging require surgical treatment for removal of surplus and repositioning of these tissues: rhytidoplasty or face-lift, which may or may not be associated with other procedures, whether noninvasive or invasive, such as the use of botulinum toxin, fillers, myotomy, and/or endoscopic rejuvenation approach [5].

Knowledge of the details of the anatomy and the aging process is the basis for getting a natural look with lasting results. Planning of the surgical process is of great importance in the search for this goal and thereby avoiding lesions and complications, with optimal results.

28.4 History of Surgical Anatomy

Aesthetic face units:

- Gonzalez-Uloa, 1956: unit and subunit
- Millard, 1966: regional units
- Berget and Menick, 1985: detailing of units and subunits for the repair of nasal defects

The facial skeleton consists of bones that surround the mouth and nose and contribute to the orbits.

Muscles of facial expression have bone origin or insertion and the other end inserted into the subcutaneous portion of the skin. Anatomically, each muscle group can be individualized according to the organization of the fibers and the function they exert.

When regarding vascularization, all muscles receive collateral or terminal branches of the external carotid artery and some branches of the internal carotid artery. These collateral branches divide until reaching the interior of each muscle, forming a network of arterial capillaries. Important to face nutrition are the collateral branches of the facial, superficial, and maxillary temporal arteries, the infraorbital branches of the maxillary artery, and the supraorbital and supratrochlear branches of the ophthalmic artery.

The facial vein is responsible for venous drainage of the superficial and deep parts of the face. Supratrochlear, supraorbital, and palpebral veins and the dorsum of the nose anastomose forming the angular vein, which from the inner corner of the orbit, goes toward the lower margin of the mandible, where it continues to the facial vein. In the cheek region, it receives the superior labial veins and inferior labial veins besides the cheek's own veins. During the course, the facial veins anastomose with infraorbital and submental veins.

Innervation occurs from efferent motor nerve fibers from the motor nucleus of the facial nerve (VII cranial nerve) located in the brainstem of the central nervous system. The motor fibers of the facial nerve emerge through the stylomastoid foramen and reach the muscular layer forming the temporal, zygomatic, buccal, marginal, and cervical branches of the mandible.

The overall sensitivity of each region is given by the trigeminal nerve. The skin of the forehead region contains the terminal nerve fibers of the frontal branch of the ophthalmic nerve, following the supraorbital- and supratrochlear-sensitive fibers. The maxillary nerve through the zygomaticotemporal branch, and the infraorbital and mandibular nerves, with the branches of the auriculotemporal and mental nerves, participate in the sensitive innervation of the area corresponding to the facial expression muscles. The transmission of tactile, pressure, and pain stimuli is made through nerve endings located in the subepithelial portion of the mucosa and the skin of the face.

The lymphatic system of the face is given to the parotid, submandibular, submental, sublingual, anterior cervical, lateral cervical, and deep cervical lymph nodes.

28.5 The Thirds of the Face

Anatomically, the face can be divided into three thirds: upper, middle, and lower.

In more detail, we can divide the thirds according to the structures, the upper third presenting as its limit an imaginary line drawn from the anteromedial portion of the ear, at the tragus, to the outer corner of the eye, surrounding the lower eyelid and continues delimiting the nasal wing (Fig. 28.1).

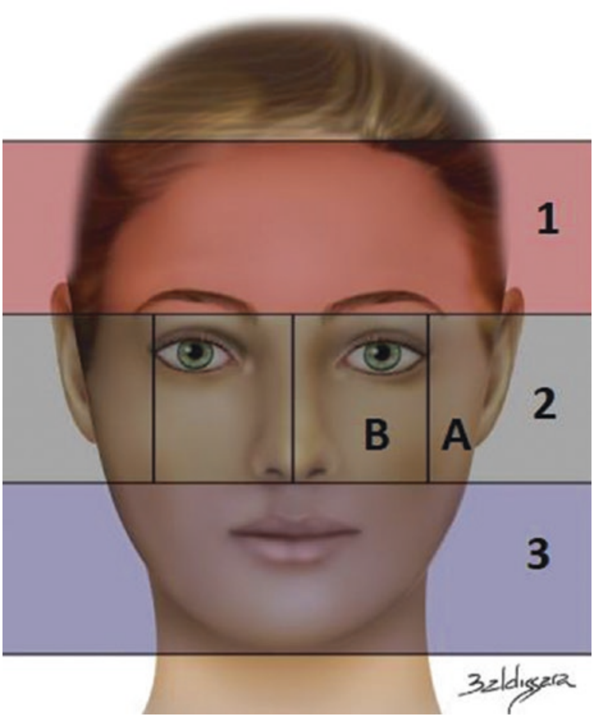

Fig. 28.1 The three regions of the face: (1) superior; (2) medio, (A) lateral antero and (B) medial antero; (3) inferior

The middle third comprises the region between the line previously mentioned and another imaginary line that begins at the tragus, extending until the angle of the mouth and surrounding the margin of the inferior lip. The middle third can be subdivided into anteromedial third and anterolateral third.

The lower third, in turn, comprises the space between this last line up to the mandibular margin, surrounding the border of the lower lip (another picture of the thirds of the face).

28.5.1 Anatomy of the Upper Third

The frontal occipital muscle originates at the anterior margin of the epicranial aponeurosis, and inserts into the subcutaneous portion of the skin of the superciliary and root of the nose, intertwining with the fibers of the procerus, corrugators, and orbicularis of the eyes. Motor innervation occurs through the facial nerve and the sensory nerve fibers from the supraorbital nerves and terminal branches of the trigeminal and ophthalmic nerve. The arterial supply is made by the supraorbital branches of the ophthalmic artery, which are branches of the internal carotid artery, and by the frontal branches of the superficial temporal artery, originating from the external carotid artery. The venous drainage is made by the angular vein, which

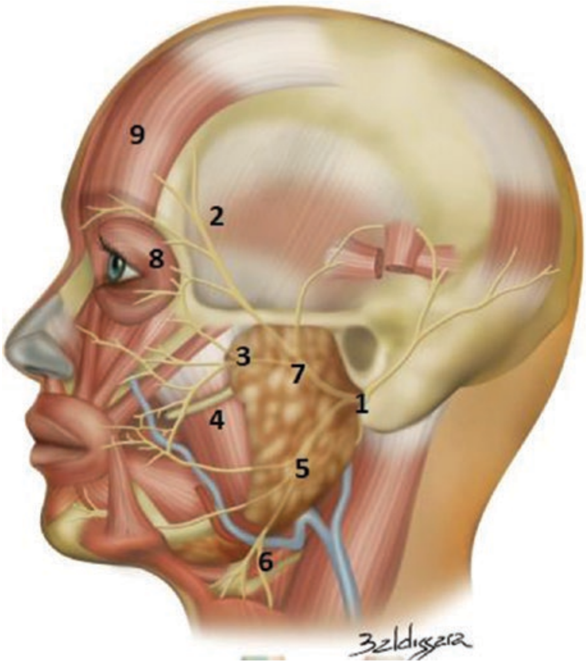

Fig. 28.2 Facial nerve: (1) facial cervical division, (2) temporal branch, (3) zygomatic branch, (4) buccal branch, (5) parotic gland, (6) cervical branch

continues with the facial vein. Lymphatic drainage of the forehead occurs to the auricular lymph nodes and then to the superficial cervical lymph nodes. The movement of the frontal muscle is responsible for elevation of the supercilium. Its movement produces horizontal lines, distributed by the frontal region (Fig. 28.2).

The corrugator muscle has its wide base, originating from the surface of the medial portion of the superciliary arch of the frontal bone and inserting into the subcutaneous portion of the skin of the eyebrow. The bundles run obliquely in the upper and lateral directions, being in a plane deeper than the frontal muscle. Their fibers become entwined with the fibers of the frontal and orbicular muscles of the eye. In its origin and in the central portion, the corrugator is deeper, becoming more superficial as it approaches its insertion. Its motor innervation is made by the nerve fibers of the motor nucleus of the facial nerve and sensory, by the nerve fibers of the supraorbital and supratrochlear nerve, branches of the frontal nerve and supratrochlear nerve. The lymph of the region drains to the submandibular lymph nodes. The movement performed by the corrugator protrudes and deepens the supercilium, tracing it down and medially. Its contraction produces vertical glabellar lines (Fig. 28.3).

The procerus muscle is a thin, narrow muscle which originates in the nasal bone and lateral nasal cartilage. Its insertion occurs in the skin of the glabella, and its fibers intertwine with those of the orbicularis muscle of the eye and the frontal belly of the occipitofrontalis muscle. Innervation occurs through the motor fibers of the anterior temporal branches of the facial nerve. The sensory part is given by the

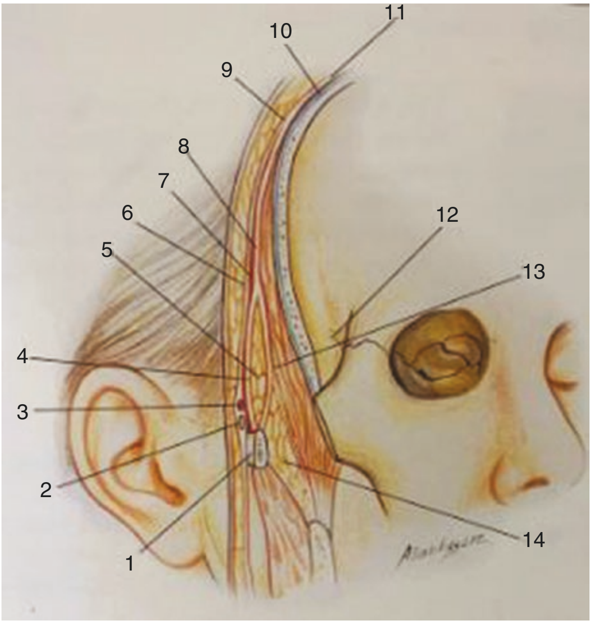

Fig. 28.3 Anatomical structures of the temporofrontal region: (1) zygomatic arch, (2) temporal branch of the facial nerve, (3) anterior branch of the superficial temporal arter, (4) superficial lamina of deep temporal fascia, (5) superficial temporal fat pad, (6) superficial temporal fascia, (7) subfascial plane, (8) deep temporal fascia, (9) line of integration, (10) periosteum, (11) galea aponeurotica, (12) orbital ligament, (13) deep lamina of the deep temporal fascia, (14) deep temporal fat tissue

nerve fibers of the supraorbital and supratrochlear nerves, branches of the frontal nerve, which is a branch of the ophthalmic nerve, which in turn is the trigeminal branch. Its vascularization comes from the supratrochlear and supraorbitary arteries and veins, and lymphatic drainage occurs to the auricular ganglia. The musculature is responsible for traction of the medial portion of the eyelashes and the skin of the forehead, producing transverse wrinkles on the nose (Fig. 28.4).

The depressor muscle of the eyelids is located in the medial arch of the orbicularis of the eyelids. It originates in the nasal process of the frontal bone and extends upward, merging with the fibers of the procerus and frontal muscles. This muscle helps to lower the head of the supercilium (Fig. 28.5).

The orbicular musculature of the eye is a thin, flat musculature composed of three portions: palpebral, orbital, and lacrimal. It has its origin in the inner corner of the orbit, where its fibers are fixed in the frontal process of the maxilla and in the surface of the lacrimal bone.

The bundles of the palpebral portion insert into the subcutaneous portion of the skin from the lateral angle of the orbit. The fibers of the orbital portion branch with the adjacent musculature, and some fibers, insert into the subcutaneous connective tissue. The lacrimal portion is inserted into the lacrimal bone. The superior innervation of the orbicularis muscle occurs through the temporal branches of the facial nerve. The lower part receives nerve fibers from the zygomatic branch of the facial nerve. The path of the frontal temporal nerve is a line that runs from a point 0.5 cm below the tragus to another 1.5 cm above and to the side of the lateral extremity of the supercilium. An important preoperative parameter for localization of the temporofrontal nerve is the orbital zygomatic branch of the superficial temporal artery

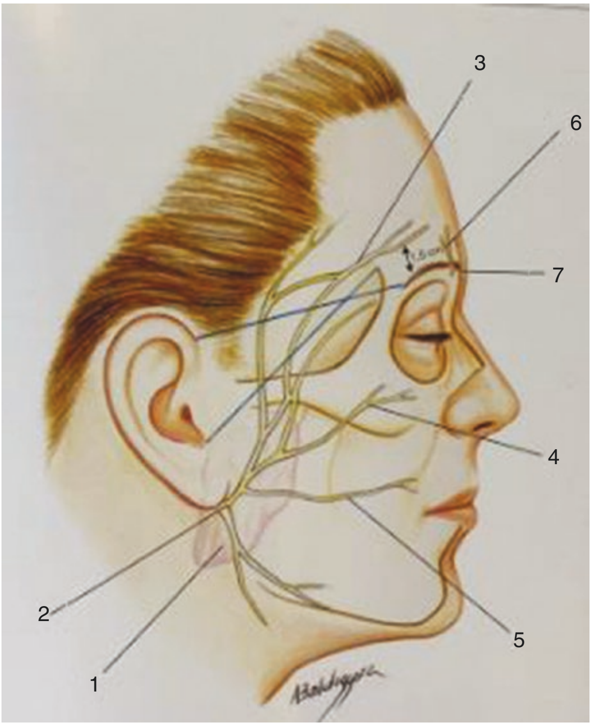

Fig. 28.4 The course of the temporofrontal branch of the facial nerve can be projected on an ascendant line, from 0.5 cm below the tragus and at 1.5 cm from the lateral extremity of the brow. The frontal branch is placed on a superficial plane as it crosses the zygomatic arch near its medial portion. (1) Parotid gland, (2) facial nerve, (3) temporal branch, (5) buccal branch, (6) supraorbitalis nerve, (7) supratrochlear nerve

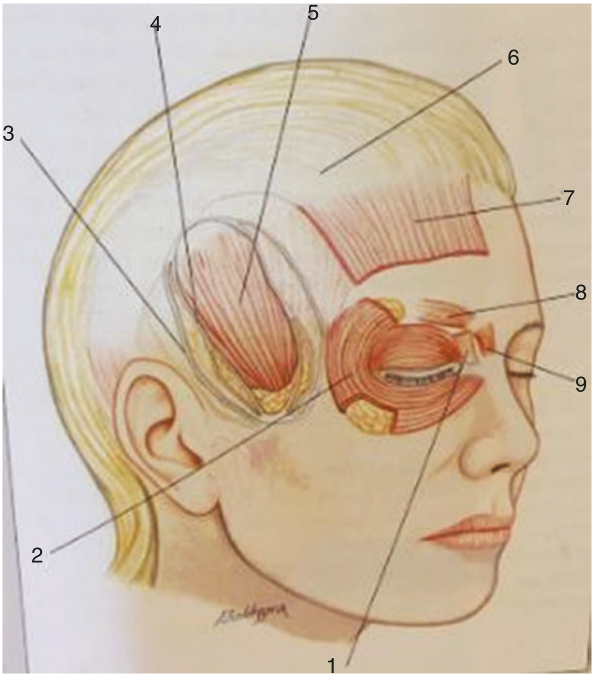

Fig. 28.5 Muscles of facial expression. Of the orbito temporofrontal area: (1) depressor supercilii muscle, (2) orbicularis oculi muscle, (3) temporoparietal fascia, (4) deep temporal fascia, (5) temporalis muscle, (6) galea aponeurotica, (7) frontalis muscle, (8) corrugator muscle, (9) procerus muscle

Fig. 28.6 The supratrochlear nerve innervates the shin of the root of the nose, lateral to the glabella. The supraorbitary nerve innervates the forehead and the anterior portion of the scalp

whose pathway to it is parallel to the penetration of the frontal muscle. Sensitive innervation of the orbicularis muscle is made superiorly by the supratrochlear and supraorbital nerves and inferiorly by the branches of the infraorbital nerve, branch of the maxillary nerve. In the supercilium, the sensitivity of the region originates in the ophthalmic branches of the trigeminal nerve, whose topography in the glabellar area and in the supercilium must be well-known to avoid lesions. The supratrochlear nerves innervate the skin of the nasal root and the glabella bilaterally. It is covered by the corrugator muscle and can only be observed during a dissection with an endoscopic view (Fig. 28.6).

The vascularization is via the branches of the angular artery and part of the temporal artery; and venous drainage is through the angular vein, which starts in the inner corner of the eye and anastomoses with the facial vein. Lymphatic drainage occurs to the submandibular and posterior cervical lymph nodes.

Within the forehead, the orbicularis muscle blends with the corrugator and the frontal muscles, continuing laterally above the temporoparietal fascia. With the depressor muscles of the supercilium, the orbital portion of the orbicularis muscle of the eyelids is the one which has the greatest performance in creating ptosis of the supercilium. This muscle is responsible for almost all oblique and vertical wrinkles of the forehead, lateral area, or supramalar area. Between the deep galea and the periosteum lies the subgaleal plane, which easily detaches from the periosteum, except from 2–2.5 cm of the supraorbital edge where the subgaleal and the deep galea are joined to the periosteum. This galea covers the skull between the frontal muscles and the occipital muscles, being firmly anchored in the posterior region of the external occipital protuberance. At the level of the superior temporal line of the parietal bone, the galea receives the superior insertions of the superficial temporal fascia, continuing with the deep temporal fascia. The fusion of the aponeurotic galea, the deep temporal fascia, and the periosteum, in the upper temporal line and the edge of the orbit, forms a firm and dense anchor of these structures to the bones of the skull.

In a subperiosteal endoscopic dissection, this firm attachment should be sectioned to release the soft tissues of the region. There are dense, fibrous bands that connect the superficial temporal fascia to the surface of the frontal zygoma process in the frontal zygomatic suture. One of these bands, the orbital ligament, holds the superficial temporal fascia at the lateral orbital rim. Superficially, the temporoparietal fascia is observed through which the temporal vessels cross. The frontal branch of the facial nerve lies within this fascia.

28.5.2 Anatomy of the Middle Third of the Face

The major zygomatic muscle originates from the temporal process of the zygomatic bone in the lateral region of the face, posterior to the orbicularis oculi muscle. Its fibers follow obliquely to the angle of the mouth, intertwining with the bundles of muscle fibers lifted from the angle of the mouth.

Motor innervation is promoted by the motor fibers of the zygomatic branch of the facial nerve, and the sensory by the sensory branches of the auriculotemporal nerve, a branch of the mandibular nerve, and by the lower palpebral branches of the maxillary nerve, both originating from the trigeminal nerve. The arterial vascularization is made by the superior labial arteries and collateral branches of the descending artery of the maxillary artery, which is a branch of the external carotid artery. The venous drainage occurs through the superior labial veins, which conflate to the facial vein. Lymphatic drainage already occurs to the submandibular lymph nodes.

The smaller zygomatic muscle originates on the surface of the zygomatic bone, in front of the origin of the fibers of the greater zygomatic, and insertion in the subcutaneous skin of the upper lip, next to the labial commissure, between the levator of the angle of the mouth and the greater zygomatic. Irrigation happens via the superior labial artery and branch of the facial artery; and venous drainage takes place through small veins that merge with the facial vein. The innervation is made by the motor fibers of the upper zygomatic and buccal branches. The movement of the minor zygomatic muscle assists in the elevation of the angle of the mouth and the accentuation of the nasolabial sulcus, contributing to the formation of oblique wrinkles in the middle third.

The elevator muscle of the upper lip has a broad origin near the inner margin of the orbit, posterior to the orbicularis oculi. Its insertion is in the upper lip and nasal wings, with motor innervation coming from the buccal branches of the facial nerve. Sensitivity is provided by the terminal nerve branches.

The elevator muscle of the angle of the mouth originates from the anterior surface of the maxilla, below the infraorbital foramen, and its fibers are inserted at the angle of the mouth, undergoing a thinning. Its innervation is made by the motor fibers of the buccal branches of the facial nerve.

The arterial vascularization is due to the superior labial artery on each side and irrigates the muscular layers, salivary gland structures of the oral mucosa, and skin; and venous drainage is made by the facial vein. Its function is to elevate the angle of the mouth, drawing inward, with little contribution to accentuating the nasogenian sulcus.

The transverse nose muscle presents two parts: alar and transverse. The fibers of the transverse part originate in the maxilla, above and lateral to the incisive fossa and the alveolar salience of the canine tooth, while the fibers of the ala portion originate in the ala of the nose. They are inserted in the subcutaneous portion of the skin in the regions of the alveolar cartilages, and the transverse ones are inserted in the region of the lateral nasal cartilages. Innervation occurs via the buccal branches of the facial nerve and vascularization by the nasal artery, the last branch of the ophthalmic artery, with drainage to the facial artery. The ala portion dilates the nostrils and the transverse tract the ala cartilages toward the midline, aiding in the dilation of the nostrils, and collaborating to the formation of the bunny lines, as a consequence of the movement.

The depressor muscle of the nasal septum lies deep in the mucosa of the upper lip, originating above the alveolar ridge of the maxillary incisor. Its insertion is into the medial branches of the alveolar cartilage and the movable septum of the nose. Its vascularization is made by branches of the facial artery, when it passes through the lateral margin of the nose. Its function is to lower the anterior extremity of the septum, and consequently the apex of the nose, in addition to narrowing the nostrils (Fig. 28.7).

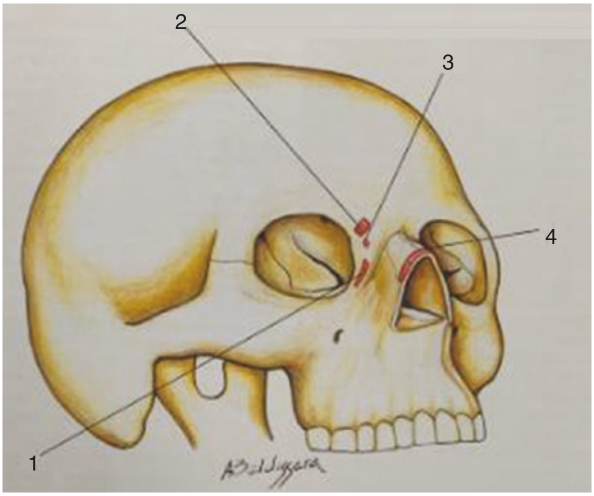

Fig. 28.7 Origin of the muscles: procerus, corrugator, depressor supercilii, and orbicularis oculi (the frontal muscle has no bony insertions). (1) Orbicularis muscle, (2) corrugator muscle, (3) depressor supercilii muscle, (4) procerus muscle

28.5.3 Anatomy of the Lower Third of the Face

The orbicularis muscle of the mouth is a broad muscle that surrounds the mouth with a sphincter, forming the structure of the upper and lower lips, extending from the base of the nose superiorly and to the sulcus labialis inferiorly. It originates in the subcutaneous margin of the upper and lower lips.

The innervation is made by the motor fibers of the upper and lower buccal nerves, and the sensory fibers by the labial terminal branches of the infraorbital nerve, which are the terminal branches of the maxillary nerve. This muscle acts as a sphincter, promoting closure of the mouth. Upon movement, they produce the vertical perioral wrinkles.

Laryngeal musculature inserts at the angle of the mouth and originates from the masseter muscle. Its innervation is made by the lower buccal branches of the facial nerve. Irrigation runs through the upper labial artery, a branch of the facial artery. This musculature has its drainage made by the submandibular lymph nodes. Its function is to act on the lateral traction of the corner of the mouth

The depressor of the angle of the mouth is responsible for depression of the angle of the mouth, down and even within. It presents its origin in the inferior margin of the mandible, above the line of insertion of the muscular fibers of the platysma muscle. It has insertion in the labial commissures, with vascularization done by the inferior labial artery.

The depressor muscle of the lower lip is a quadrilateral muscle, broad and flat, as a source of platysma in the mandible and depressor muscle of the oral angle.

The mental muscle has its origin in the mental cavity, and firm insertion in the subcutaneous portion of the skin of the mentum, in some cases, can form a cutaneous depression at the point of insertion.

The mentum muscles and the depressor of the lower lip have the same innervation performed by the marginal nerve of the mandible.

The masseter muscle is part of the chewing muscles. It has a rectangular shape, and it is located on the branch of the mandible. Part of the cheek's fatty cushion can locate on the surface of the muscle. The masseter is crossed by the parotid duct.

In the anterior cervical region, the platysma musculature and the sternocleidomastoid muscle can be found as supporting structures. The muscles of this region can be categorized according to their position as suprahyoid muscles and infrahyoid muscles. In the suprahyoid region, there are the digastric muscle, stylohyoid muscle, mylohyoid muscle, and geniohyoid muscle. It can be emphasized that the digastric musculature, being part of the floor of the mouth, provides a base for the tongue and participates in the cervicofacial surgical anatomy. The digastric muscle has anterior and posterior projections, separated by a small tendon junction, which descends toward the hyoid. The posterior part is connected by a tendon toward the paraoccipital process; anteriorly, the muscle inserts through the surface of the mandible. A fibrous loop allows the movement of the tendon to move anteriorly and posteriorly. The platysma musculature broadly derives from the upper part of the deltoid muscle and the pectoralis major muscle. Its innervation is made by the descending branch of the cervical nerve and arterial supply of the carotid arteries.

28.6 The Aging Process

With greater knowledge about the facial aging process in relation to the progressive loss of bone and fatty and muscular tissue, surgical plans are increasingly aimed at restoring deep structures, as well as lifting the superficial structures of the body in the conventional rhytidoplasties.

In volumetric terms, this broader approach contributes to a better standardization of surgery which aims at rejuvenation and embellishment at the same time.

The first to change the behavior regarding face-lifting was Skoog in 1974, by promoting the repositioning of soft tissues and SMAS (superficial aponeurotic muscle system) of the face, in addition to the removal of the skin performed in a conventional face-lift.

The pioneer of the vision of a volumetric face-lift was Coleman in 1998 with his approach to the aged face using fat replenishment in order to fill volumetric areas that suffered loss with the aging process.

The concept of volumetric face-lifting has gained evidence and has been studied extensively by several surgeons, with various proposals for the surgical approach and varied results. More recently, in 2004, Trepsat and Ellenboegen aimed at complementing the conventional rhytidoplasty using ancillary procedures for the redefinition of deep volumes.

The endoscopic approach is a promising technique and an excellent option for the treatment of the frontal, tempororbital lateral, and the middle third of the face. It also allows for the treatment of these areas by means of small incisions. In 1995, with full support and encouragement from Professor Ivo Pitanguy, the Endoscopy Video section was created by the senior author of the chapter at the Ivo Pitanguy Institute, a pioneer service in plastic surgery in Brazil.

The anatomical knowledge of the structures to be treated through the endoscopic approach to the face is of fundamental importance for the success and safety of the procedure.

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Chapter 29
Anatomy of Aging Facial Skeleton

Marcelo Paulo Vaccari Mazzetti and Ryane Schmidt Brock

29.1 Introduction

Among the most aesthetic procedures in plastic surgery, there is the facial lifting or rhytidoplasty, a technique that can range from large to small detachment, support points, or association with other procedures such as blepharoplasty and submental liposuction.

For the ideal treatment of facial aging, providing a jovial result, it is necessary to correct and reposition the anatomical structures without changing the naturalness of the face.

The harmonious and natural rejuvenation demand the treatment of all craniofacial segments that suffer changes with age, from the skin, muscle, redistribution of subcutaneous fat, ligament flaccidity, and modifications of the bone structure [1, 2].

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29.2 Skin and Subcutaneous Layers

The skin is a complex human body organ, composed of multiple layers, and responsible for prevention of water loss, temperature control, sensory perception, and immune barrier [2].

Female skin has less distenstibility and more elasticity than male, but this difference occurs until the 40 years of age; after that the skin of the two sexes tend to resemble due to hormonal changes, characteristic of women [3].

The aging of the skin depends on intrinsic or chronological, genetic, and extrinsic or environmental and behavioral factors such as sun exposure, smoking, lack of food nutrients, weight loss, hormonal factors, and facial muscular movement [2, 4].

Facial skin evolves physiologically with atrophy, tuning of the epidermis, dermis, and hypodermis. It becomes thinner and loses the elasticity because biochemical and structural changes in the collagen, elastic fibers, and fundamental substance, with a reduction of collagen synthesis and increased degradation of this by increased levels of collagenase and decreased number and diameter of elastic fibers. These changes occur mainly in patients with restrictive diets or weight loss, in the post-gestational and menopausal period [5, 6].

Repositioning of malar fat pad and deepening of nasogenian sulcus are aging characteristics [2, 7].

Some areas loose volume of soft tissue as the periorbital, frontal, temporal, malar, mandibular, and mental region, while others present persistence and tissue hypertrophy as the submental, lateral nasolabial region, lip crease, infraorbital, and malar fat pads (Fig. 29.1) [2, 8, 9].

29.3 Muscle and Ligaments

There are five facial layers, including skin, subcutaneous layer, muscle-aponeurotic layer, subaponeurotic layer, which contain ligaments, soft tissue spaces, and deep or periosteal fascia. These layers are interconnected and adhered to the facial skeleton through ligaments [6].

Facial fat compartments are divided by connective and fibrous tissue from the fascia to the dermis, where there are skin-perforating vessels and arteries. These fascial ligaments provide support and stability [7, 9].

With aging, gravity action, and volumetric loss of subcutaneous layer occurs a lower facial migration by weakening the deep ligaments [6, 9].

The facial muscles are very complex and provide movements above and around bone cavities such as orbit and oral one. The muscles are connected to the deep bone surface and the surface of the skin (Fig. 29.2) [6].

With age advancement occurs muscle atrophy, especially in the masticatory muscles which cause facial structural changes [6].

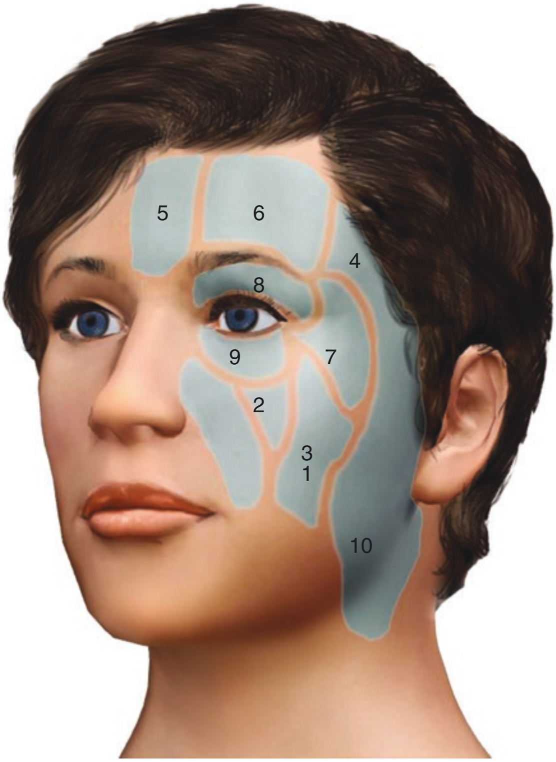

Fig. 29.1 Facial subcutaneous compartment divisions: 1, nasolabial; 2, medial malar; 3, medium malar; 4, lateral temporo-malar; 5, middle frontal; 6, lateral frontal; 7, lateral temporal; 8, superior orbital; 9, inferior orbital; and 10, mandibular

29.4 Bone Skull

The facial skeleton suffers changes throughout life. In childhood occurs the facial skull growth, and at adult age, the bone presents some absorption areas and other bone deposition areas [1, 6].

It has expansion capacity; for this reason, the vertical measures continually grow with age, and there are differences according to sex (Fig. 29.3) [1].

Men present most protruding front crests, greater pyriform, and bigger jaw than women. The female frontal region presents a continuous curvature both axial and sagittal planes, while men's front region presents more flat frontal over the orbital rim [1, 10].

The facial skeleton is absorbed, especially the middle third part that includes the jaw, nasal spine, orbit, and jaw. The loss of teeth accelerates maxillary and mandibular bone absorption [1, 6].

The orbital cavity grows with age in both area and width. The changes occur mainly in the superomedial and infero-lateral portions. The first aging changes occur at infero-lateral orbital part (Fig. 29.4) [1].

The facial middle third portion also presents bone absorption, mainly of the maxilla, leading to a facial retrusion (Fig. 29.5) [1, 11, 12].

Fig. 29.2 The facial muscles are connected to the deep bone surface and subcutaneous layer as demonstrated at the figure

The nose also grows during the years, and the nasal tip falls, decreasing the nasolabial angle due to the loss of maxillary projection, nasal spine, and increased pyriform opening [1].

The lower third of the face presents a horizontal mandibular growth, except when dental loss occurs, which leads to bone absorption and atrophy of the lower portion of the face [1].

Through knowledge of the facial anatomy and physiology and the aging process, it is possible to evaluate each patient in an individual way and program the most appropriate treatment that can range from less invasive procedures such as fillers to surgical repositioning methods.

Fig. 29.3 The figure demonstrates the facial bone evaluation during the years. The yellow arrows are the vectors of absorption areas

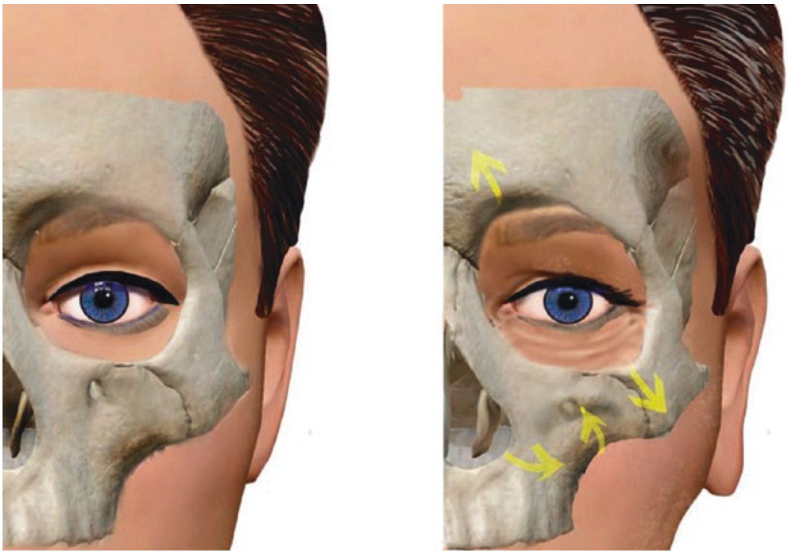

Fig. 29.4 Facial aging changes of the bone, superomedial, and infero-lateral orbital portions, maxillary and pyriform opening

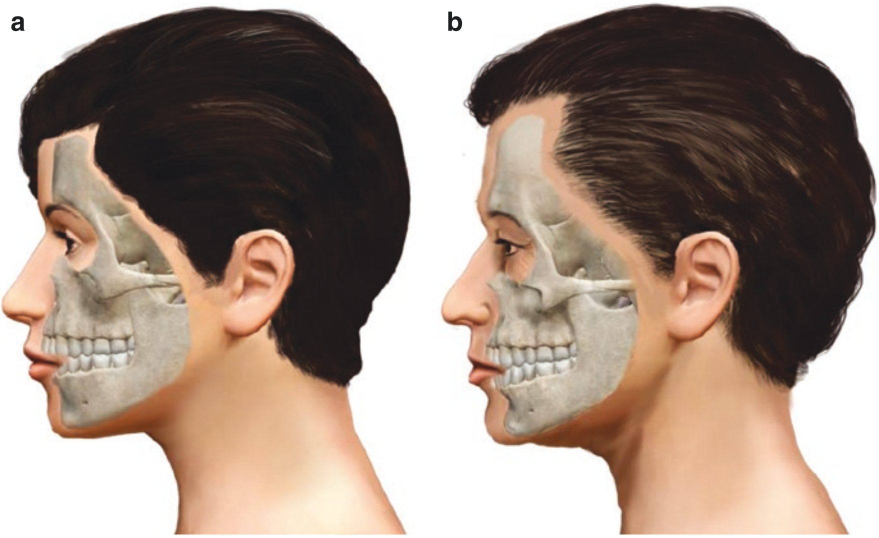

Fig. 29.5 (**a**) young facial skeleton and (**b**) old facial skeleton with middle third retrusion because of maxillary absorption

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Chapter 30
Philosophic Considerations About Senility

Ramil Sinder

The word oldness is unpleasant. It can mean disposability, discrimination, compulsory retirement, loneliness, and poverty, beyond the ghost of degenerative diseases, cardiovascular diseases, Alzheimer's disease, and remembering the implacable finitude of our lives. Society masks senility with euphemistic expressions: old age, better age, and happy age, instead of the term "old people" that currently disqualifies and discriminates.

Aging is a normal phenomenon that afflicts mankind since the early ages. Bracelets, rings, earrings, necklaces, hats, wigs, laurel wreath, and various types of adornments and cosmetics have long been used to conceal, camouflage, or disguise the unwelcome signs of old age such as wrinkles and sagging skin, white hair, and baldness. All of those are in the vain attempt to prevent the dream of youth from becoming the nightmare of senectitude.

The vitality and optimism of young people stimulate them with enthusiasm in the struggle for life that seems eternal. They are eager for new knowledge and more experience, which are acquired as they mature. But gradually they perceive that the pillars of maturity culminate in the roof of old age, signifying that death to all lurks in some depths of time and that, inexorably, we are going to meet him.

In some societies there were times in which the experience, knowledge, and wisdom of the elders were qualities that made them deserving of the deepest respect, consideration, and admiration, making them proud of their ages.

Nowadays several social movements, including feminist ones, contraceptive pills, and the powerful strength of advertising agencies, allied to technological development, in addition to the influence of the media and commerce, created a time of exaltation of youth and beauty: young fashion, young music, modernity, and, above all, young and beautiful appearance, overvalued and practically unsurpassed. Increasingly, professional, social, and affective successes are directly related to appearance.

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In recent years, science has advanced at a speed never seen, with highly sophisticated, overwhelming results. In an increasingly short time, what seemed truly unapologetic becomes obsolete, and ideas that seemed impossible dreams become resources and devices of common use. Knowledge grows exponentially, giving rise to new specialties that in turn expand, perfect and branch out.

Research and enhancements in personal computers, the Internet, mobile phone, HD, CD, DVD, IPOD, MP3, digital camcorders, remote services (in banks and e-commerce), industrial automation, nanotechnology, biotechnology, cloning, molecular biology, stem cells etc., evolve so rapidly and with so many innovations that it becomes increasingly difficult for our minds to follow and assimilate. Many believe that the next 10 or 20 years will bring more inventions, discoveries, changes, and technological improvements than the entire twentieth century.

Life expectancy in the most industrialized countries has increased greatly due to better health conditions. Geriatrics and gerontology facilitate the lives of the elderly, but they do not prevent them from having existential crises and seek refuge that can be in religions, psychology, psychoanalysis, antidepressant medications and/or similar drugs, alcohol, and other drugs. But those could never replace love, affection, and the dedication of their respective families, because everyone wants to be loved and everyone deserves respect and attention.

In Brazil there is a growing elderly population trying to continue in the labor market. The great inequality of economic and financial conditions is responsible for the contrasting difference in quality of life among the social strata. The poorest people survive poorly, do odd jobs, or have low-paying jobs.

In many homes, the grandmother runs the house, takes care of the children – her grandchildren – and controls the home life so that the parents of these children, their children, can work out and thus contribute to the family's livelihood. The new middle- and upper-class seniors, who are in better health, often remain active, exercise citizenship, vote, produce, consume, represent, circulate, decide, participate, and act as consultants, business council presidents, traders, etc. But no one wants to look old due to the fear of being away from the professional, sexual, and consumer markets. In the war against old age, they spend fortunes on medicine drugs, spas, invigorators, gyms, salons, hairdressers, cosmetics, botulinum toxin, fillers, and plastic surgery. In many cases the obsessive culture of the body assumes incredible proportions and is even dangerous for health. Multicellular beings have limited lifetimes and undergo physiological changes. Their life is usually divided into three phases: growth, development or reproductive, and aging or senescence.

Aging is caused by endocrine, vascular, and metabolic changes at the molecular and cellular level, resulting in progressive functional losses of the organs and the organism as a whole. It occurs sequentially and interdependently. The rate of decline of physiological functions is exponential, that is, the occurrence of functional losses is accelerated with increasing age. There is progressive degeneration of the mechanisms that regulate cellular and organic responses to internal changes and external aggressions.

Diversified and new researches have been increasingly deepening the knowledge and understanding of many biological phenomena, such as apoptosis (a kind of physiological cellular suicide) that will greatly contribute to controlling and delaying the process of senectitude. In order to improve and extend our life expectancy, it is very important to understand the main causes of death, such as cancer, whose study and understanding may be beneficial for health.

Among the many factors we have mentioned are the telomeres at the ends of the chromosomes which, thanks to the enzyme telomerase, favor the successive divisions of cancer cells, which make cancer so powerful and feared. Antiangiogenic substances and many others that hinder these divisions have also been deeply studied. In sexual reproduction, death occurs after the reproduction phase. Some animals, like salmon, die soon after ensuring the species' perpetuation. Others mature, and, after the reproductive phase, they age, degenerate, and die. Some, like crocodilians, seem to retain the vigor of youth to the death. The capacity of cellular regeneration varies according to the species and is greater the more primitive the animal in the zoological scale, having extraordinary cases like the sea sponges and starfish.

Unfortunately, mankind's destructive action is affecting many important ecosystems, condemning many living beings to extinction even before they know or know that they exist. It is very probable that, thus, we are missing the opportunity to better know and clarify many mysteries of life and the aging process.

There are multicellular beings, such as *Turritopsis dohrnii* (a kind of jellyfish) whose cells renew themselves continuously and indefinitely, conserving youth. *Sebatis aleutianus* (a Pacific fish known as rockfish) and two species of chelonians (*Emydoidea blandingii and Chrysemys picta)* have cells that remain mysteriously young or with negligible aging.

In senectitude there is a decrease in the volume of the face due to atrophy and dehydration, not only skin collagen and elastic fibers, which results in sagging and wrinkling, and other tissues such as bones, muscles, and adipose tissue, which are further modified by the action of gravity, solar rays, and habits of life.

Maybe one day the combined work of all branches of science will substantially delay and even avoid the aging process. But while this is not happening, we can and should continue to use and perfect all existing resources to conserve and improve health, such as healthy balanced nutrition, physical exercises, and brain activity, such as reading a lot, to strengthen our mental forces. Vices and unruly living harm and age young people. Healthy virtues and habits benefit and rejuvenate the elderly.

We do not know the ultimate explanation of our existence. But we must always remember that the main goal of our lives is to be happy, regardless the age or other factors. We can and should use everything we have to achieve and preserve happiness.

Facial plastic surgery with exclusively aesthetic purpose began in the late nineteenth and early twentieth first centuries. At a time when vanity in many societies was condemned as one of the capital sins, both clients and surgeons who used it sought to do so secretly, without fanfare. Gradually these surgeries have become a common, powerful resource, safely and without prejudice. The evolution and improvement of modern techniques, carefully used, provide increasingly rewarding results in the sense of restoring or increasing the well-being, joy, good humor, faith, and hope of the growing number of patients who turn to it.

It is up to all of us who embrace this noble specialty to continue to exercise it with the seriousness, competence, love, and responsibility that have already become traditional in Brazil.

Part III
Basic Techniques on Facelift

Chapter 31
Deep Temporal Fascia FLAP in Rhytidoplasty

João Erfon, Claudio Mauricio, and Aleksandra Markovic

31.1 Introduction

The rhytidoplasty was a surgery to detach and remove excess skin; for years, it has been through a considerable evolution since the works of Mitz and Peyronie [14] and Skoog [19], who introduced the treatment of deep facial structures in the desire to improve the aesthetic results of this surgery. Many authors [4, 9] have contributed to the observed advances, some with subperiosteal detachments [11, 16], others with the use of videoendoscopy [1, 6, 17]. Some of these contributions are ancillary

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procedures to classic rhytidoplasty [7, 15]. All these techniques have advantages and disadvantages. In this study, the author introduces the use of a flap of the deep temporal fascia [5, 6] to suspend and maintain the SMAS plication of the middle third of the face, as a complementary method, and can be used with a classic [18] or video-endoscopic approach [1, 17]. Good definition and rejuvenation is observed of the middle third of the face, as well as maintenance of the results in a longer term.

31.2 Method

A retrospective study was carried out with patients who underwent rhytidectomy with the deep temporal fascia flap by a classical or video-endoscopic approach during the period from January 1995 to December 2018. A careful review of the deep temporal fascia anatomy was performed [8, 21]. 535 patients underwent cervicofacial rhytidectomy with SMAS-platysma treatment and the use of the bilateral deep temporal fascia flap, making 1070 flaps.

The mean age was 58 years, ranging from 37 to 88 years old. Females predominated in 500 (93.45%) cases; the remaining 35 (6.55%) were males. In 503 (94.02%) patients, the classic approach was used, with temporal, preauricular, and postauricular incisions (Fig.31.1b). In 32 (5.98%) video endoscopy with temporal incision or

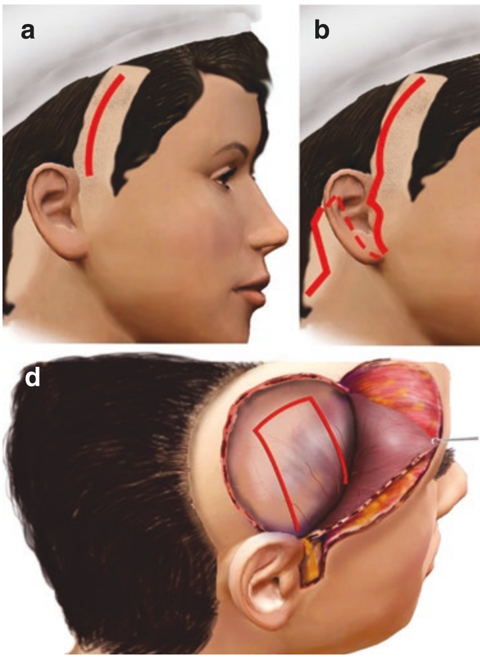

Fig. 31.1 Incisions used in rhytidoplasties (classic and modified for use with video endoscopy)

temporal and postauricular incision was used (Fig. 31.1a, c). In 408 (76.26%) patients, blepharoplasty was associated with rhytidoplasty. Submental liposuction was performed in 518 (96.82) of the cases. Anterior platysma plication was performed in 48 (8.97%) patients. Filling with lipoinjection or hyaluronic acid was used in 402 (75.14%) of the surgeries, elevation of the eyelashes by video-endoscopic approach in 248 (46.35%) of the cases, and treatment by video-endoscopic approach of the fronto-glabellar region in 152 (28.41%) patients. Only 2 (0.37%) of the cases of frontal rhytidoplasty incised in the hair implantation line.

31.3 Technical

After sedation and local anesthesia infiltration (0.5% saline and xylocaine solution and adrenaline 1: 200,000 IU), surgery is initiated by the classical or video-endoscopic approach. The face and cervical region dissection is performed, followed by SMAS-platysma treatment (Figs. 31.1 and 31.2). Then the deep temporal fascia flap is planned (Fig. 31.3a) in a rectangular shape. A parallel line coinciding with the classic temporal incision of the rhytidoplasty, following the superior insertion of the auricular pavilion, is demarcated. From this, another parallel line is marked, 3 cm medially from the previous. These two lines are joined by a transverse line, at the cranial insertion of the temporal muscle level, in the upper temporal line [8]. It has a proximal pedicle in the zygomatic arch, nourished by the medial deep

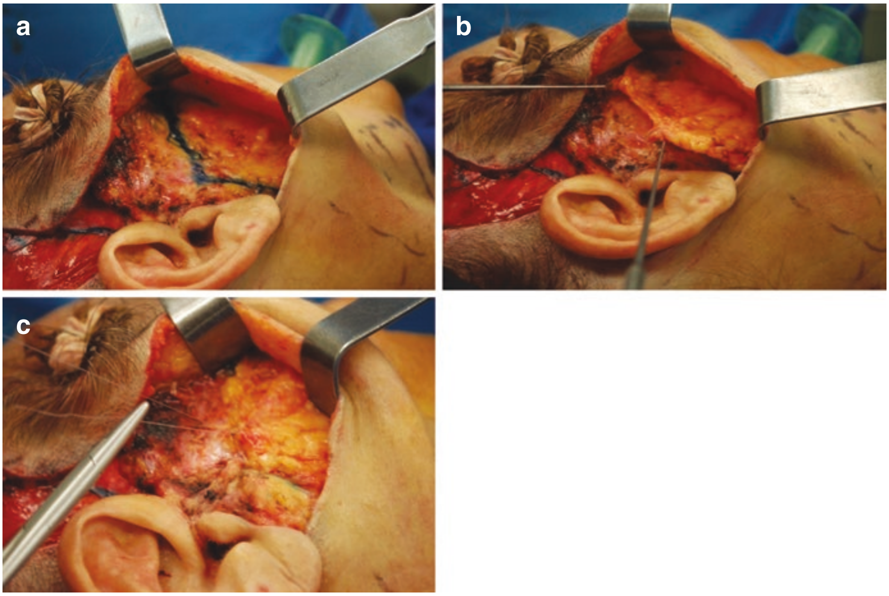

Fig. 31.2 SM plication treatment. (**a**) Marking the SMAS incision. (**b**) Dissection of SMAS. (**c**) SMASectomy and SMAS suture with 3×0 mononylon

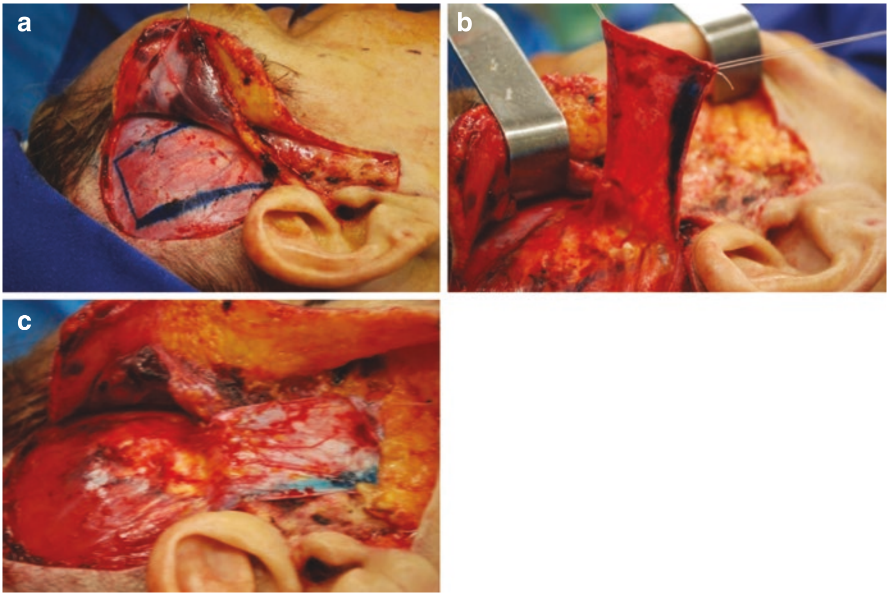

Fig. 31.3 Depth of deep temporal fascia (**a**) Flap design in the deep temporal fascia, 3 cm wide and over the entire length of the m. temporal. The nutrient vessels of the flap, can be visualized. (**b**) Dissected flap with lower base. (**c**) Flap folded in 180° and sutured in addition to the SMAS plication

temporal artery [21] (Fig. 31.3b). The dissection of the flap is initiated by its distal end, in a proximal direction, taking care to keep the nutrient vessels intact, which are located on its deep face. After SMAS treatment, the flap is folded 180 degrees above the zygomatic arch and fixed beyond the plication of the latter. Three fixation points are used, with 3x0 colorless mononylon, in the direction of the nasolabial folder, the labial commissure, and the jowls, respectively (Fig. 31.3c).

In the video-endoscopic approach (Fig. 31.1a, c) a skin retractor is needed to access the middle third of the face, from the incision of the temporal region, with the aid of the video endoscope, where subcutaneous dissection and plication of the SMAS are performed, prior to flap suturing, as described in the open approach (Fig.31.1b). The surgery is completed according to the ancillary procedures required in each case. Drains are not used. Occlusive dressing is maintained for 48 hours.

31.4 Discussion

The rhytidoplasty techniques that were limited to the subcutaneous dissection, to the traction and removal of skin excess, had an important evolution from the works of Mitz and Peyronie [14], on the treatment of SMAS. Many authors have started a constant search for better results in this surgery, some with detachment and plication of deeper structures, such as SMAS and platysma [15], others with subperiosteal dissections [11, 16]. The video-endoscopic approach was introduced(1,5,6.17). Other authors added complementary methods to the classical approach [10]. Several techniques were developed for the treatment of the SMAS, such as dissection and SMASectomy [2]; plicature without dissection [20]; traction in different directions [3, 13]; and partial resections and plication.

Surgeries became more aggressive and complex, with greater skin detachments and deeper planes, resulting in increased risks and surgical complications.

In recent years, a new trend has developed in order to reduce the extent of cutaneous dissection, minimizing complications [3, 15, 20]. Compensatory ancillary methods have been introduced with the intention of preserving the aesthetic results.

Skoog (1974) demonstrated that a face dissection could be made subfacial which would later be known as SMAS [19].

Connel (1995) developed a flap of SMAS "trifurcate" providing three independent vectors for correction of the cheek area, jowls, and neck (neck) bags, obtaining a better repositioning of these areas [4].

Mottura (2011) describes what he called "Spa Face Lift," in which three parallel lines are marked on the skin, after the cutaneous detachment are transferred to the deep part marking the area of SMAS to be plucked, under continuous suture, reducing cutaneous detachment [15].

Cárdenas-Camarena (2011) describes his experience with SMAS plication reducing from 6 to only 3 plicatures, with decreased edema and faster postoperative recovery, suggesting that sometimes more does not mean less [3].

Hoenig (2011) recommends the subperiosteal approach from the temporal region, by video endoscopy, to treat the malar region [11].

Liu (2012) divided patients into three groups: younger than 50, between 50–60 years and older than 60 years, concluding that those who operate before 50 have the best and more consistent results, but have more complaints about the degree of very high expectations, while those above 60 have less consistent results and greater satisfaction in the long term, 10 years [12].

Hodgkinson (2012) recommends m. platysma traction, in the vertical direction, and suture to the tympanoparotid fascia (Loré's fascia), improving the contour of the jowl and the submental region [10].

Ramirez (1991) recommends subperiosteal dissection of the upper third of the face until malar and can be combined with an endo-oral approach to treat the rest of the face, bringing benefits to the sub-SMAS by subperiosteal dissection of the face musculature [16].

In 1995, the author of this article developed the deep temporal fascia flap, as a complementary method to SMAS treatment, with a precise indication of mid-face suspension reinforcement and elevation. The flap is fixed with three sutures directed, respectively, to the nasolabial sulcus, the buccal commissure and the jowls areas. With this procedure, an improvement in the aesthetic results (Fig. 31.4) was observed, as well as the maintenance of these, in the longer term, with greater patient satisfaction (Figs. 31.4 and 31.5).

Fig. 31.4 Patient at 48 years of age, submitted to videoendoscopic rhytidoplasty (without preauricular incision), using the temporal fascia flap. (**a**) Pre op, 48 year old patient. (**b**) 1 month post-op. Videoendoscopic approach, without pre-auricular incision. (**c**) 7 years post-op. (**d**) Pre op, 48 year old patient. (**e**) 1 month post-op. (**f**) 7 years post-op

The reoperations were more frequent in the patients who had a videoendoscopic approach, when compared to those who underwent the classic approach. Based on this observation, the indication of video endoscopy for the middle third of the face fell in the last 10 years from 15.9% to 5.6%. The author uses this approach in patients in the 40s with excellent skin elasticity, which may have great contractility in the immediate postoperative period (Fig. 31.4b).

Patients were followed up about 6 months postoperatively. An excellent degree of satisfaction was observed during this period, as well as the good maintenance of the results obtained with the use of this flap. We observed in patients who underwent secondary rhytidectomy by the senior author (JE), after 15 years, the presence of the deep temporal fascia perfectly viable in the middle third of the face, greatly

Fig. 31.5 Patient with 62 years old, submitted to traditional rhytidoplasty by open approach (with preauricular incision). (**a**) Pré-op de ritidoplastia por abordagem aberta. (**b**) Pós-op 4 anos depois. (**c**) Pré-op de ritidoplastia. (**d**) pós-op 4 anos depois

facilitating the SMAS replication. The deep temporal fascia flap was evident in all patients.

31.5 Complications

The hematoma index was seven (1.30%) cases, requiring surgical drainage in only two (0.37%) of those. The other five (0.93%) were treated with puncture, in the ambulatory. Epidermolysis, of the retroauricular skin, in the most distal part of the skin flap (greater than 0.5x0.5 cm), occurred in three (0.56%) patients who healed for second intention. Temporary paresis from the temporal branches of facial nerve in 5 (0.93%) cases submitted to elevation of the eyelashes and 12 (2.24%) cases of the buccal branches. Reoperative interventions were performed in nine (1.68%) patients. Of those, four (12.50%) had a video-endoscopic approach, and five (0.99%) had an open approach.

31.6 Conclusions

We conclude that using the deep temporal fascial flap may superimposed the SMAS plication, favoring an excellent fixation of middle third of the face, reinforcing the traction and suspension of the cheek and jowl areas, more effectively and more durable, being an important ancillary method in the cervicofacial rhytidoplasty. The temporal fascia flap is easy to learn and apply.

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Chapter 32
Neck Lift (Restoring the Neck Contour)

Claudio Cardoso de Castro and Sheyla M. Carvalho Rodrigues

32.1 Introduction

Facial rejuvenation procedures are an increasing interest to the public, and the restoring of the neck region is very important to recognize the success results of this type of treatment. The lower third of the face and neck are one of the places where you often notice the first signs of aging on the face.

The neck changes can be the result of variable deformities such as the condition and the excess of the skin, fat amount and distribution, prominent platysma bands, mandibular marginal definition loss, hyoid position, and the submandibular glands (Fig. 32.1a, b, c, and d).

A complete facial analysis is of particular importance essential to the successful results of these procedures because patients present diverse ages, different deformities, and variable expectations, bringing a tough challenge for the surgeon.

Recently several technological advances had improved the surgical techniques available to achieve the aesthetic goals of the neck lift, but the anatomical structural conditions potentially assist in developing a treatment plan. There are numerous anatomical conditions that change with age and affect the neck's appearance: so it is mandatory to provide a very personal surgical plan for each one.

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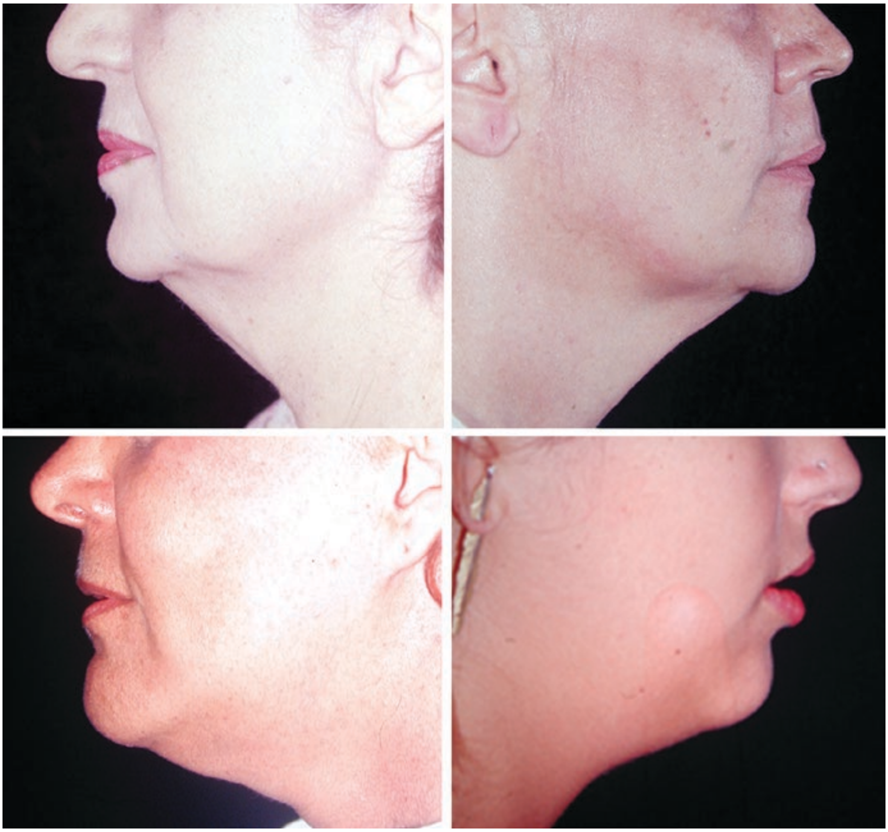


Fig. 32.1 Several examples of cervical deformities caused by the aging process. Different patterns of fat distribution, platysmal bands visible in some patients, laxity of cervical skin, and jawline erasure

32.2 Method

32.2.1 Operative Strategy

The Surgical planning is a necessary step before surgery, is the decision of which operation is possible to achieve good surgical correction.

Excess skin flaccidity, accumulated fat in the submental region and submandibular regions, hypertrophy, and ptosis of the submandibular gland associated with the flaccidity of the platysma muscle in the medial and posterolateral portions are responsible for neck contour deformities. These alterations will be more or less noticeable according to the bone structure, skin quality, and position of hyoid bone and the submandibular gland. According to the sum (magnitude) of these factors, the surgical plan is done aimed at the elimination\attenuation of the deformities. One must respect the limitations of each case and even the surgeons' limitations.

In most of the cases, we unite the skin dissection at the suprahyoid region. We open the submental area wherever there is alteration at the median line. In doubt, we always open it. We never regretted opening the chin, and in some cases, we would have had a better result if we have open the chin. It is important to state that we never had a complaint on the scar on the chin.

When there is severe deformity in the jawline, we recommend the superficial muscular aponeurotic system (SMAS) simple dissection. Treatment of the lateral portions of the platysma muscle is done with the SMAS. The SMAS and the platysma muscle are an anatomical unit. Therefore, they should be treated together [14].

Concerning the treatment of the SMAS, plication, SMASectomy, and dissection greater or less extended the choices. [2, 3] The extension varies according with the deformity of each case. We like to dissect SMAS because we can mobilize the tissues repositioning them according to the alterations. The extension of the undermining depends on the magnitude of the alteration of each case, and when the dissection is performed, the flap is being pulled, and the surgeon feels when it is enough for that patient.

The indication for cervical lipectomy is always present when there is accumulation of fat in the suprahyoid region [6, 8]. We use liposuction, open or closed, for cervical lipectomy, complete with scissors when necessary. For submental aspiration, we use Pontes cannula that in our opinion facilitates the fat removal evenly in an open manner. When lipectomy is performed, they are usually limited, in order to avoid skin retractions or even artificial results and waves [13].

When fat is removed, the medial fibers of the platysma muscles are dissected in order to evaluate thickness, anatomical behavior, and flaccidity of the muscles. A lateral dissection is done, and the muscle excess is carefully observed and removed. A medial suture is performed following a medial section as describe by Aston [1] utilizing scissors as proposed by Aboudib. For Cardoso de Castro [6], it is extremely important to remove the muscle in excess because the approximation of the medial fibers in a great percentage of patients with muscle excess will show redundancy of the muscle if it is not reduced (Fig.32.2a, b, and c).

The importance of the anatomical knowledge of the anatomy of the medial fibers of the platysma muscle (Fig. 32.3a, b, c) is to have in mind that these fibers can be separated or not. They can be more or less separated presenting variable grades of flaccidity and also different grades of thickness. This led us to evaluate the grade of muscle excess when treating neck deformities, because if you did not pay attention to this in many patients, flaccidity will remain [9].

We do not favor subplatysmal defatting because there is a natural space between the platysma muscle and the mylohyoid muscle. If fat is removed, the muscles will heal, and a deformity very difficult to be corrected will occur.

We also do not favor submandibular gland resection and/or digastric muscle operations. Prolapse or ptosis of the submandibular gland can occur in patients with or without the fatty neck, but the operations may yield severe complications, and the benefits are not worth the risk. We have similar thoughts about the digastric muscle. We do not see advantages on operations on the digastrics muscles. They are masticatory muscles.

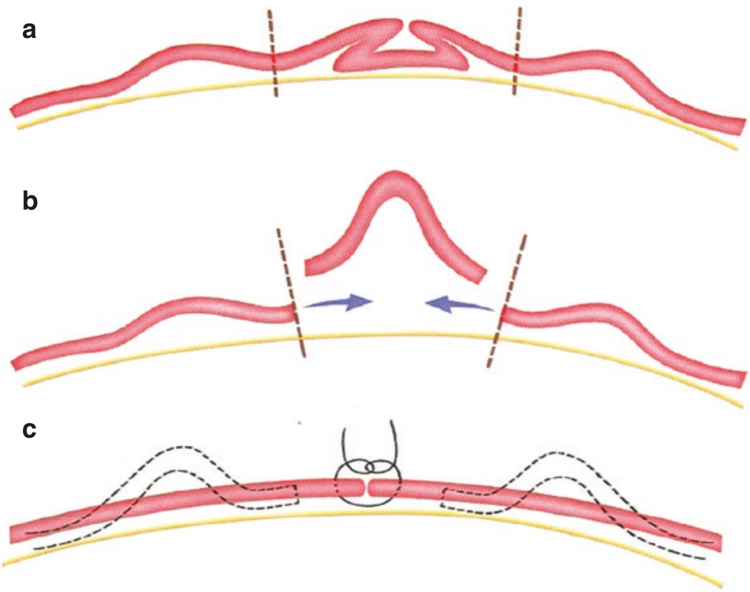


Fig. 32.2 Scheme showing approximation of the medial fibers to my medial: (**a**) – without considering the muscular excess; (**b**) – evaluation and resection of the muscular excesses and sutures of the fibers for the midline without tension; (**c**) – regular, natural contour expected from anatomical variation, sagging, and thickness of platysma muscles

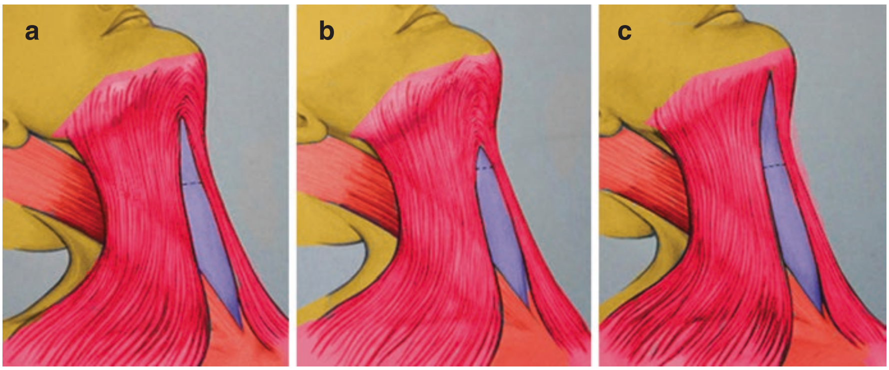


Fig. 32.3 Different types of distribution of the medial fibers of the platysma muscle in the midline classified into three different groups. The fibers are joined or separated. (Cardoso de Castro): (**a**) – Type I, the fibers interlace 1 to 2 cm below the chin; (**b**) – Type II, the fibers interlace at thyroid's cartilage level behaving as a single muscle at the supra hyoid region; (**c**) – Type III, fibers do not interlace. They go straight to the chin

32.2.2 Surgical Technique

The Intravenous sedation anesthesia is instituted (occasionally we use general anesthesia) and local infiltration is performed with a solution of 0.9% saline, lidocaine, ropivacaine, and epinephrine 1:200,000 is employed along the incisions.

32.3 Incisions

A submental incision is performed in the majority of the patients. This is a 4 cm incision located 3–4 mm behind the submental crease. According to Cardoso de Castro, he made a 3 cm incision, but an increase of 0.5 cm at each end did not mean anything to the final result and helped a lot in the visualization of the surgical field, as well as in the manipulation of the surgical tools (Fig. 32.4).

The retroauricular incision may stop just behind the earlobe as Baker [5] advocates (Fig.32.5), or at the level of the auricular implantation, in the occipital area, or in cases where the excess skin is large, the incision follows the hairline.

We detach much of the skin from the neck and the cheeks, extending it to the skin of the back of the neck and retroauricular region, when necessary, with scissors. Dissection of the skin flap over these areas must be done with care to prevent injury to the submandibular ramus branch of the facial nerve, lesions of external jugular vein [10], and to prevent irregularities in the skin (Fig. 32.6).

We removed submental fat with lipectomy (in order to visualize and classify the platysma medial fibers) and then platysma muscle treatment (Fig.32.7).

After identification of the platysma medial fibers, the amount of muscle to be removed is determined. This muscle removal is not performed at random, but by evaluation of excess muscle after medial undermining of the platysma muscle of about 2 to 3 cm and then muscle excess resection (Fig. 32.8e and 32.9).

Fig. 32.4 Submental incision of approximately 4 cm located 3–4 mm behind the submental crease

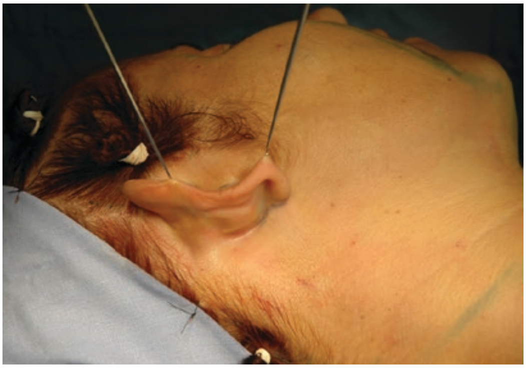


Fig. 32.5 Short retroauricular incision

Fig. 32.6 Dissection of the skin flap over the suprahyoid region and lateral cervical regions with scissors

Fig. 32.7 Cervical lipectomy [7] preferably by open liposuction with cannula completed with scissors

Once the muscular excess is eliminated, the fibers are sutured in the midline with inverted 4–0 Vicryl nodes. The extension of the suture will dictate how much we want to define the suprahyoid region. The medial section is also performed for the purpose of better readaptation of muscle fibers, as described by Aston (Fig. 32.10).

Fig. 32.8 Visualization, classification, and identification of the medial fibers of the muscle platysma. Both the fibers are dissected about 2–3 cm, being approximated to the midline for a perfect evaluation of the amounts to be removed

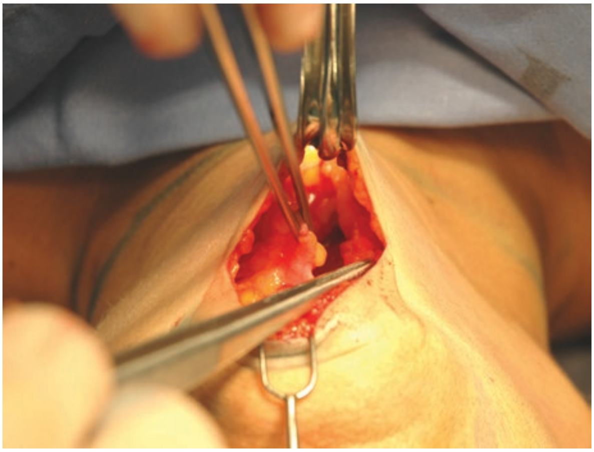
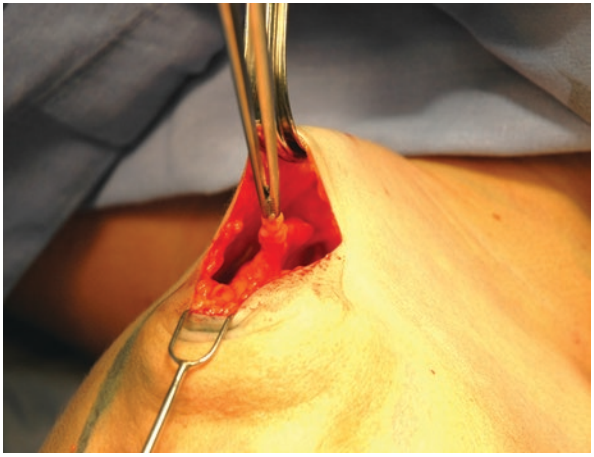


Fig. 32.9 Removal of excess medial platysma muscle after undermining and evaluation of excess



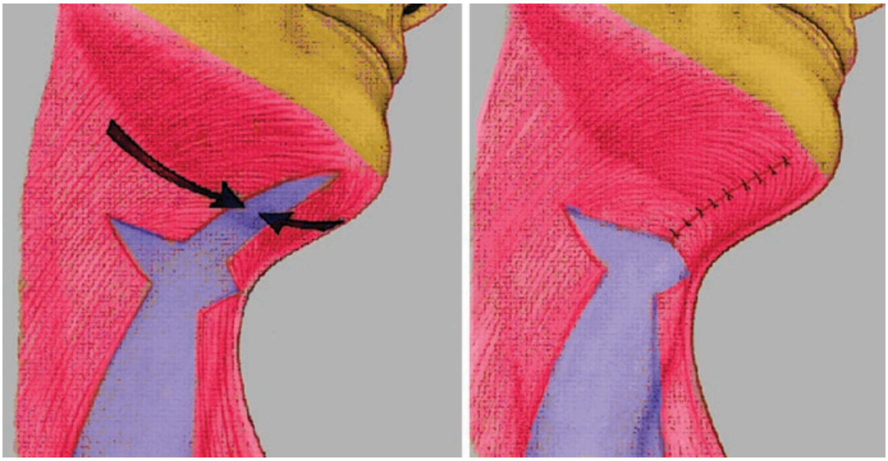


Fig. 32.10 Schematic representation: lateral incision of the medial fibers and muscular sutures

Fig. 32.11 Preoperative lateral view and 6 months after neck lipectomy and treatment of SMAS-platysma and medial fibers

Fig. 32.12 Preoperative appearance of patient complaining of deformities of her neck and 6 months after treatment of SMAS-platysma and medial fibers

Through the auricular incisions, we plicate the detached lateral portion of the muscle platysma toward the mastoid fascia. With this, the cervical fascia stretch, digastric muscle, and the submandibular gland are lifted, thus correcting the bulge of the neck. These details help define the mandibular border.

We must keep in mind that the skin is sufficient to naturally cover the new cervical contour. If there is not enough skin, we may encounter flanges in the midline (Figs. 32.11, 32.12, 32.13, and 32.14).

We performed carefully hemostasis using fiber-optic illumination.

32.4 Complications

As in any surgical procedure, complications can occur [4] [11], such as hematomas, nerves injuries – mandibular ramus – skin necrosis, keloids, hypertrophic scars, skin irregularities, or retractions by excessive removal of subcutaneous fat or adherence

Fig. 32.13 Preoperative appearance of patient presenting huge deformities of the lower third of the face and neck and 6 months after SMAS-platysma flaps, lipectomy, and medial platysma treatment

Fig. 32.14 Preoperative view of patient seeking for neck improvement and 9 months after SMAS-platysma and medial platysma treatment

of platysma to a cutaneous flap, in addition to infection or dissatisfaction (Figs. 32.15, 32.16, 32.17, and 32.18).

Hematoma, if large, is imperative to use one draining technique to reduce the pain and swelling, but if is small, it may be left, where, through the natural healing process, it will clear away [12].

Mandibular ramus nerve injury is usually due to liposuction or cauterization. Commonly the recovery occurs in 1 to 3 months [15].

Skin necrosis and other scarring may be the cause of skin thinning, heavy smoking, or excessive skin traction. Good technique and prevention are key, but the therapeutic treatment of necrosis is with chemical debridement and regenerative dressings. Hypertrophic and keloid scars are treated with compression therapy, intralesional corticosteroid injections, excision, radiotherapy, or laser therapy.

Skin irregularities usually are due to defatting, hematoma that was not very well treated, or adherence of the platysma to a skin flap. Treatments include linear subcutaneous lipoenxertia performed under retraction tissue, steroid injections, or

Fig. 32.15 (**a**) Nerve damage evidenced by the deviation of the labial commissure and (**b**) 3 months after with improvement after physiotherapeutic treatment

Fig. 32.16 Skin irregularities and retractions by excessive removal of subcutaneous fat

treatment through remodeling and tissue reorganization with massage and physiotherapy.

Infection is extremely rare, and the causes can be several, such as teeth inflammation, not properly performed asepsis, etc. Treatment is antibiotic therapy.

The unsatisfied patient is an issue that is extremely difficult to manage. Patients who have had very well-performed procedures and are unhappy sometimes become extremely difficult to take care of at our offices.

When it is necessary to perform a revision, I advise waiting 1 year before performing any secondary procedures.

Fig. 32.17 Skin necrosis and 6 months after treatment

Fig. 32.18 Keloid scar

32.5 Discussion

As discussed above, we deal with different kinds of patients exhibiting different anatomical arrangements of the structures in their neck, different ages, and different expectations, and we have several techniques from which to choose. We must have successful results in every single case. Patients have no idea of the deformities they show. They demand a fast recovery with the best possible result that is long lasting.

Due to the diversity of the involved elements, a neck lift turns out to be an extremely complex challenge for the surgeon, demanding both accurate technique and common sense.

From the surgical point of view, it is important to know that the medial fibers of the platysma muscle can be separated or joined in the suprahyoid region. They have different degrees of sagging and are more or less distant. In some studies, authors recommend "clipping" or "approaching" the medial fibers of the platysma muscles. Now, if we have different ways of presenting, we must treat them according to their alteration. We must assess the degree of sagging and observe the anatomical variation to choose the most effective treatment.

The very approximation of the medial fibers must be careful so that we do not obtain artificial results.

32.6 Conclusion

In summary: It is not easy to define a difficult neck or to evaluate the result solely as the operating surgeon; the result will define it, and, depending on the patient, he or she will evaluate the result and state whether he or she is pleased or is dissatisfied with the result.

"Beauty is a rational quality that is defined by rules, is in the eye of the beholder, while the elegance, grace or charm is not precisely definable; it depends on the observer's judgment."

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Chapter 33
The FAMI Technique with Mesenchymal Stem Cells, Pan Facial Rejuvenation Without a Scalpel

Roger Elie Amar

33.1 Introduction

Fat transfer is a very old procedure which has gained more popularity in the 1980s with liposuction development thanks to two well-known French surgeons Pierre Fournier [7] and Yves-Gerard Illouz [9] who advocated the extraction-injection of fat, with the same syringe at the same time.

In the 1990s a US practitioner, Sydney Coleman [5], marketed a simple method of fat transfer using two straight harvesting cannulas for fat and two straight cannulas for injecting the mechanically purified fat.

Fat injections relied more on artistry than on a precise anatomical algorithm and often gave unpredictable outcomes, necessitating repeated engrafting sessions to achieve a good result.

Facial Autologous Muscle Injection also known *as Fat Autograft Muscular Injection* or *Facial Autologous Mesenchymal Integration*, abbreviated as **FAMI®,** was created in 1998 in France by Roger Amar and published in 1999 in the French journal of plastic surgery [1].

The technique put more science on fat grafting current methods by destroying the large fat lobules and concentrate a very fluid excerpt from the fat (SVF) which is the support of adipose adult stem cells (ADSCs) and by injecting in deep facial structures as mimic muscles, deep fat pads, and skull periosteum, giving more predictability and longevity to the graft.

Between 1997 and 2018, 1,026 patients were operated on successfully mainly for rejuvenation in upper face, mid-face, or lower face. Single or rarely two sessions of the FAMI® technique were necessary for permanent improvement in facial volumes and contours.

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33.2 The Consultation

Every patient considered for autologous fat grafting should have a physical examination to understand his or her specific ageing process with the help of their younger photos.

33.2.1 Initial Meeting

The first consultation is important to decide if the patient is suitable for the FAMI procedure. One must explore the patient's past history and family history for diabetes, cancer, cardiovascular, neuropsychiatric, thromboembolism, and bleeding problems with the list of all medications the patient is taking. The specific diet is noted.

We carefully list dates of all previous injections and facial surgeries (what was done, how, when, and importance of treatment/procedure).

The previous injecting areas with fillers are documented and saved on file.

33.2.2 Physical Examination

First of all, we review all the facial asymmetries specially if patients have had previous injections or surgeries. The loss of bone in the orbital and mandibular areas is drawn with specific defect or lumps that are carefully measured. Hypo- or hyperpigmentation in the overlying skin should be noted specially if a laser resurfacing has been done.

The harvesting area where fat will be removed for transfer is determined, and the amount of fat that will be utilized is evaluated. Preoperative photos with no shadows should be taken to prepare the blueprint.

33.2.3 Written Instructions

After consultation, the patient receives a letter with facial analysis and cost assessment as well as preoperative and postoperative instructions.

The patient must receive sufficient information on the procedure to make a well-informed decision as to whether or not he or she should have the procedure and agree by signing the consent confirming that the complete/correct information has been given.

33.3 Method: The FAMI Technique

FAMI is a procedure which depends in a capital way on the material used, (FAMI centrifuge, set of 17 cannulas) and the expertise behind (upgraded knowledge of 3D anatomy in cadaver training).

To make this closed procedure safer, before performing directly onto patients, more than 50 half faces have been dissected after being injected with gel dyed with methylene blue [2].

33.3.1 Instrumentation

FAMI is also material dependent. What does it mean? If the surgeon wants to approach the facial musculature with strong accuracy, from their origin to their insertions or conversely, he needs not only to know perfectly the facial anatomical planes and where he is supposed to inject but also to master the thin cannulas he will be using.

The ten reusable 18-gauge cannulas were designed in 1998, and their curvatures have never been changed for the simple reason that their seven main curvatures duplicate the contours of the skull. With their three different lengths and two different blunt tips, round and spatula-like, they can follow the mimic muscles which, as they age, tend to be shorter and get closer to their bone origin.

More recently, to ensure sterility, disposable cannulas are used which are lighter and more precise.

The tumescent local anaesthesia is performed with a 17-gauge disposable infiltration cannula leaving the reusable ones as a backup (Fig. 33.1).

Each blunt-tipped injecting cannula is made for a muscle or group of muscle or bone surface. Table 33.1 lists the cannulas developed for a full-face FAMI on the basis of one cannula for one specific muscle.

The two harvesting cannulas of the set are made of a round-tipped, two-hole stainless steel tube.

A very important part of the instrumentation is the FAMI centrifuge which includes three pre-set programmes 1, 2, and 3 which correspond to the three different structures to inject: bone, muscles, and deep fat pads.

33.3.2 The FAMI Steps

Numerous articles have been published on fat injection; therefore, we will only describe the points that are specific to the FAMI concept.

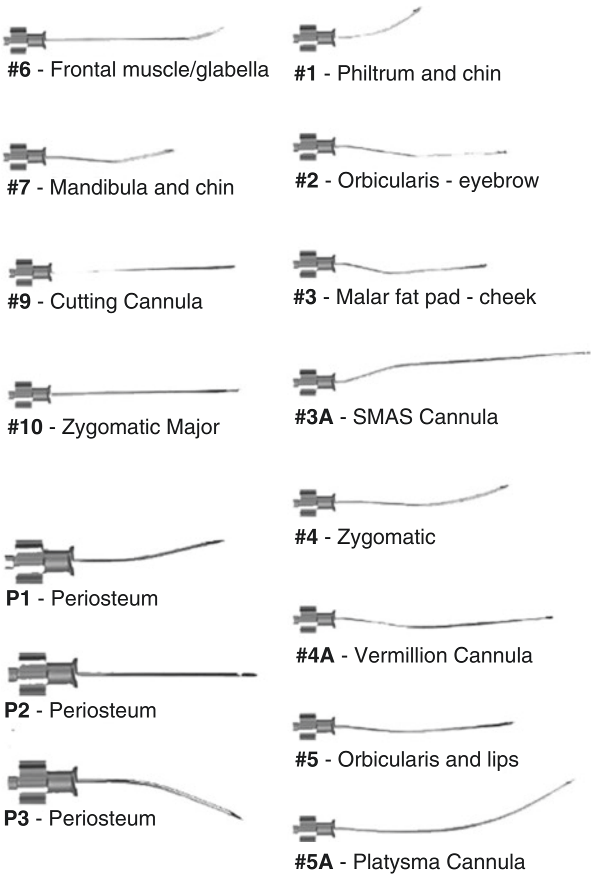

Fig. 33.1 To the set of 15 disposable injecting cannulas, it is added 1 more for injecting the tumescent solution and 2 others for harvesting the fat

33.3.3 Blueprint

An individualized plan of the injection pattern to be used during the procedure is formulated after analysis of the ageing changes or other defects on patients' younger photos and recent. The selecting subperiosteally, intramuscular, and fat pad locations to be addressed are marked on black and white patient recent A4 photo to be compared with the patients' younger photo of the same A4 size.

33.3.4 Harvesting

During the consultation, a diet-resistant fat donor area is chosen with the patient in a standing position. The sub-umbilical fat is most frequently used with the love handles region that are genetically present in men and women.

Table 33.1 This table shows the list of 17 cannulas used for the FAMI technique and their muscular targets with facial fat compartments. Are included the three cannulas used for subperiosteal injections

17 numbered cannulas	Muscle and fat pad targets
Cannula # 1:	For the levators labii superioris, levators labii superioris alaeque nasi, and philtrum
Cannula # 2:	For the Orbicularis oculi and ROOF
Cannula # 3:	For the risorius muscle
Cannula # 3A:	For the pillars of the cheek
Cannula # 4:	For the zygomaticus minor superficial and SOOF
Cannula # 4A:	For the zygomaticus minor lip part and Cupid's bow
Cannula # 5:	For the frontalis, buccinator, depressor anguli oris, masseter
Cannula # 5A:	For the Platysma and neck bands
Cannula # 6:	For the corrugators and procerus
Cannula # 6A:	For the Bichat fat pad temporal extension
Cannula #7:	For the depressor labii inferioris, mentalis, and levator anguli oris
Cannula #8:	Malleable cannula for testing
Cannula # 9:	Dissecting solid tube for scar undermining
Cannula # 10:	For the zygomaticus major and platysma origin
Cannulas **P1, P2, P3**	For all subperiosteal injections

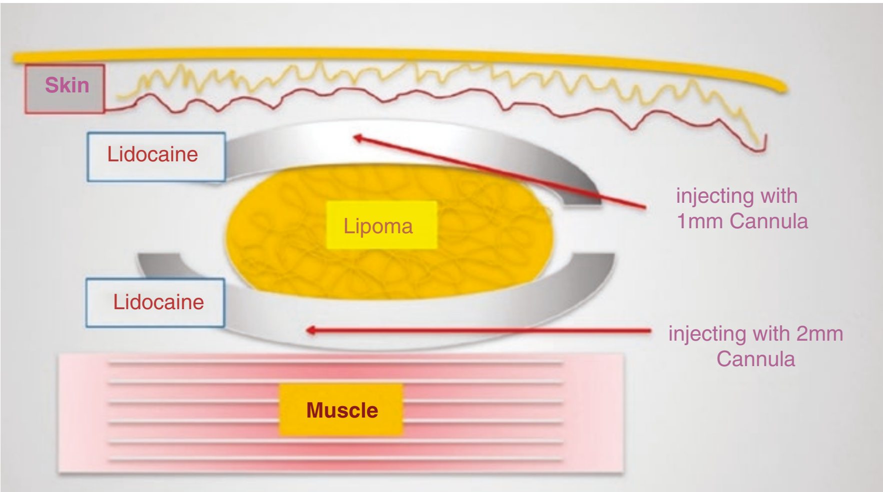

Fig. 33.2 The "isolation technique" for local anaesthesia injection of the harvesting areas

The "isolation technique" (Fig 33.2) is used for local anaesthesia which preserves harvested fat from lidocaine and other local injected products.

Klein's solution begins within the subcutaneous space followed by the deep supra-aponeurotic plane making the central fat deposit relatively free of anaesthetic solution.

The disposable harvesting cannula is connected to a BD 10-cc Luer-Lok syringe. A negative pressure in the syringe body is created by pulling the syringe plunger to 4-cc graduation. The fatty connective tissue is gently aspirated with a movement going back and forth to reproduce a multiple biopsy piercing more than a conventional liposuction.

33.3.5 Centrifugation

To prevent any leakage and air mixture during the spinning process, an aluminium cap seals the 10-cc syringes. After removal of the syringe from the centrifuge, we can observe in Fig. 33.3, on top, a layer of less density, yellow in colour, mainly composed of oil of destroyed fat cells; this layer can measure up to 5 cc after

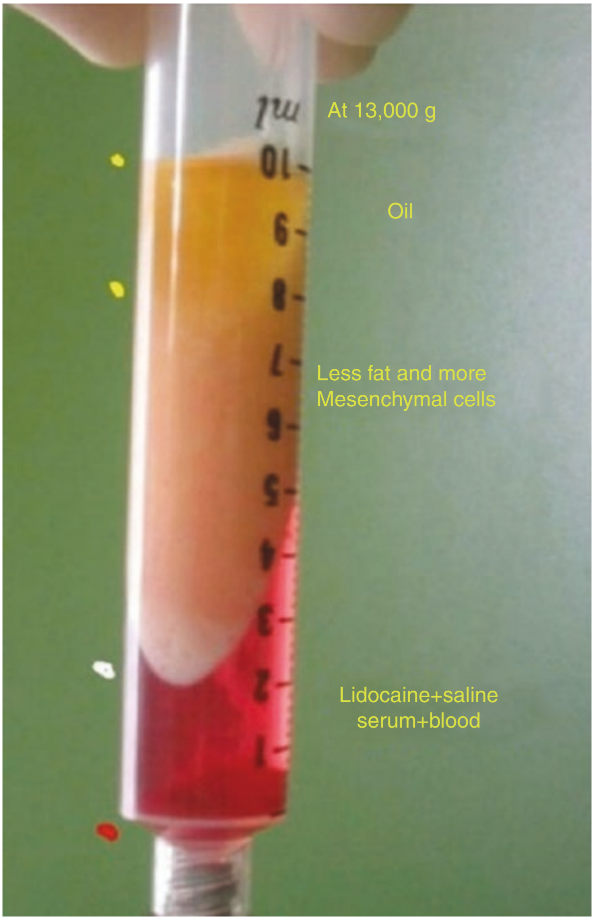

Fig. 33.3 Fat sample after being removed from the centrifuge. One can observe from top, a layer of oil from destroyed fat cells, then the SVF, and then in the bottom, the pink layer is mainly constituted of blood, lidocaine, and saline

Table 33.2 This table shows the different G force applied on lipoaspirates during 2.30 minutes, to obtain autologous SVF for restoration of bone, muscle, and fat pads. ("G forces" are used to make the same protocol compatible with other centrifuges of different diameter of rotors)

Spinning speed in G force	Tissue to repair
10,000 to 13,000 G	Subperiosteal
5000 to 6000 G	Muscles
1200 G	Fat pads

applying 13,000 G. In the bottom, the pink layer is mainly constituted of blood, lidocaine, and saline. The middle layer is composed of an accumulation of tissues: free fat cells, fat cells within a stromal vascular fraction (SVF) that contains the mesenchymal stem cells, and a lower white crescent of pure collagen.

Different speeds of spinning are used according to the facial structures to be augmented: bone, muscles, or fat pads (Table 33.2).

Lipoaspirates centrifuged at higher G force (13,680) tend to be more liquid and are injected subperiosteally; lower G force (1,200) processing is done when larger-volume corrections with lobulated fat aggregations are desired, such as in the fat pads.

33.3.6 Anaesthesia

To inject a face, we need to avoid any deformity due to tumescent infiltration and prefer to use a complete trigeminal sensory nerve block (Fig. 33.4) using Naropin 0.5% (ropivacaine 5mg/100ml – Astra-Zeneca) along with cervical sensory branches. Lorazepam 0.5mg PO or similar sedative and clonidine 0.1–0.2mg are useful adjuncts preoperatively.

33.3.7 Access Ports

Access ports are made with a tapered tip awl, which minimizes any dermal bleeding. These locations are relatively poor of vessels and nerves and heal without sutures. Sometimes bleeding coming from severed venous capillaries is stopped by few minutes' application of cotton pads (Fig. 33.5).

33.3.8 The Graft Placement

The processed lipoaspirates are transferred into 1-cc and 3-cc BD Luer-Lok syringes for injection with the appropriate cannula.

Acquired technical skill and a detailed knowledge of the anatomy are necessary to successfully place the grafts (Table 33.3). Correct intramuscular placement in

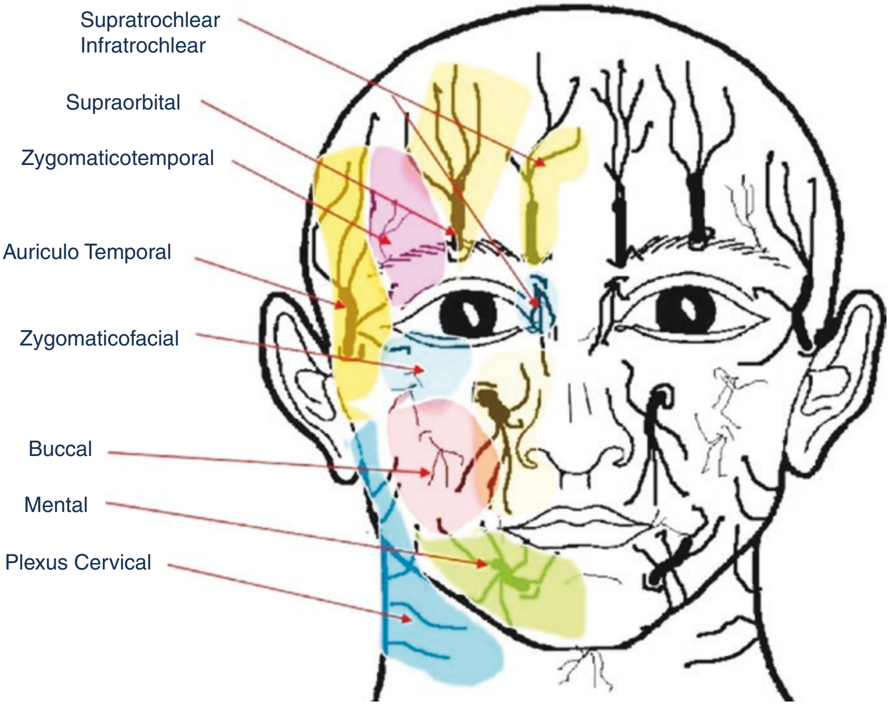

Fig. 33.4 Trigeminal branches distribution and the distribution of the anaesthesia according to each branch

Fig. 33.5 Approach ports for the FAMI procedure, frontal, orbital, nasal, buccal, and mandibular

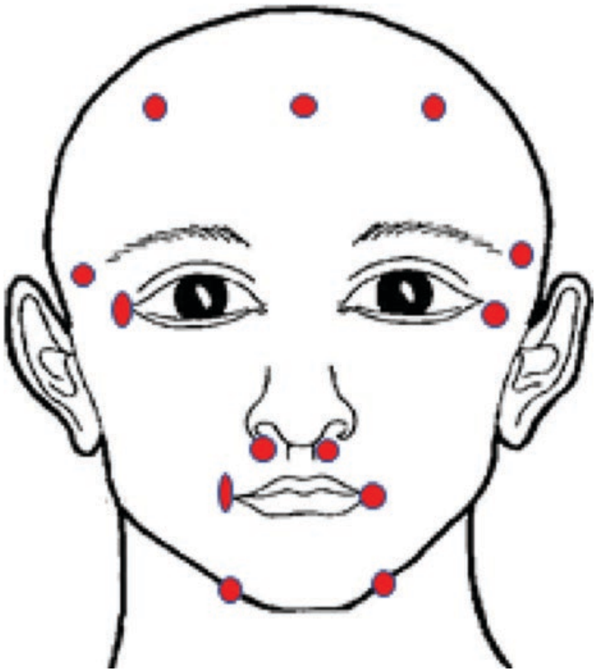

Table 33.3 This table shows the details of anatomical targets, muscle, bone, and fat compartments, of all facial regions injected during a pan-facial rejuvenation

Approach sites	Subperiosteal injection	Muscle injection	Fat pad injection
1. Frontal		Frontalis Corrugator procerus	Superficial lateral fat pad
2. Temporal	Temporal crest	Temporalis (rare)	Superficial temporal
3. Orbital	Orbital rim	Orbicularis oculi zygomaticus minor	ROOF SOOF
4. Zygoma	Zygoma, zygomatic arch		
5. Nasal	Nasal frame, nasal spine	Levator labii superior, Lev labii sup alaeque nasi	
6. Oral commissure	Alveolus superior and inferior	Levator anguli oris, zygomaticus major, Orbicularis oris, buccinator, platysma	Bichat and buccinator Fat Pads (FP)
7. Mandibular	Mandibular body	Platysma (neck bands) Depressor anguli, oris Depressor, labii inferioris, Digastric	
8. Mental	Chin	Mentalis	Submental FP

body muscle is associated with no resistance as the plunger is pushing forward. The systematization of the injections, from periosteum to skin, anatomical plane after adjacent anatomical plane, is one mandatory characteristic of the FAMI procedure.

The injected quantities vary from 0.5 ml (philtrum) to 9ml in some fat pads (Bichat temporal extension). The intramuscular injections vary from 0.5 (procerus) to 3.0 cc in mentalis and 5.0 cc for platysma. A circulator records the graft volumes as they are administered.

33.3.9 Postoperative Care

Benzoin solution is applied after the procedure without dressing, and the patient is asked not to wash his or her face for 3 days to avoid any rubbing of the skin to provoke a blood leakage from the graft neovascularization. If the oral region is treated, to put their 20 muscles at rest, the patient is advised to not speak too much to prevent a peri-buccal bruising.

In the immediate postoperative, since there is no tissue destruction or cutting there is no need for postoperative analgesia other than usual painkillers like Paracetamol. In some patient with medical history of Herpes, Valtrex (valacyclovir) is used.

Patients are asked to sleep on their back with their head between two pillows. Strenuous activity is restricted for 5 weeks after surgery. After 2 weeks, the activity level should be slowly increased and returned to normal by the end of the third week. The oedema is maximum on the third day and decreases rapidly after.

As in many other surgeries, they are many variations in the downtime period due to the importance of ecchymosis. It varies from 2 days on young patients to 3 weeks on patients in their 70s.

33.4 Case Study

1026 patients were treated personally with the FAMI technique from January1997 to January 2018. In this series, the age ranges from 22 to 83.

To illustrate how the FAMI technique can achieve a pan-facial restoration, I have chosen a few cases, one of my first cases in 1997 with post-surgical bone defect and other cases of premature ageing deformities such as fossa temporalis hollow, skeletonization of the peri-orbital region, malar fat pad atrophy, tear trough, labiomandibular fold, lip atrophy, and chin atrophy associated with jowls.

33.4.1 Case 1: Cure of Frontal Bone Defect

This first case is a patient of 38 who underwent a neurosurgery for a sphenoidal meningioma at the age of 28 in 1987. The upper part of her left orbit was resected, and Paul Tessier did the orbital frame reconstruction in 1989.

She was consulted for baggy eyelids, and then her frontal bone defect was mentioned during the clinical exam. After a careful evaluation and a complete control of her cerebral condition, July 1, ***1997***, she underwent four-lid blepharoplasty associated with an inferior transconjunctival approach. In the same operating session, 50 ml of fat transplant was processed at 5,000 Gf to obtain 22 ml of SVF for injection under the periosteum in the frontal defect (13 ml) and temporal fossa and malar fat pad (9 ml).

The bony defect was cured in less than 6 months and was maintained 3 years later, indicating its permanence (Fig. 33.6).

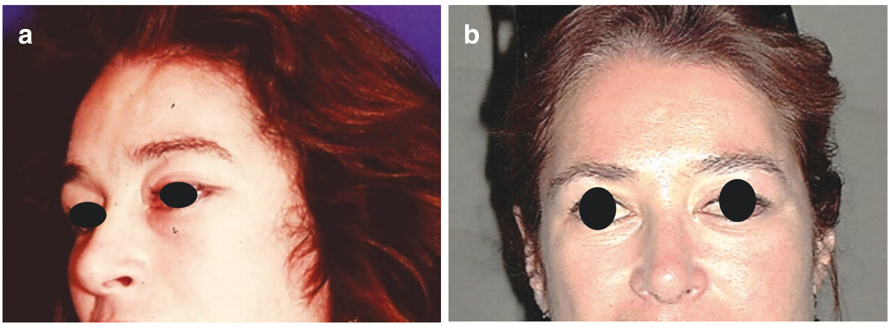

Fig. 33.6 (**a**) shows the patient before the two procedures; (**b**) demonstrates the restitutio ad integrum at 41, 3 years after the procedure

33.4.2 Case 2: Rejuvenation of a Premature Aged Face with FAMI

Woman of 40 with premature aged face seeking rejuvenation with a full-face FAMI (Fig. 33.7).

Her photo at 28 used as a template shows the fullness of her younger face and the Spanish location of her malar prominence (Fig. 33.8).

130 ml of raw fat have been processed at 13000 and 5000G to yield 85 ml of SVF:

- 16 ml processed at 1300 Gf, were injected under the skull periosteum.
- 19 ml processed at 5000 Gf, were injected in the deep plane of facial muscles (corrugators, buccinators, mentalis, levator anguli oris).
- 24 ml processed at 5000 Gf, were injected in the middle plane of mimic muscles (procerus, levator labii superioris, levator labii superioris alaeque nasi, zygomaticus major, risorius, depressor labii inferioris, platysma).
- 26 ml processed at 5000 Gf were finally injected in the superficial plane of mimic muscles (frontalis, procerus, orbicularis oculi, zygomaticus minor superficial, depressor anguli oris) and deep fat pads (ROOF, SOOF, Bichat extension).

The result 12 months after was very satisfactory for the patient and the surgeon (Fig. 33.9). The result lasted as demonstrated by the photo of her at 50 (Fig. 33.10).

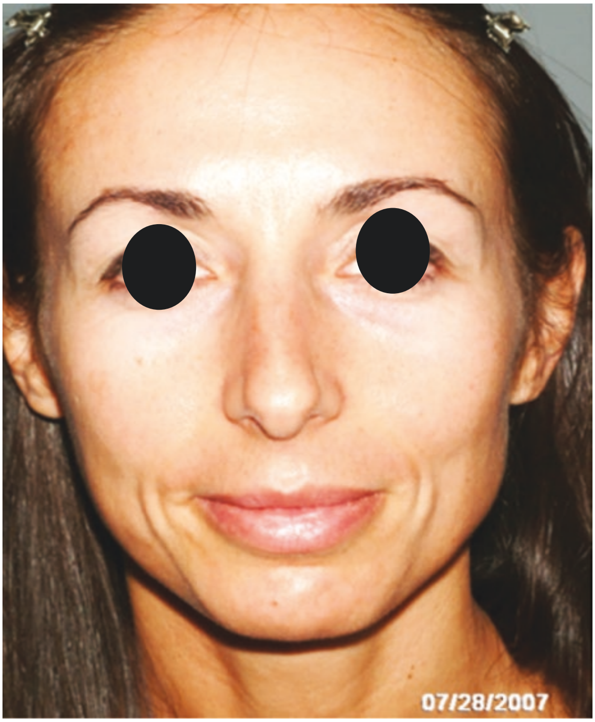

Fig. 33.7 Photo of the patient at 40 with premature ageing process before the FAMI procedure

Fig. 33.8 Photo of the same patient at 28, which was used as a template during the FAMI procedure to duplicate her youthful volumes

Fig. 33.9 Same patient 1 year after the FAMI, at 41 without touching up

Fig. 33.10 Very long-term successful result of this same patient 10 years after initial procedure, at 50. If senile spots are noted on the skin of her right side, however, the main youthful volumes have lasted beautifully without touching up

33.4.3 Case 3: Rejuvenation of a Premature Aged Face with FAMI

Woman of 44, mother of three, seeking rejuvenation with a full-face FAMI (FFF) after an episode of important stress and loss of weight (Fig. 33.11). A preoperative blueprint can help the patient to imagine her procedure (Fig. 33.12).

- 140 ml of raw fat gave us 90 ml after processed at 13000 and 5000G.
- 19 ml were injected under the skull periosteum (orbit, zygoma, maxillary, mandibula)
- 21 ml were injected in the deep plane of the facial muscles (corrugators, buccinators, mentalis, levators anguli oris).
- 23 ml in the middle plane of mimic muscles (procerus, levators labii superioris, levators labii superioris alaeque nasi, zygomaticus major, risorius, depressor labii inferioris, platysma).
- 27 ml in the superficial plane of mimic muscles (frontalis, procerus, orbicularis oculi, zygomaticus minor superficial, depressor anguli oris) and deep fat pads (ROOF, SOOF, Bichat extension).

The result 13 months after was very satisfactory for the patient and the surgeon as demonstrated in Fig. 33.13.

Fig. 33.11 Patient of 44 before a FFF showing her asymmetries

33.4.4 Case 4: Rejuvenation in a Man

A man of 50 years old was seeking a rejuvenation procedure without incision to please his younger girlfriend. He would accept a rhinoplasty to reduce the nose size because there is no visible scar. During the consultation, it was explained to the patient that the relative size of his nose will look smaller after restoration of the suborbital lid support. Talking about the FAMI, the offered procedure will correct: the frontal and temporal fat compartments, the eyebrow position, the tear trough, the suborbital hollowing, and the nasolabial folds as shown in Fig. 33.14.

The patient was aware of the possibility of bruising around the eyes lasting 3 weeks, swelling during 10 days, and possibility of unsuccessful outcome due to the unknown quality of his fat stem cells.

The positive points were noted: absence of sun damages, absence of sad feelings and anhedonia, no hidden depressive disorder, and no addiction (alcohol, tobacco). All these ailments might be a contraindication to FAMI.

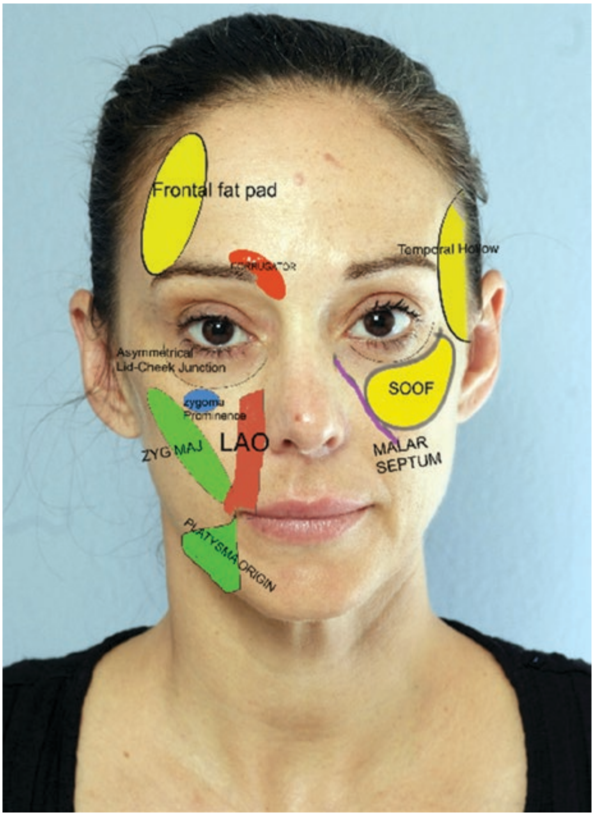

Fig. 33.12 Main atrophied areas to this patient to be corrected by the FFF

The full-face FAMI (FFF) on this patient used 62ml of SVF from 180ml fat extraction. According to the operative form filled during the procedure the injections included:

Subperiosteal bilateral injections with 11ml:

- 1 ml in the orbital arcus marginalis superior
- 2 ml in the arcus marginalis inferior
- 4 ml in the zygoma
- 1 ml for the canina fossa
- 1.5 ml for the mandibular vestibular sulcus
- 1.5 ml for the chin and jaw line

The deep muscular plane with 10ml:

- Corrugator, 1 ml × 2
- Levator anguli oris, 1 ml × 2
- Buccinator 1 ml × 2
- Mentalis 2 ml × 2

The middle plane with 14ml:

Fig. 33.13 Same patient 1 year after the FFF at 45 without touching up

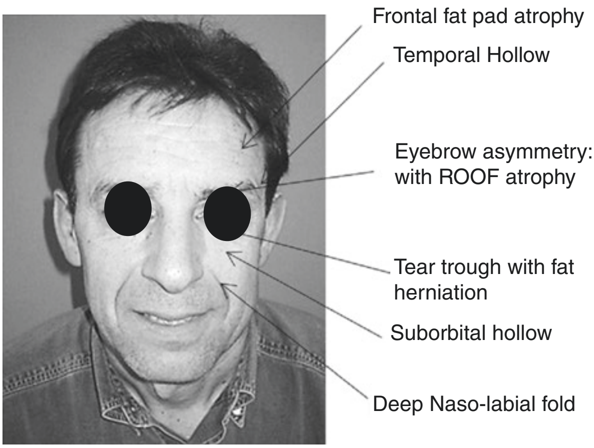

Fig. 33.14 Photo of the patient before the FAMI procedure showing the main areas to be treated, part of the facial analysis included in his informed consent

- Levator labii superioris, 1 ml × 2
- Levator labii superioris alaeque nasi, 1 ml × 2
- Zygomaticus major, 1 ml × 2
- Depressor labii inferioris, 2 ml × 2
- Platysma origin 2 ml × 2

The superficial plane with 13ml

- Procerus, 1 ml
- Frontalis, 2 ml
- Orbicularis oculi, 2 ml × 2
- Zygomaticus minor, 1 ml × 2
- Depressor anguli oris, 1 ml × 2
- The pillars of the cheeks, 1 ml × 2

The deep fat pads with 14ml:

- ROOF, 1 ml × 2
- SOOF, 3 ml × 2
- Bichat temporal extension 3 ml × 2

One year after FAMI, the rejuvenation is obvious especially around the eyes. The action of his adipose stem cells was well effective in the orbital contours, malar prominence, in the fronto-temporal fat compartments (Figs. 33.15, 33.16, and 33.17).

Fig. 33.15 Patient of 50 after a FAMI procedure which treated his main six aged areas without touching up

Figs. 33.16 and 33.17 One year after FAMI, these two 3/4 views show how the reshaping of his lateral facial contours acts as an endo-facelifting even on man with thick skin. Notice the new position of the nose with apparent columella supporting an apparently smaller nasal tip. Nasolabial folds are less deep and the wrinkling less obvious

33.4.5 Complications

In our 1,026 cases, the FAMI procedures have been remarkably free of complications.

Overcorrection was the main concern in the 2 first years of the FAMI procedure, and this is most likely to happen in the palpebral region. This thin skin makes any lumps visible immediately and necessitates a surgical removal. In 1997 I had one case of lumpy right lower lid, palpable but not clinically visible, which was treated successfully 6 years later by a direct small excision.

Hematoma is theoretically possible if one uses general anaesthesia, but has not been seen since FAMI is using local block sensory anaesthesia. A slight bruising can be noted in lower lid easily hidden by a normal make up.

1. *Infection* - Infection is theoretically possible but never been observed. Routine prophylactic antibiotics for fat transfer are rarely used.
2. *Asymmetry* – On the operative table, the asymmetry can be identified and cured. The patient leaves the theatre with a facial symmetry, and if asymmetry is found in postoperative follow-up, it is secondary to swelling so it is important to wait at least 6 weeks before taking any decision.
3. *Loss of volume* – The patient is advised to maintain the preoperative weight and gain some more after the procedure. If a loss of weight occurs, in our experience, it is due to mental problem or hidden depression which becomes obvious after the procedure. It is the main cause of failure of the FAMI technique. It emphasizes the importance of diagnosing it at the time of consultation.
4. *Neuralgia* – Some sensory abnormalities have been reported that resolved spontaneously. I have no complaints of this kind in my series. Nerve injury, sensory or motor, has never occurred.
5. *Fat cysts* or fibrosis, cytosteatonecrosis, pseudocyst formation. These sequelae have been reported after fat transfer or fat filling; these situations require surgical intervention. In FAMI, since the fat lobules are destroyed and the SVF is so fluid that it can enter under the periosteum with an 18-gauge cannula, fat bolus are not delivered under the skin and lumpy skin results have never been observed.
6. *Tenderness, pain* – After FAMI the patient feels a discomfort due to the stretching of the injected muscles but not a real pain that prevents the patient from sleeping. Few tablets of paracetamol are the usual help during few days.
7. *Problems following liposuction* – Although liposuction is of low volume, in some patients it is possible to observe severe bruising with pain when the area is touched. Cooling after the procedure makes everything go into order within a few days.

33.5 Discussion

Nguyen A. in 1990 [12] recommended the intramuscular injection of adipocytes to put the autologous tissues in contact with the vascular muscle plexus to augment the rate of cellular retention. Later Guerrerosantos [8], in experimentation with fat grafting in muscles of rats, made the correlation between the rate of vascular penetration into the fat graft and its ability to survive. He stated: "due to the magnificent circulation of the muscular tissue the surgeon can augment facial contours with predictable results". MRI studies have shown that engrafted fat cells can survive within muscle, even when using large amounts [11]. By placing the grafts into a rich muscular vascular bed, the predictability of graft preservation, and its longevity, is enhanced. The technique, first published in 1999 in the French journal, *Les Annales de Chirurgie Plastique* [1], has been improved in 2002 with the extensive use of mesenchymal stem cells, and since then FAMI stood for Facial Autologous Muscle Injection as it can be found in Wikipedia.

FAMI carried three innovations [3]: first, the use of a tuneable centrifuge to choose the quality of the graft to inject; second, the use of muscles of facial expression as a recipient targets; and third, the use of a specific instrumentation adapted to the skull curvatures to make the deposit of the graft harmless. Loss of volume in the midface is often the earliest sign of ageing in men and women of all ethnicities. Reshaping this area can restore youthfulness and reduce the "gaunt face" about which patients most often complain.

Very precise anatomical knowledge is a prerequisite for any injection in the face that goes deeper than the subcutaneous plane, as does the FAMI technique. The position, direction, and depth of the facial muscles must be visualized in the surgeon's mind in order to be able to develop a feel for the correct plane of injection. Unlike open surgery, the vision is a relative help and all the technique rely on palpation of the bony markers. By locating the injections precisely in the muscles of facial expression, subperiosteally, and in the fat pads by specifically designed cannulas, the risk of nerve injury, haematoma, and tissue destruction with scar formation are eliminated, making the procedure safer than open surgery.

What is notable about engrafting lipoaspirates into facial muscles with the FAMI technique is that there is no clinically apparent muscle fibrosis or limitation of muscle function. This would be obvious postoperatively in a reduction in facial muscle motility and facial expression. The fact that this does not happen is related to the technique of injecting *non-paralyzed muscles* (no general anaesthesia with Curare) in the plane and direction of their fibres. Any approach that does not respect this rule has the potential for inducing fibrosis by mechanically disrupting and damaging the muscle. Further, there is no point in using multiple aggressive passes to induce neovascularization because the graft has been placed in contact with a rich vascular supply [6].

The transformation of subperiosteally placed processed lipoaspirates into the bone, as in case 1, had not been previously described prior to 1999. Three years before the publication of P. Zuck [13] on adipose stem cells, I had the intuition that pre-adipocytes could build bone after being injected under the periosteum.

The 3-year follow-up in this case, and the palpable new bone formation in the areas of subperiosteal injection in subsequent cases, is clinical evidence for the presence of cells capable of metamorphosis that are not mature adipocytes. To prove this claim and demonstrate the possibility of creating bone cells from fatty extracts, we have, with Arthur Balin in 2006, cultured a fat excerpt passed in the centrifuge at 13680 G [4]. A week after using collagenase, we got over 2 million of cells, and after 3 months, good osteoblasts were obtained with the help of an osteogenic differentiation solution (personal communication).

The necessity and purpose of centrifugation of lipoaspirates has been controversial. Initially, it was used to separate fat from blood, proteases, lipases, and triglycerides from ruptured adipocytes. An electron microscopic study by Robaglia-Schlupp showed that adipocytes lose their lobular conformation, but are in good condition after 3500 rpm centrifugation [10]. Moreover, research by a team directed by Arthur Balin, MD, PhD (personal communication) has shown that centrifugation speeds (G forces) have little effect on stem cell fractions as measured by culture yields from samples processed at different G forces, as many stem cells are cultured from 100 G lipoaspirates as 13,680 G lipoaspirates, even after 4 minutes of centrifugation. The enhanced destruction and removal by decantation of ruptured adipocytes at higher G forces only means that the stem cell fraction is more concentrated at higher G, with the added advantage of greater liquidity for subperiosteal and intramuscular injection.The abdominal or flank fat that is transferred seems resistant to the same drugs that cause atrophy of the facial fat. This “donor-dominant” characteristic of fat allows the transferred fat to survive and even enlarge with weight gain in these patients.

By using the patient’s anatomy, in situ, as the model, a natural appearance to the result can be achieved. The use of lipoaspirate stem cells to restore skull surfaces, muscles, and fat pads makes the FAMI technique a true rejuvenation procedure and differs in many fundamentals from the fat filling procedures, including nanofat injections.

If we compare with short-time non-allergenic techniques called fat grafting, fat filling, fat transfer, or lipostructure [5], FAMI shows important benefits such as little downtime (5 to 7 days), minimal discomfort with no pain, no nerves, arteries damages, no scaring, no bumps or uneven discoloured skin texture, and no deformities as asymmetry or changing the ethnicity.

Contrary to fat grafting, which, as described by many authors, has been largely limited to the subcutaneous plane with vague reference to injecting into the muscular planes, FAMI technique targets specifically the individual muscles of facial expression, and their bone origin, to engraft the mesenchymal cells. One session (very rarely two sessions) of the FAMI technique results in permanent natural improvement in facial volumes and contours.

FAMI carried three innovations: the use of a tuneable centrifuge to choose the quality of the graft to inject, the use of the muscles of facial expression as a recipient targets, and the use of a specific instrumentation adapted to the skull curvatures to make the deposit of the graft harmless. FAMI is a “one session systematized pan facial restoration”. The revascularization of the transplant is good and the graft last virtually indefinitely. FAMI is a very simple technique of injection for the patient but very complex for the surgeon. The learning curve is steep with numerous cadaver dissections to develop a true expertise in facial anatomy.

33.6 Conclusion

Autologous tissues are the ideal material to repair and/or rejuvenate the facial contours without creating deformities. However, the classical fat transfer techniques have lost their popularity because of painful sessions, enormous bruising for short-lasting effects, and necessity of additional sessions and touch-ups for lumpy results. Therefore, the majority of professional plastic surgeons are using fat injections as an adjuvant technique during facelift or blepharoplasty.

In 1998 the FAMI technique was set, with the ambition to create a non-incisional pan-facial rejuvenation procedure based on 3D anatomy. After 20 years, the procedure is always the same; it injects multipotent mesenchymal tissues under facial periosteum, into the enfolding sheath of round muscles of facial expression or in the vicinity of their rich deeper vascular plexus in flat mimic muscles, and into the deep fat compartments.

The FAMI technique using the photos of the patients younger achieves a facial volume correction with natural and proper vectors to produce a true return to the youthful appearance of the ageing face. The time is coming where injecting the face disregarding the micro-anatomy of the underlying tissues will no longer be tolerated. By aiming principally on the 30 muscles of facial expression, the FAMI technique has proved to be gratifyingly effective and a safe treatment for congenital, traumatic, or ageing facial atrophies.

Disclosure Dr Roger Amar has no financial interest to disclose.
mailto: rogeramar@gmail.com
https://www.londonfamiclinic.com
https://en.wikipedia.org/wiki/Facial_Autologous_Muscular_Injection

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Chapter 34
Rhytidoplasty: My Current Techniques, Biplane Extended Facelift, and Microlift

Vladimir Mitz

34.1 Introduction

My standard facelift technique has not evolved for 40 years; the basic fact is that I stayed throughout this period as a strong supporter of *biplane* skin and SMAS technique; the skin and SMAS are worked on separately, but in different ways, based on observed results, publications, and various confrontations with colleagues around the world. Since the beginning of my practice, I have favored a vertical vector in the face and a posterosuperior pull in the neck area.

34.2 My Personal Journey

Observing giants performing facelifts in their own way has been the best lesson in finding my own road, for obtaining what would be the most desirable result: a natural look preserved, a tremendous change in appearance, and a great stability in the obtained results, with the minimal amount of complications.

The SMAS discovery in 1973, published in 1976, made me think different and perform biplane facelifts with a critical observation of the used techniques, mostly subcutaneous, practiced around me.

The SMAS discovery (Fig. 34.1a, b) has brought a new perspective for biplane facelifting procedures:

1. in Paris, 1974, my master *Paul Tessier* performed impressive facelifts which were purely subcutaneous or, more and more often, *subperiosteal*; I never saw him address the SMAS, despite his perfect knowledge of this structure; Tessier

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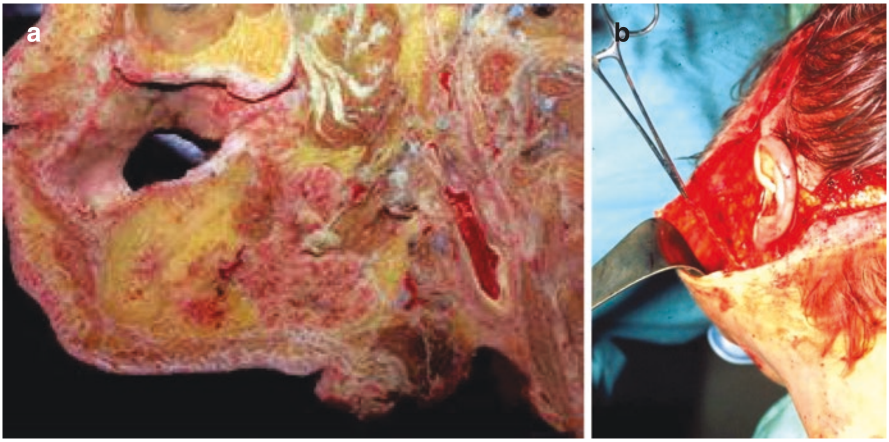


Fig. 34.1 (**a**) Perimandibular SMAS layer on a sagittal head cutting; (**b**) SMAS dissection as a separate layer

loved facelifts under the periosteum, because he could use and go fast with the "rugine" or bone elevator; Tessier was the king of the fast rugine!

2. In New York, 1975, my master has been *John Marquis Converse*, surgical prince of Manhattan.

   I went to help him operate his personal patients; he had a very elegant gesture; he was twirling the knife which he used exclusively to cut and undermine; but he did not know about the SMAS, yet not published, the facelift was purely subcutaneous; with him the surgery looked extremely easy; I never dared to tell him about the SMAS.

   Miami, 1975: the third surgeon who struck me deeply was *Ralph Millard*; Miami was the capital of facelifts, where many retired old and wealthy ladies, wrinkled under the Florida Sun, were comparing their faces operated by Dr. Gordon, or Dr. Baker, or by other surgeons from New York City.

   With R. Millard, we operated nasolabial clefts in the morning and then performed two facelifts, in general, in the afternoon; Randolph Garst, an ex-assistant of Millard, was operating in a nearby room, performing three or four facelifts in his day, feuded with Millard on the number of original copies of Tagliacozzi's original book they could afford!

   Millard was an extremely conscientious and elegant surgeon in his gestures; he was the incarnated perfectionist! Fascinated by logic operating principles and by technical mastery, he was not interested in me SMAS discussing; SMAS was still unpublished during my stay with him. Demonstrating a sublime virtuosity, and graceful movements, he desired to accomplish the perfect movements of a true repairman, looking for absolute perfection, replacing structures where they ought to stay; he has been the hottest teacher I had, but he didn't love me, because I ate faster than him at lunch or at breakfasts! But he was the one who then taught the best technique in dealing with subcutaneous tissues, undermining widely the face with sharp blade and no scissors! I appreciated his philosophy of aesthetic operations and adopted the part of his facelift approach in the temporal and in the neck areas.

3. The third surgeon that has marked me deeply was *Bruce Connell*, whom I discovered, in various US Congresses where I went later on. He was deeply invested in his design of an original biplane facelifting with clever scraps of SMAS, and pushed the SMAS and skin dissection far; I have seen by eyes the results on patients he had operated on; the quality of his results was impressive in every facial area, specially amazing in the neck, and by the quality of homogenous appearance on the operated face; it took him hours to obtain this perfection!
   All of these surgeons reinforced in me the idea that facelifting was a very technical procedure; its purpose was a reliable and natural-looking rejuvenation of the face, longing for the longest-term results.
   I had a great pleasure to observe operations by *Sherrell Aston*, and other fellow Americans; they seemed all rediscover each year new techniques and tricks in facelifting, thanks to the multiple variations made to the treatment of the SMAS.
4. In 1992, suddenly a trained ENT American plastic surgeon, *Sam Hamra*, launched a different operation: the “composite facelift”; adopting a deep sub-SMAS approach distally, going under the periosteum like Tessier, claiming his devotion to Skoog, he blew the biplanes facelifts and convinced (temporarily!) a good number of surgeons worldwide; *B. Mendelson*, an Australian colleague, was his brilliant ally, deeply involved in a remarkable anatomical knowledge. We shared in some meetings our controversies, discussing them respectfully, but steady on our positions.
5. Later on, I have been very proud to obtain an invitation from the Brazilian society of plastic surgery where could present and defend the results of my biplane facelifting; at this meeting, I insisted also on the action of volumizing the face with strips of SMAS; lipofilling was not yet popular; I mostly keep a marvelous remembrance of discussions with Prof. Ivo Pitanguy and his gifted pupils, in Rio de Janeiro and in Brasilia conventions; whenever present, the famous Professor Pitanguy made any discussion, professional or general, at the highest level of finesse and perfect understanding; he made me a great honor by inviting me in his home. Prof. Pitanguy has given esthetic surgery to Brazil, and Brazil has given itself to the clever hands of Pitanguy and his trainees!

34.3 A Brief History of My Facelifts Techniques

I can distinguish four phases in my professional practice:

1. *The beginning, in the early 1980s.*

I was doing very few facelifts, because I was a very young surgeon!

When *J. Owsley* published his famous article in the PRS, which demonstrated very close ideas to mine – it reassured me that a biplane facelifting was no nonsense, because I remembered having discussed these ideas with him in the United States, before returning as chief resident in the Paris hospitals.

Then, slowly, I could find confident patients to operate on.

Since the very beginning, in the period 1980–1990, influenced by my American master R. Millard, I used his incisions design, even very high in the temporal area in order to add a brow lift effect and a very large undermining under the skin; my action on SMAS was steady and constant: the SMAS was incised horizontally below the zygoma, dissected carefully from the parotid. Another vertical cut in front of the ear could free the down located SMAS; SMAS dissection was quite extensive in these times!; I stayed faithful to this approach of the SMAS since that time (even if later on I sometimes was less invasive below the SMAS, stopping the freeing when the anterior border of the parotid was reached). Then a vertical section of the SMAS downward was done, cutting it toward the platysma in front of the external jugular vein (Fig. 34.2a, b, c, d).

The lifting effect started with a vertical main pull of the SMAS in the cheek area, accompanied with an inward rotation of the SMAS toward the malar eminence and the zygomatic barrier; this highlighted the malar eminence and lifted back in place the submalar compartment of abundant fat; the excess SMAS under the zygoma was excised and used for volumization of the lips; the platysma was dissected low then pulled upward, at a 45° angle; I tried sometimes the corset platysmaplasty of Feldman, but did abandon it for a more energetic lateral pull of the platysma.

At that time, I was not performing the low total transection of platysma muscles in the neck, which was not popular yet; I introduced this maneuver in my practice in the years 1990–2000; this helped a lot in defining the angle between vertical and horizontal neck (Fig. 34.2e, f).

2. *Phase II extends in the 1990s–2000.*

I become more confident in the biplane technique, with extended separation between skin and SMAS; *liposuction* for fatty necks and heavy cheeks and jowls inaugurated almost every facelift in fatty patients to create the lipolifting concept: the liposuction for the inferior face created a skin retraction of almost 20%, sometimes sufficient to treat minor young cases of aging in too round faces. The extensive cannulation made the dissection easier and led to preservation of Furnas retaining ligaments.

Associating a horizontal and low transection of the platysma muscles accompanied by the liposuction allowed to tighten the best the heavy necks by a strong lateral pull, with sutures toward the sternocleidomastoid muscle and tendon.

At this time, I also introduced in my practice lip and nasolabial volumizing: I used strips of SMAS in the lips, in the form of thin strips introduced by minimal incisions around the corner of the lips and intranasally.

3. *In the years 2000 to 2010.*

Micro-lipofilling has supplanted the use of strips of SMAS. In the different locations of dermal atrophy, or when I remarked a volumetric loss of the face, my technical approach to the facelift changed, not at the level of the skin incisions (I added a triangle of hair preserved above the ear to avoid lateral alopecia), but mostly at the level of the SMAS: I became less aggressive in the undermining, tried sometimes a modified *Baker's SMASsectomy*, performing it horizontally below the zygoma.

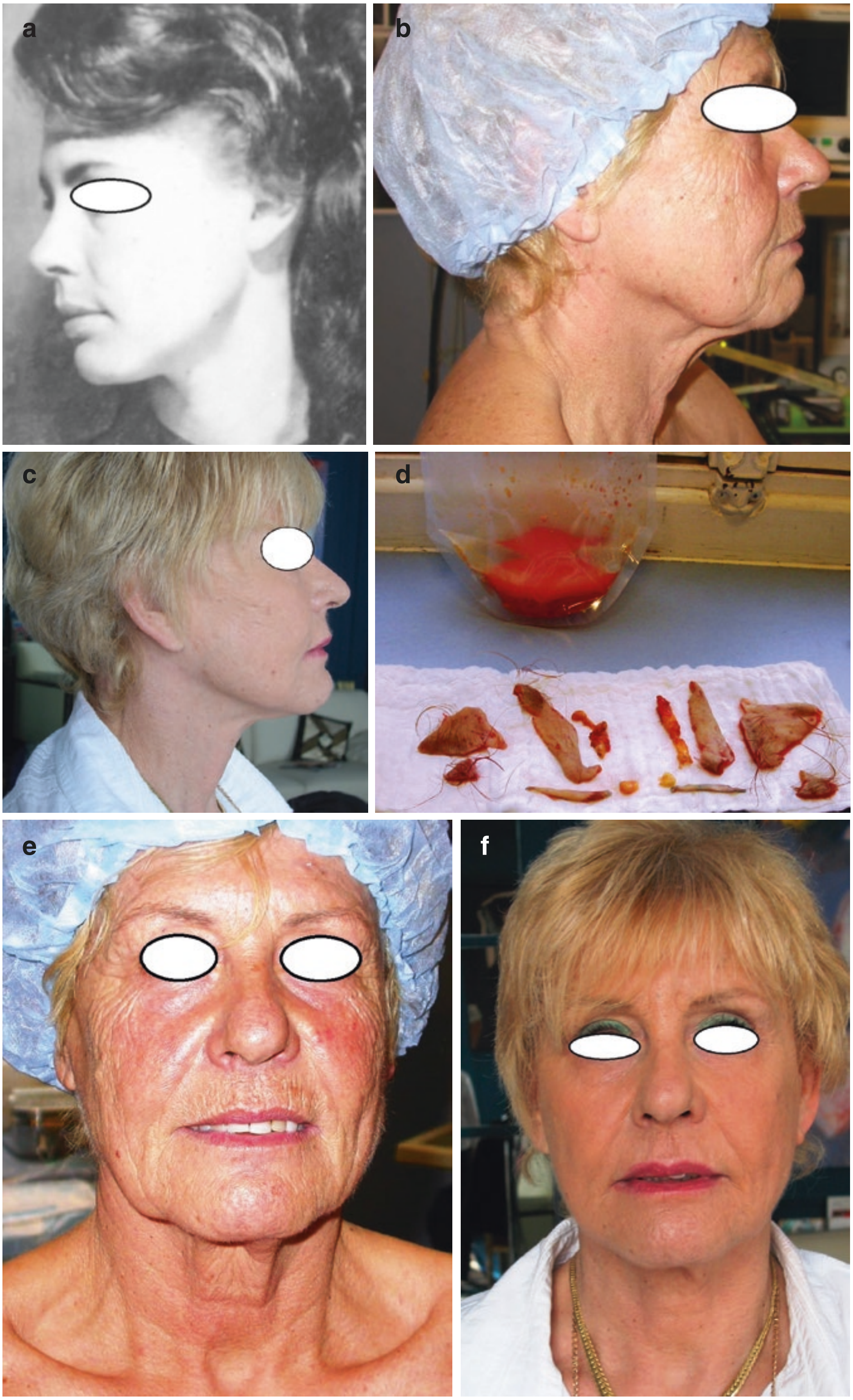


Fig. 34.2 (**a**) patient A young. (**b**) Patient A before biplane cervicofacial lifting. (**c**) Patient A 2 years post-op. (**d**) Patient A fat, skin and SMAS horizontal strip removal. (**e**) Patient A before. (**f**) Patient A after

4. *From years 2010 to 2014.*

This was the period where I developed the *segmental facelifts*, because the number of patients operated increased a lot in my practice; it became necessary to answer to very specific situations: patients were increasingly young, but also fearful of a painful disability after the big facelifts; relayed by the press, the overdone stars and celebrities made bad reputation to facelift surgery, imposing new standards of technique, and facing the increase of medical facelifting by threads or barbed wires.

Thus, I imagined various facelifts targeted on a particular area of the face to be treated, according to the imperative desire of overinformed patients.

I used segmental facelift procedures such as the temporal facelift, the upper facelift, and the pure neck lift; these procedures had the advantage to diminish the recovery time, but treating partially a problem, they got partial results, resulting in redo procedures after 5 to 8 years.

More I started the scope of the detachments under skin and even perform less aggressive gestures on the SMAS, sometimes adopting the SMASsectomies under zygomatic, but never vertical preauricular or oblique; I was fixing the operated faces by a *biplane* technique, which I have never abandoned! (Fig. 34.3a, b, c).

5. Since 2014 to 2018.

I was driven to develop the technique of the microlift biplane under local anesthesia and on an outpatient basis, to withstand the pressure of the thread's lifts used very widely by aesthetic medical doctors, but also by many colleagues, surgeons – who saw it as an easier way to practice non-surgical rejuvenations (Fig. 34.4a, b, c, d).

34.3.1 Classification of Facial Deformations Related to Aging

Classifying simply the facial damage seems to me essential before any operation.

First, I use a very simple classification mode; the initial criteria differentiate two types of patients – skinny patients and fat face patients, usually showing a rounder face:

A. *A thin face or a round face?*
   Each patient in this group offer different surgical conditions, more or less difficult to operate because the absence of fatty tissues makes the SMAS dissection uneasy, the SMAS being very thin in some cases. For that matter, when it comes to dissect the SMAS in a more or less extensive way, the section of the SMAS is obviously much easier in lean patients; the dissected SMAS may become too delicate or inconsistent. SMASsectomy should be then preferred.
B. *The four stages of facial aging.*
   Patients are divided into four stages of aging, based on the importance of jowls, of degradations along the mandibular line, and of anomalies in the neck area and noticing if there is a downward rotation of the of the submalar fat pad, which is located above the nasolabial fold:

Fig. 34.3 (**a**) Patient B before biplane facelift. (**b**) Patient B 5 years later. (**c**) Patient B: the skin+ SMAS excision

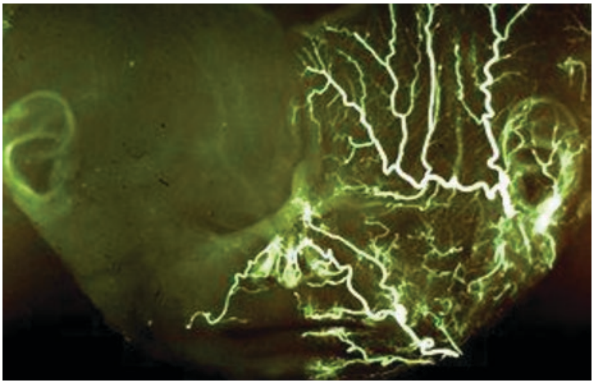
- Stage 1: skin excess in the jowl area are noted by the patient; 15 to 20 mm skin excess may be noted by the pinching maneuver in front of the ear, almost no visible jowls. The neck appears moderately disrupted by skin excess, and the mandibular line has lost its straightness.
- Stage 2: slight degradation of mandibular line, with jowls bulking mildly, slight protrusion of platysma bands. Fat excess bulging in the neck.

Fig. 34.4 (**a**) Patient C before biplane facelift. (**b**) Patient C 3 years later. (**c**) Patient C before. (**d**) Patient C after biplane microlift

- Stage 3: jowls are evident, especially when patient maintains the head downward; skin and fat neck excess can be easily pinched; bands are evident in supine position.
- Stage 4: jowls are marked; neck bands and skin excess are patent. Global appearance of overaged patient is striking.

34.3.2 Preoperative Examination

Preoperative examination is already a starting of the surgery! It is essential because it is what will guide our surgical project:



Schema 34.1 Vascularization of the face and SMAS interconnections

1. *Examination of the skin* is vital to the conduct of the operation. We can oppose two types of skin (Schema 34.1):
   (a) A translucent or very thin skin, which can easily be pierced by too brutal dissection maneuvers
   (b) A thick skin that will be difficult to dissect, especially in men with high risk of postoperative hematoma
2. The *implementation of the scalp*, its density, the hairy aspect of the temporal area.
3. *Skin excess:* feel and measure by pinching the skin excess, vertical and horizontal preauricular, and inclined at 45 degrees posteriorly to the mastoid process, to assess the cervical excess of skin; sometimes it is a notable difference in the two sides.
4. *Deep tissues palpation:* direct pinching of the fat at the level of the jowls and cheeks, neck area, difference between subcutaneous and deep fat, position of the submandibular glands, the open or closed formed inter-platysmal angle when the patient contracts his cervical muscles.
5. *Upper and lower palpebral level*: this is important to decide and advise and practice a combined blepharoplasty
6. Study the depth of *nasolabial folds*, and *marionettes lines*, giving bitterness to the face, and the *thickness of the lips*: If the patient complains about, she will have to accept a contemporary lipofilling at the end of the facelift.
7. The *malar cheekbones* are important to assess. This is done on the patient putting his head backward, with the nose pointed horizontally. We can thus better remark if there is an asymmetry of the cheekbones, how much to increase them to get a good result, so that the light would be back well distributed in the right place.
8. Finally, we must consider the *frontotemporal area*. If once we practiced a lot of frontal facelifts, now in case of important wrinkles of the frontal area, or frowning lines, there is a surgical alternative to Botox: an endoscopic forehead lift, or even without endoscopy, using special rugines manipulated through three tiny holes. This brow lift a minima must be practiced at the same time as facelift.

34.3.3 Preoperative Pictures

Preoperative photographs have the value of x-rays in orthopedic surgery; I advise to practice yourself these photographs and develop them in large format photo: front profile and two three quarter views. These photos will be compared to old photos, brought by the patient, accepting even photographs of identity or the look when the patient was very young. These photos are intended to show us a starting point of the face to operate, in order to better understand the demand of the patient, and guide the surgical gesture based on the desired result.

34.3.4 Preoperative Facial Examination with Technical Remarks

A. *A thorough evaluation of subcutaneous fat lodges*
   The presence of subcutaneous fat facilitates the genio parotid SMAS freeing but also the subcutaneous dissection SMAS dissection, because the scissors slide easily in the layer of fat that overcomes the parotid and beyond.
B. *Testing the superficial musculoaponeurotic system*
   The SMAS mobility is easily tested just before its dissection: to test the SMAS, it is convenient to pinch it with a forceps and stretch upward and backward, to see what level of replacement you can expect; in general when the SMAS will be released from the parotid area, it will occur the maximal mobilization of the cheek and also the temporary flattening of nasolabial fold; the jowl is mobilized and disappears by SMAS stretching, which is a main goal of the biplane facelift.
   The SMAS dissection does not bleed freakily, only minor perforators must be coagulated.
   A wound of the parotid can occur; it should be repaired by superficial resorbable sutures; a wound from a branch of the facial nerve should be immediately sutured by a precise microsurgical technique.
C. *The respect of the mimic muscles*
   These muscles will not be addressed or dissected during the operation. However, the SMAS under zygomatic section allows to approach the outer face of the zygomatic major muscle; it marks the leading edge of deep dissection without having to free space beyond muscle.
D. *The respect of the parotid gland and masseter structures*
   These deep structures have to be untouched, in order to not provoke a salivary fistula or impairment during mastication. That's why I prefer to do the SMAS dissection with special long scissors I have designed, instead of a scalpel. Doing so, I feel diminishing the risk of inadvertently injure an intra-parotid deep branch of the facial nerve, or the Stenon duct.

E. *The deep facial fascia and periosteum*
During the usual biplane facelift, there is no room to approach the periosteum or to address deep facial fascia or masseteric fascia; repair of facial palsy surgical techniques is specific to this area approach, but we do not have to deal with them during the regular biplane facelift procedure.

F. *The facial nerve*
The trunk of the facial nerve must always be preserved at time of the lift. Only its branches, the temporal, zygomatic, mandibular, or secondary branches, can be injured. If occurs a wound made inadvertently, then it should be fixed immediately by a suitable microsurgical technique.

G. *The Furnas retaining ligaments of the face*
During the extended biplane facelift procedure, the retaining ligaments of the face are almost all cut as part of the release of the fibrous structure of the SMAS, in order to follow the chosen vectors of mobilizing the skin and separately the SMAS; these vectors do not exactly coincide in the extended biplane facelift.
The release of the retaining ligaments will allow a good harmonization of the facelifts, at a double level of pull, surface of the skin, and below the skin.
This marks a great difference with the new microlift technique: in the microlift we don't cut the retaining ligaments in the face, but we gently elongate them only. In doing so, the skin and the SMAS are mobilized together by taking advantage of this thick and strong double layer structure.

H. *The great auricular nerve*
The great auricular nerve is the great neglected nerve of facelift surgery, as he journeys two or three millimeters below the ear's lobule; being very easily cut inadvertently, it led to insensitivity of the lobule of the ear and pain; such a neuroma poisons the lives of patients. If postoperative examination founds that it has been injured or severed, it must be repaired, or by microsurgical suturing, or by deeply pulling the neuroma inside the sternocleidomastoid muscle; but being vertical, the great auricular nerve should not be confused with a nervous cervical nervous plexus branch sensitive, running horizontal and superficial.

I. *Preoperative exams*
Standard preoperative assessment with a particular emphasis on the cardiovascular condition and coagulation of patients are performed 1-week pre-op; contraindications must be carefully checked.
The existence of a former myocardial infarction or a recognized ancient stroke is not a formal contraindication to the operation; the existence of a brain tumor an angioma or an intracranial aneurysm makes necessary to confront with the advice of a neurosurgeon to determine whether or not operating risks are too important for the realization of an operation; it is hard indeed, to maintain a stable blood pressure during a procedure of 3 hours average duration, with a risk of spikes if the anesthesiologist does not perfectly master the stabilization of blood flow.

34.3.5 The Desires of the Patient and Also His Pathological Past

These data along with patient's history, expression of his expectations, should be clearly expressed and considered, in order to decide if the operation may be extensive, moderately limited, or extremely limited and fast.

The questioning of the patient is of fundamental importance. It is in the expression of his wishes that we must find what is the technique which applies best and how to proceed in a manner adapted to the demand of patients, currently over-informed.

The information we give them must be extremely clear, completed by written documents. Personally, I use drawings to explain the surgery; I mention the extent of the delamination and the potential complications that the patient may fear; I also give them the YouTube or Dailymotion links to videos I made on the subject: the patient sees results in animated videos, and not only on dubious pictures before after.

The vast majority of patients will ask for a light operation, hoping it will have a maximum effect!

I never heard a patient saying to me "do me please the most extensive facelifting, because I want the maximum result." The patient always expresses anguish, justified by the media showing frequently catastrophic outcomes or complications. We must therefore strive to explain what we will do to him in case of problems.

Ultimately, in face of the worried patient, it is better to not push the operation when he feels reluctant or too fearful; also by experience I appreciate a patient who comes to see me 2 times before the operation; If he comes 3 or 4 times, it will definitely cause us problems because it's a hyperanxious one who doesn't have confidence in me; usually, the information we provide must be accepted and understood generally after two preoperative consultations.

34.3.6 My Operative Technique of Biplane Facelifting

My operating technic did not change that much over the years.

34.3.6.1 Anesthesia

Most of patients are sedated, with no intubation, provided with oxygen, but without mask or tube in the mouth; obviously collaborating nicely with the anesthesiologist is essential. If he imposes an intubation for a given patient, I respect his request but I ask him good mobility of the head and the implementation of an oral packing as in a rhinoplasty.

34.3.6.2 Instruments

I do need very special instruments except from very long powerful scissor (30 cm long!) (Schema 34.6) who allow me to dissect away, quickly, with power and determination, while freeing up easily the adhesions and connections; they cut with precision the SMAS and platysma muscles; they are not as sharp and dangerous than the Metzenbaum, but require address and manual stability; I use a headlight to operate and practice strict hemostasis of monopolar type.

34.3.6.3 Installation

The patient is installed in supine with a tilt in proclivity of the operating table of 30 to 40 degrees in order to lower blood pressure at the cephalic level.

34.3.6.4 Local Anesthesia

Hemostatic and anesthetic infiltration: a large infiltration needle of lidocaine with adrenaline1,5/1000, diluted 100 x (1 cc of lidocaine for 100 cc of saline) is injected in the operative area, to decrease bleeding and increase local analgesia; infiltration is performed by the syringe and needle, immediately after the champage and disinfection of the surgical field; an important precaution is to cover the eyes with strips to keep eyelids closed during the operation: this will prevent postoperative conjunctivitis, caused by prolonged exposure to air.

34.3.6.5 Lipolift First

When it is necessary to remove the fat from the neck and jowls, a lipolift (regional liposuction of the inferior face and neck, performed with thin canula 3 mm opening) is practiced first trough three incisions: one each side in front of the ear lobules, and one in the crease under the Chin; by progressive cannulation, it manages to remove between 50 and 200 grams of fat, which is carefully preserved and simply decanted, in case you want to practice a volumetric lipofilling at any face level (Fig. 34.5a, b and 34.6a, b).

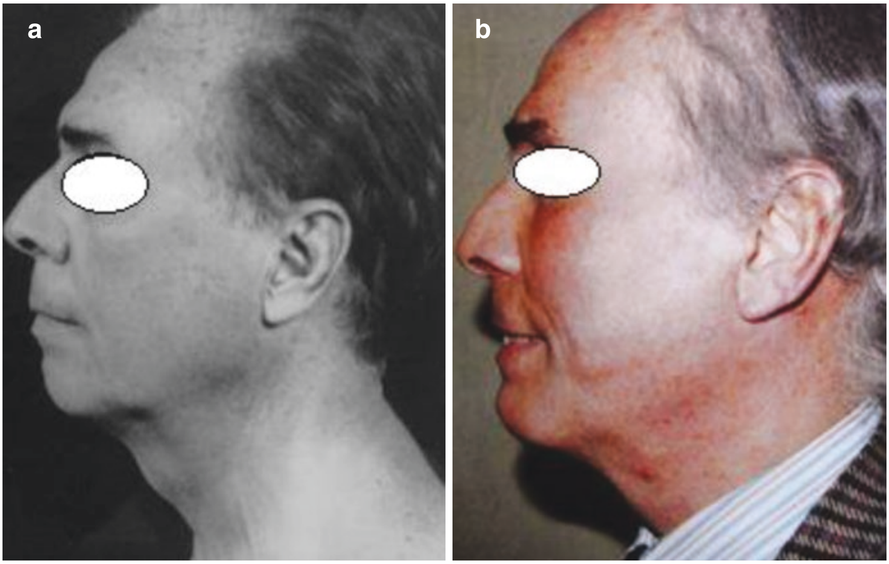
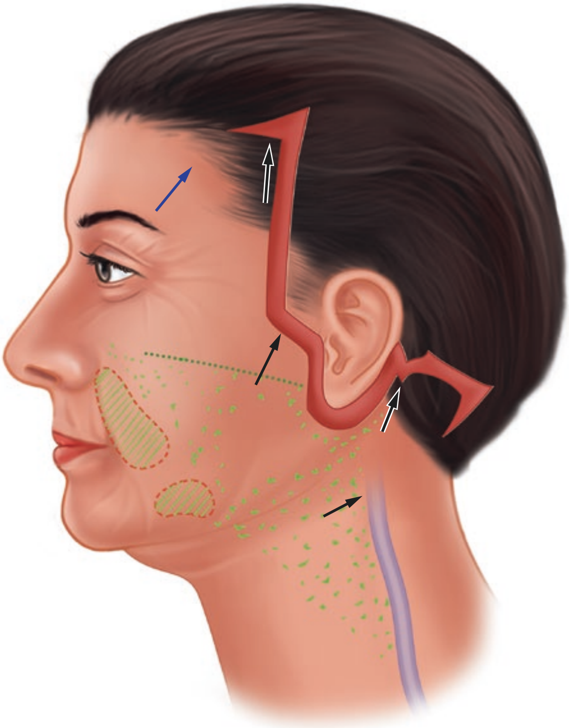


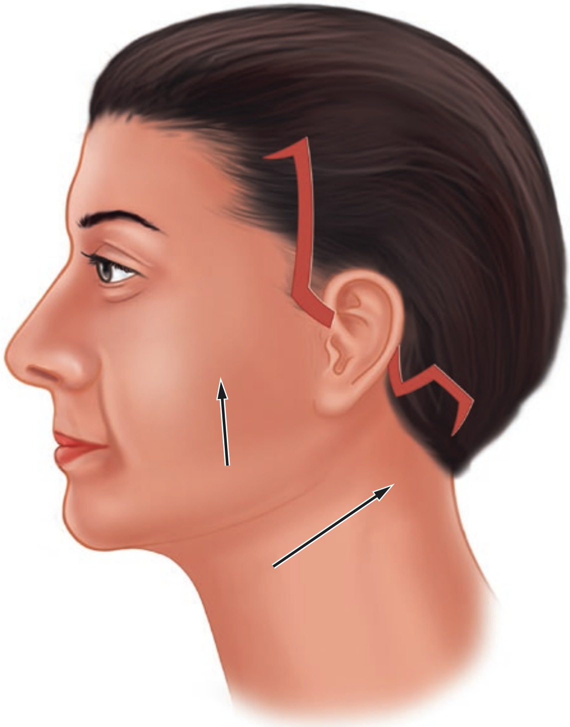
Fig. 34.5 (**a**) Patient D before biplane facelift; (**b**) patient D after 5 years

Fig. 34.6 (**a**) Patient E before biplane facelift and lipofilling for facial volumizing. (**b**) Patient E after 6 years

Schema 34.2 Incisions of SMAS and SMAS sutures; skin approach



Schema 34.3 The vectors of skin pull



34.3.6.6 The Continuous Incisions

Incisions are made continuously, by starting in the temporal area, then the intra-tragal slope, and then peri-auricular, continuing in the retro-auricular groove, and lastly in the mastoid region at the edge of the scalp (Schema 34.2 and 34.3).

A triangular hairy flap is preserved in front of the top of the ear, to avoid too conspicuous postoperative baldness.

34.3.6.7 Skin Undermining

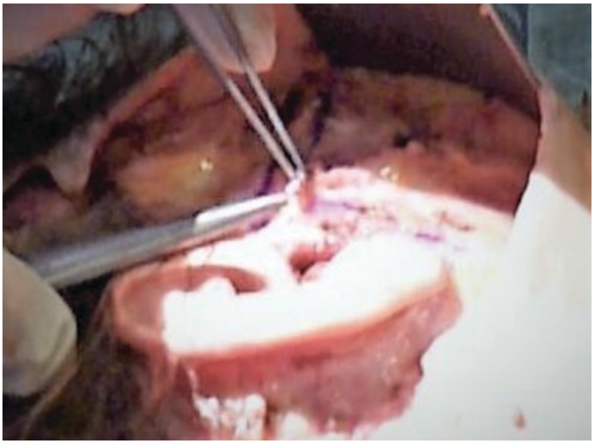
Skin undermining is made according to a fixed order: we use very powerful Mitz scissors that allow to save time; but Mayo scissors allow to do the same job properly.

We respect a constant order for the skin undermining, the M.I.T.Z. order:

1. *M*astoid dissection first and retro auricular.
2. *I*ntermediate area in front of the ear lobule.
3. *T*emporal incision und undermining up high enough in the hair in order to eventually practice a temporal lift and lift the eyebrow. We preserve the hairy triangle behind the Crow's feet level.
4. *Z*ygomatic area dissection, which is the delicate area where we have to change the level of SMAS approach: beneath SMAS below the zygomatic arch, above it in the temporal area.

Thus, the detachments are all carried out according to the mnemonic letters M I T Z!

Schema 34.4 Starting SMAS dissection through a button hole in the SMAS flap



Schema 34.5 The SMAS dissection below the zygomatic arch

34.3.6.8 Deep Gestures on the SMAS

(a) Once the skin has been elevated enough, we open the SMAS by a *preauricular buttonhole* located 1 cm below of the zygomatic arch, in front of the tragus (Schema 34.4).
(b) *The SMAS is cut horizontally* below the zygomatic arch until reaching the zygomatic major muscle, at his insertion on the zygoma (Schema 34.5).
(c) Then a *vertical incision* allows to reach the back edge of the platysma muscle; we follow the anterior border of the external jugular vein which we take care NOT to hurt with the long scissors. If this happens, excessive bleeding occurs; pressure on the vein below the wound allows to make a ligation, getting rid of the bleeding.
(d) The *jugal SMAS dissection* carefully performed below the zygomatic arch is with the Mitz scissors, gradually, until reaching the anterior part of the parotid gland attachment; the SMAS flap looks then as a quadrangular flap; we don't push SMAS dissection far away in the cheek and perioral area, because we want

a global composite action through the SMAS and skin layers together. Indeed, the traction on the SMAS allows, from that time, to a very good tightening of the underlying structures, showing a nasolabial groove that disappears momentarily (Schema 34.7).

Sometimes, in tension and fatty necks, we *transect the platysma muscles transversally* and totally, at a level 7 cm below the mandibular arch.

(e) The most difficult part of the SMAS dissection is the necessity to *change planes* between the temporal area – where dissection is subcutaneous – and to penetrate the subzygomatic area below the SMAS plane; lowering the SMAS in the temporal area is performed with delicacy by scissors pushing down the jugal SMAS. This move is useful in order to avoid the injury of the frontal branch of the facial nerve.

(f) *Strict hemostasis* is mandatory at this point. It is accomplished by use of a coagulation; do not panic when you see the small mimic muscles contract, when passes electric current, by excitation of a few superficial of the facial nerve and secondary branches: it is generally electric benign propagation.

(g) *Tensioning and suturing of the SMAS.*
Once the quadrangular SMAS flap is free, we have to rotate it toward the malar eminence upward and toward the mastoid area backward. Thus, it includes two key points and two different vectors:

1. An anterior vertical vector which requires *an upward lift and an anterior rotation* at the corner anchor point between the zygoma and the pretragal angle.
2. A posterior neck oblique vector brings the cervical *SMAS-platysmal flap up and backward*, toward the insertion of the sternocleidomastoid fascia; this allows a strong SMAS-platysma pull back upward at 45 degrees (Photo).
   We use deep stitches of nylon 3-0; I prefer indeed implement of well-tolerated nonresorbable deep sutures allowing me, after many years, to find them again when reoperating, in order to check and there is a rupture of the sutures, which occurred in very rare cases. Such sutures of the SMAS are strong and do not break easily.

(h) *Drainage or not drainage?*
I do not use fibrin glue.
In patients with an hemorrhagic tendency or hypertensive males or females,, it seems more reasonable to insert a drain for the first night; this drain will be removed the next morning, after my control visit, unless there is a significant hematoma requiring urgent surgical revision. The drain is used that way to alert, when he fills more than 100 cc. But there are situations that I have encountered, where the drain remains dry, while a giant hematoma has exploded.

(i) *Skin suturing will be fine and carefully performed*
I currently use two floors of absorbable sutures: in depth, suturing is done with polyglactyl 3/0, and then a surface running suturing is quickly set on with

Vicryl sutures 3/0 behind the ear, and 4/O in front of it. A surgical varnish to seal the wound is applied on top.

(j) *Dressings are light*
A temporary protective film is applied over the sealed wound, to avoid that the patient puts his sometimes soiled fingers, directly on the surgical wound.
A compressive dressing around the face and neck appears sometimes useful, especially in nervous, hypertensive, or hemorrhagic patients.
It is applied momentarily to provoke a mild compression and for a few hours, and it is useful after a liposuction on the neck and jowls.

(k) *The operating record is immediately typed or dictated*
While the anesthesiologist wake up the patient, an operating record is typed to well preserve the uniqueness of this case, to be able to remember it and refer to it in case of complications.

(l) *Immediate postoperative course*
If possible, and when the patient accepts the cost, he will be hospitalized overnight, mostly after an extended facelift. However the segmental facelifts patients, or after a light microlift, are operated on an outpatient basis.

(m) *Related procedures:*
Sometimes associated procedures include:

- Upper blepharoplasty, with sometimes the associated cure of an asymmetric *ptosis* – but then postoperative evolution is not always easy to manage – because of asymmetry which irritates the astonished patient, even in case of moderate ptosis.
- Lower blepharoplasty.
- One or more lipofillings: at the level of the cheekbones, lips, etc.
- More rarely a rejuvenating rhinoplasty or a cure of protruding ears.
- Brow lift: the tail of the eyebrow *ptosis* is usually corrected by the Millard-type high incision in the temporal scalp; this allows adjusting the brow level in the temporal area by subcutaneous dissection under the tail of the eyebrow: it is an elevation rotation of the temporal flap, following Millard's principles.
- Endoscopic brow lift and frontal lift: this maneuver is performed after the facelift itself has been performed, but this surgery necessitates to be programmed. We make this surgery through three mini incisions through the frontal and temporal hair, without endoscopy, but with long rugines and elevators.

34.3.7 Results of the Biplane Extended Facelift Are Usually Very Good and Long Lasting

I'm certainly not the one who has performed the greatest amount of facelifts in the world, for the past 42 years; previously, I did more precise accounting of the facelifts that I have done; now each case appears to me as being unique and new; I never forget the pleasure to perform this long and wonderful surgery, unique because of its precision, its necessity of extreme concentration, and its amazing and rewarding results, when a long-standing and natural result is obtained.

The satisfaction of the patients that I operated on has been supportive professionally, intellectually, morally, and financially, as well as did the renewed confidence when patients returned to see me after 10 or 15 years, seeking a second facelift after the very satisfactory first one.

But during this prolonged exercise, I continue even now, to encounter all the possible complications, or almost!

34.3.8 Complications Are Not Rare but Often Avoidable Through a Proper Technique!

I observed a large amount after my own surgeries, but also a large number which have been shown to me by some of my colleagues, and some of my students. Also patients come to consult for a second professional opinion – as dissatisfied with their result, not always rightly – and rather through a violent break out with their operator!

One of the leading causes of rupture with the previous surgeon was, not that much the finding of a horrible defect, but rather a sharp conflict of confidence, caused by a too rigid position maintained by the operator surgeon, who was not willing to recognizing some small errors or inconvenient issue; these small things that annoy sometimes pernickety patients may break the relationship with the surgeon, without necessarily requiring from him money or a trial; the patients require that the surgeon acknowledges the problem, asks for a pardon, and propose some repairing action.

34.3.9 Description of Usual Complications

In my personal statistics, boring complications appeared in general rather belatedly; diagnosis of complications is not always obvious, especially if patients come back from overseas, where they returned too fast after their surgery.

Fortunately we now have confrontation means through the Internet video technology; so we are able to stay in touch with them; but these indirect elements of visualization can be unfaithful in the perfect visualization of the encountered trouble, and in any case they do not allow a surgical emergency repair if the patient is far away; so, a complication abroad remains a big disadvantage for an recently operated on patient.

1. *Hematomas:*

   (a) The giant postoperative hematoma: it imposes an urgent take back to the operating room. In three cases, I did remove the stitches at the patient's bed, because there was a compression in the neck area. I could suck out quickly, in the recovery room, the blood clots in the neck, which impaired breathing!

A rare case of a giant hematoma, erupted on *the seventh day* (at the time of removal of the temporal stitches), probably caused by breaking a temporal artery branch, maintained by one of the stitches, inadvertently torn.

(b) Localized secondary hematoma: mainly in the cervical region, rarely in the parotid or anterior cheek area.

2. *Fasciitis of the face*
   The disadvantage of an unexpected hematoma is to be sometimes perpetuated by a retraction in the depth of the face; it takes the shape of longitudinal knotted rope or string that appears in the cheek, with contractures under the skin that resembles a Dupuytren disease; positioned in the subcutaneous level of the face, this cord can appear secondary to any hematoma, or even sometimes without it; I observed nine cases in 42 years; in some cases it was not at all sequelae of a localized hematoma, but fibrous subcutaneous nods appearing in rather depressive patients, or with an obsessive and over narcissist psychic background.
   The local improvement happens spontaneously in 4 to 6 months, with help of gentle massages; exceptionally it did require some infiltration of local corticosteroid that I performed during postoperative consultations.
   The disadvantages of facial fasciitis outcome is that sometimes it provoked a secondary distension of the skin, which spoil the result of the facelift. We can offer a surgical remodeling after 1 to 2 years, to satisfy a little disappointed patient about his evolution: he considers usually that the end result is not very satisfactory aesthetically, with even more an early degradation of the result.
3. *Skin necrosis, related to poor vascularization or excess of tension*
   Skin necrosis appears especially in the angles of maximal skin traction after the suturing under exaggerate tension. In my practice, it occurred the most frequently in the mastoid and retro-auricular area: there I saw skin disruptions, and some small necrosis, which imposed local care and gardening of the wound; a secondary healing took place in a few weeks.
   Another cause of skin marginal necrosis has been when the wound opened after a local infection, caused by too early showering under polluted water and accumulation of infected liquid in the dehiscence deep in the neck.
   It is also excessive tension on the skin shreds which is probably responsible for the small points of skin necrosis in front of the ear, or in temporal area.
   Exceptionally observed, these small areas of skin necrosis in the pre-auricular region have healed slowly, in 6 to 8 months, under medical treatment without necessity to an immediate repair. The enlarged scar that resulted could be resumed only a year after, bringing back satisfaction to the bothered patient.
4. *Infection*
   A serious and toxic infection is rare after a facelift. What is usually observed are small areas of localized infections; they can be the result of local cutaneous septic stitches resorption, or of an accumulation of liquid after a shower or washing, as said previously, if the patient takes showers too soon after the operation, in the hours following surgery; for example, the shower water seeped into the detachments and accumulates in between the sternocleidomastoid triangle, forming a septic deep heap, which has to be evacuated promptly.

A local cleaning through syringe wash will help but a pus culture and antibiogram have to be made, followed by adequate antibiotic treatment.

5. *Postoperative salivary fistula or pseudo-lymphorrhea*
   It happened to me two times to observe a very important swelling of one cheek unilaterally after a facelift. The diagnosis of salivary fistula was clear. Indeed, there was a swelling increased after food intake and mastication; the irruption of the parotid saliva came from a small accessory Stenon canal, as demonstrated by a retrograde sialogram. In these circumstances, an evacuation by puncture and instillation of a little cortisone allowed spontaneous healing, within a few weeks. Other colleagues face the problem using a few units of botox injected into the pocket, with success.
6. *Nerves palsy after facelift*
   Facial postoperative palsies raise a lot of problems; they are generally very irritating to the unhappy patient, but they evolve rather well, though slowly.

   - Mandibular branch of the facial nerve: it causes paralysis of the lower lip, which is everted, and hangs miserably causing the patient sadness and grief. This paralysis or paresis which resolves the best, because the nervous branch is rarely totally cut off; it is rather irritated by nearby dissection or coagulation.
   - Zygomatico-malar branch: the somewhat depressed patient reports the fall of his upper lip, an asymmetry when speaking or smiling. This paralysis slowly recovers in 4 to 6 months; in my experience it has never been necessary to reoperate; the cause of the paralysis is likely a bleeding near the facial nerve, and not a section of an important injury.
   - Frontal branch: the patient complains on frontal asymmetry and more frontal wrinkles on one side! This palsy is not well tolerated by any patient, seeing only the conspicuous frontal paralysis on one side, and the fall of the eyebrow that accompanies it; a little botox contralateral allows waiting for spontaneous nervous recovery, which is the rule; otherwise, it will cripple the other side.

7. *Bad scarring*
   All types of scar problem may arise:

   (a) Hypertrophic scar or keloids like, to treat as such, mostly by corticoid injections and compression.
   (b) Clear white scars that worry many patients, especially those who love their hair combed pulled back, which exposes clearly the stigmata of the facelift; the only treatment is pigmentation by multipunctures or by a professional tattooist; the surgical excision and repair is not the best solution in my experience.

8. *Recurrent pain*
   The persistence of postoperative pain, beyond the first days of healing, shows the presence of an abnormal event. The main causes can be:

   - A localized intramuscular hematoma.
   - A small nervous wound of a sensory branch (superficial cervical plexus).
   - An infection starting in depth on a former wire suture.

- A psychological fixation on dissatisfaction observed at the level of the result, considered insufficient by obsessive patients.
- A forgotten sponge in the depth; doing an echography may be indicated, if there is a local suspicion. Surgical exploration is then indicated.

Treatment of residual pain (especially of neurogenic origin) remains very difficult and imposes psychological consistency with the operator. Sometimes you have to search for the psychological reasons of a residual pain with no organic reasons, even long away in the history of the patient. Finally consider also that the patient desires not only a request for cosmetic surgery, but also hopes of a major revival that does not occur.

34.3.10 Facelift in Men

There is no significant difference in my technique in men compared to the technique used in women; I do also prefer the intratragal incisions in men; they can get rid of displaced hair follicles by shaving the pretragal area; the main objective is to hide the scar!

Ptosis of the eyebrows is more frequent and pronounced in men.

An uprising of the tail of the eyebrow is easy to correct by the technique of the high temporal incision of Millard; the rise of the tail of the eyebrow has a particular positive effect in men, to illuminate the overall younger appearance, in association with upper blepharoplasty and removal of inferior eyelids bags.

34.3.11 The Turkey Neck

At the cervical level, after a lipolift has been done, and a low horizontal transection of both platysmas performed, we realize a strong anchoring, pull, and suturing by several stitches, laterally, to the sternocleidomastoid fascia. Then, with a teguments backward rotation, we observe the highlight of the Adam's apple structure, previously hidden in a heap of fat. But sometimes, direct vertical cervical skin and fat resection, in front of the neck, will be the best solution for men too old or unable to overcome the ordeal of a biplane facial lift!

34.3.12 Multiple Facelifts

About 15% of patients for which I had done the first facelift did came back to me after 10 or 15 years for a secondary surgical procedure. In some cases, the patients came to see me from 8 years after the first lift, because they have noted a deterioration in the result of their first facelift, with the reappearance of the jowls and folds in the neck. The revision surgery was performed by a large biplane facelift, which did not cause specific technical problems, even in cases where a dozen years had passed between the two interventions.

I was able to find quite easily the non-absorbable sutures in the depth of the SMAS, they were not broken up!

In my experience, the degradation observed in these secondary cases was especially about skin elastic damage; the relaxation of the SMAS was minimal if any, which validates the technique consisting, during the first surgical procedure, to section the SMAS at right angles, and pull it with two separate vectors, one upward in the cheek level and another oblique vector at 45 degrees up and backward in the neck and retro-auricular area.

In the most recent cases (2%) where a small degradation occurred in the 5 years that followed a facelift, which was very satisfactory initially but quickly deteriorated, I used a variation of the biplanes minilifts techniques, which I called the *microlift.*

34.3.13 The Microlift: A New Biplane Composite Minimal Facelifting Procedure

The need for a new surgical procedure of facial redraping become challenging because of the explosion of medical thread lifts, which do not remove any extra skin, and thus lack of consistency and long-lasting effect; it is how I have imagined and practiced, since 2014, a new concept facelift with predesigned skin excision, double composite layer skin+SMAS (not dissected from each other), with minimal undermining and almost no cutting of the Furnas retaining ligaments. Thus, this quick surgical procedure can be performed on an ambulatory basis, under strict local anesthesia alone.

34.3.14 Microlift Surgical Technique

1. Preparation of the skin: washing dermal Betadine, diluted, without cutting hair.
2. Drawing of the skin excess around the ear, as pre-established design, for identifying the excess by a pinching maneuver; there may be a difference of resection between the two sides, given the usual asymmetry of the face.
3. Anesthetic infiltration of lidocaine adrenalin diluted (1 cc of lidocaine in saline 100 cc adrenaline).
4. Removal of skin excess by desepidermization, leaving intact the dermal base and the underlying SMAS layer, specifically in the cheek area.
5. Strict hemostasis.

6. Incision of the SMAS, at the distal level of the skin excision, in order to reach the top of the parotid gland, producing a skin+SMAS flap, where the SMAS and the skin remain attached.
7. Careful and progressive freeing of the under SMAS level, by gentle elongation and freeing the elements, without cutting the nervous, vascular, and lymphatic pedicles, and freeing a minima and gently the Furnas retaining ligaments of the face that we're trying instead to preserve to a maximum: because they will help in mobilizing the deep tissues through the skin and SMAS strong pull! With Metzenbaum scissors, we try to release and gently stretch the Furnas and other retaining ligaments of the face, so that the composite SMAS+skin can reach the edges of the wound, following the previous skin excision. We can thus gain length and allow a back stretch of the SMAS, with minimal sacrifice of these ligaments and skin; in doing so, one can see how well this composite action ameliorates the jowls and restores a perfect jaw line.
8. In the retro-auricular area, the composite flap is more delicate to define; we try to stay over the sternocleidomastoid fascia, in order to have a flap with some consistency, in order to support the strong back pull needed; it involves also the lateral border of the platysma, usually not easy to reach.
9. A strict hemostasis is performed, because there will be no need for inserting a drain, in a very limited chamber of undermining.
10. Deep sutures of SMAS are performed at first, using resorbable monofilament sutures 2:0 or 3: 0 with two key points: the first is in the temporal angle, between the zygomatic line and the temporal area, and the other is at the angle of retro-auricular line and the mastoid incision.
11. Suturing the skin is done along 2 levels: subcutaneous and epidermal; a few resorbable Vicryl rapid 4:0 sutures subcutaneously bring the edges of the skin wound with the least possible tension.
12. Surgical glue is applied on top of the wound, aiming to prevent patient's finger to manipulate the scars.
13. Small compress coverage is applied. Sometimes a circular bandage helps for 48 hours.
14. The patient leaves the clinic after 2 hours of rest.

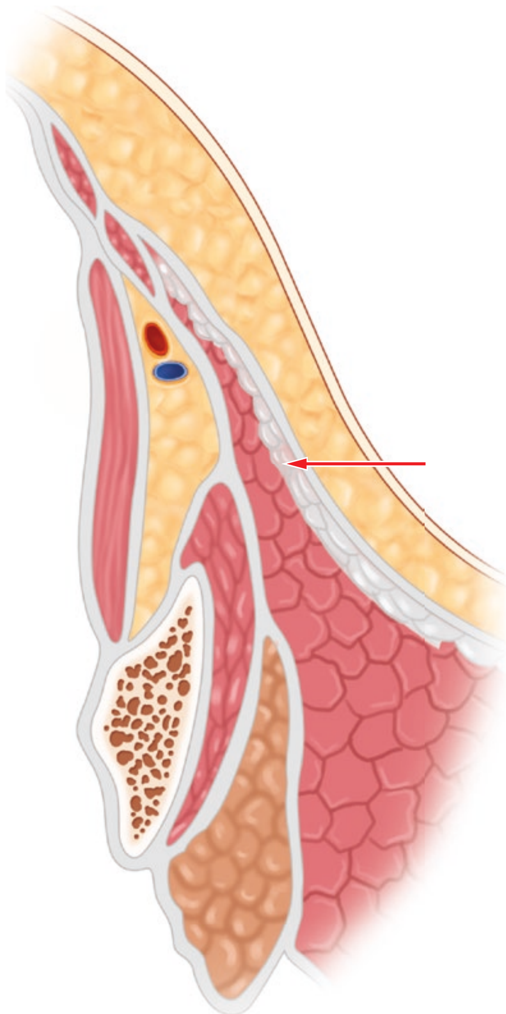
34.3.15 Microlift: Material and Methods

32 patients have been operated since January 2014 until April 2017.

The first patients were operated by me following a request for repair after a degradation of a previous neck and facial lift performed by me, after 10–15 years of evolution or so.

The majority of these patients who went to microlift had had had surgery with, as main indication, a degrading process: moderate stage 1 or 2 at the level of their face (Schema 34.6a, b and 34.7), which corresponds to the discreet re-appearance of jowls and bands.

Schema 34.6 The long Mitz scissors for skin undermining. (**a**) Skin excision in the microlift technique with preservation of retaining ligaments; (**b**) sub-SMAS limited undermining. (**c**) Patient before surgical biplane microlift. (**d**) Patient after microlift



Schema 34.7 The extraparotid SMAS can be surgically separated

Less than 3 cm of excess skin by the pinching test was observed in these patients, in the face and in the neck.

At the beginning of our experience, 3 patients with fatty faces and neck, underwent a liposuction first (lipolift) followed immediately by the microlift. This combination provoked a marked postoperative swelling, and the result appeared unsatisfactory – with a low and disturbing amount of skin distention.

Since then, we stopped to associate liposuction of the face at the same time as the microlift. We currently prefer to perform, as second process, the defatting is some concerned areas of the face.

The overall results appeared satisfactory in the majority of cases, except 3 cases of fast secondary distention: it started from the third month post-op in one case, 6 months in another case, and an unconvincing case from the start. A second surgery under local anesthesia in ambulatory was proposed and practiced, with pure skin excision, leading to a great correction and a stable result since 3 years for the first case (liposuction of the face that had been associated with some strong swelling of the face).

34.3.16 Biplane Facelifts and Microlifts: Selection of the Patient

It should be mandatory to identify patients feeding unrealistic expectations, and not succumb to the temptation to operate them: they will be still disappointed! But sometimes it is not easy after only one consultation; usually, I advise 2 consultations prior to surgery and become suspicious when the patient wants to come 3 or 4 times prior to be operated on, which appears as a sign of overfearing attitude.

Similarly, beware of patients taking too much attention to hyperperfectionism, clinging to details without real significance. They will be mental assassins in the postoperative period, if we have the weakness to yield to their demand, especially when they insist in saying that they chose us because we are the best!

Mistrust must also stands when there is a disagreement between the patient and his family prior to surgery. If children feel useless and costly this incoming operation, there is not hard to bet that they will find the procedure, once realized, not efficient, asymmetrical and torment the unfortunate patient of offensive remarks, destroying little by little the real benefit this superb operation which is generally a facelift.

A friendly relationship between the patient and the surgeon doesn't have to be; we do not have to marry all our good results because of proudness, or the bad results because of fear of a law suit!

Patients multiplying cosmetic interventions are not the best candidates; they are marked into their flesh by many scars, sometimes tattooed along, and comparing the different colleagues who did intervene with humor, but always at our one expense.

34.3.17 Conclusion

Practicing since 42 years biplanes facelifts with extended or more limited SMAS flaps have not exhausted me or distracted me from the pleasure to make this great surgical achievement: the successful facelift and its variants.

I always have as much satisfaction to search, analyze, and innovate in these amazing and complex anatomical field which structures our face, allows facial expressions, and represents the principal tool of the comedian and ordinary people, expresses hatred, love, and astonishment.

Therefore, a facelift is an aggressive surgical act, but a deeply human one; we desire to correct aging, i.e., an expression distorted by the disastrous appearance of a skeletonized appearance with external signs referring to decay and incoming death.

Nothing is nobler than this challenge: rejuvenate but remaining natural, from the surface to the depth, navigating among diverse anatomical structures, of which the SMAS is a recent discovery that I could achieve in 1973–1974 and published in 1976.

But at deeper layer, there is a consciousness of a patient, a soul that is much more mysterious than the entire organic devices that we have to help with discrete work and maximum respect.

Chapter 35
The Striking Continuous Evolution in Surgical Facelifting Techniques

Vladimir Mitz

No other comparable surgery to a facelift operation results in as many questions and mysteries, since cosmetic surgery exists.

Very quickly, in the beginning of the twentieth century, an American surgeon, A. Miller, and the great German surgeon Jacques Joseph developed facial rejuvenation procedures, which have disrupted the implacable logic of programmed facial aging.

Before, you should absolutely accept the wrinkles, the jowls, the digging of the face, altered eyelids and looking tired, because such was the human nature, and its unrelenting destiny.

The human quest for immortality, at least in appearance, led looking for a nice, young appearance with well-positioned features and harmonious lines, which would return back to the happy you, having a positive and narcissistic satisfying image, making this good news daily.

35.1 Ivo Pitanguy and Facelifting

The great Brazilian surgeon Ivo Pitanguy said in a French newspaper interview ("le monde"):

> To feel beautiful, is to be at peace with the image we have of ourselves. By instinct, every man wants like to others.
>
> There is not, in this area, little suffering. Any disgrace can be source of unhappiness. "It would be cruel to not address this pain.

Speaking of facelift in a professional journal in 2000, I. Pitanguy wrote:

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35.2 "The technic of round-facelift"

"Aging of the face is a frequent complaint in today's youth-oriented society." Competition and successfulness in social and professional circles, are intimately related to how a person reflects, in his or her physical appearance, your inner well-being. Regardless of chronologic age, it is imperative that the surgeon perform a problem-oriented, detailed analysis of the face and each subunit so that specific conditions can be individually assessed as they apply to the harmonic balance of the whole. It is generally assumed that the most common source of unfavorable results following a rhytidectomy is patient dissatisfaction. This fact stressed the importance of correctly identifying the patient's expectations.

Therefore, perhaps as important as the technical procedure is a correct diagnosis of the dental disorders and a thorough interpretation of the psychological motivations of each patient. The real goal of treatment is to reestablish the patient's inner well-being and to balance how he or she interprets this self-image in relationship to the external world, without denoting that has facial rejuvenation procedure has been done."

This great innovator who was Ivo Pitanguy had acquired an incredible habit in performing facelifting procedures among politicians and celebrities. Why? Because of his special approach, his humanism, and his talent in surgery, which allowed him to operate with address and delicacy; but it is mostly remarkable that he could reassure his difficult patients, exposed in politics and medias, above all by a special charism and his psychological support: he was truly special.

35.2.1 Mutual Trust and Postoperative Management

Mutual trust uniting the surgeon to the patient, like Pitanguy's strength, must be a good example for us!

However, Pitanguy did not despise postoperative skin care: he had taken attention to develop a skin cream after facelift, which continues to have a great commercial success.

Pitanguy was very interested in new developments and new techniques in facelift procedures, which did not change a lot until the 1980s; he favored the SMAS evolution and liked plications better than dissecting it at far.

35.2.2 The Concept of SMAS and Biplane Facelift

Until 1975, the technical debate on facelift was focused on the intensity of the subcutaneous undermining, in order to maximize the results of a facelift; since I was working in a laboratory of anatomy in Paris during my residency and my fellowship, I was able, under the leadership of Paul Tessier of whom I became resident in 1973, to study, dissect, and develop the concept of the cervicofacial SMAS structure, which I will discuss in detail in another chapter.

But this discovery would open the way for a new technique called biplane facelift. One of the historical major developers from the outset was J. Owsley that I had met in San Francisco: I did expose to him my discoveries regarding the SMAS, in Ralph K. Davies hospital, where I also worked H. Buncke, my teacher in microsurgery.

Just before coming to San Francisco, I tried to explain the SMAS concept to my master of esthetic surgery in Miami, the great R. Millard, who performed magnificently extensive skin undermining of the face by knife, at least five times a week! He had on target: the entire population of old women in the elegant Miami Beach area, sitting on benches, all wrinkled, under a nice sun, comparing their mutual aging, and the results of their facelifts carried out by Baker, Gordon, or Millard, Garst, Devine, etc.

But Millard rejected the SMAS concept in the face and in the nose areas; he gave no importance to my work on the SMAS.

In 1974, there was only T. Skoog who dared to address, in depth, the problem of cervical bands, by a direct approach on the cervical platysma.

The concept of biplane facelift helped revive the modern time facelift, in order to replace the elements in the depth and bring them back to regain a position of origin, by tightening the skin, like a housewife who would tighten her bed by stretching the cover, without replacing the sheets and pillows in their due place!

The SMAS concept offered a new way of considering the slipping down of deep structures, the facial retaining ligaments of Furnas, and the fat compartments of the face; but even in France, the SMAS concept and the idea of a biplane facelift have been difficult to accept in the beginning. Numerous surgeons, mostly ENT surgeons, rejected totally this idea and even tried to deny it as anatomically false and contra-productive. Until the admitted it and even published their own vision of the SMAS!

35.3 The Volumetric Facelift

In the 2000s, the use of fat grafts after liposuction, which was invented by the French surgeon YG Illouz in 1976, and the facial fat grafting popularized by the Frenchman P. Fournier, was introduced in 1983.

This method has allowed an additional approach to the problem of facial hollowness due to aging.

Before this technique, we used strips of SMAS or temporal fascia strips in order to enlarge thin lips or deficient cheekbones.

35.4 The Complex and Feared Biplane Facelift

The old myth of Faust and Marguerite shows that a man is ready to sell his soul to the devil in order to obtain a new appearance sufficiently beautiful and juvenile, for the purpose to seducing an attractive woman!

As it is well-known, this story ended badly! If the devil gets involved in cosmetic surgery, complications will surface.

Because of increasing complications after extensive undermined facelifts and postoperative adjusting difficulties, patients became more hesitant to sustain this tedious surgery; the prospect of not being able to work for 3 weeks and the risks of bruising and experiencing nerve paralysis and skin necrosis made the patients very conscious of undergoing facelifts!

Thus, the operation of biplane facelifting, still very sophisticated, very beautiful, with large undermining, using different vectors at the level of skin and SMAS (which allows a more natural result but complicates the procedure), is truly very rejuvenating, and even more when associated gestures are combined on the eyelids, or with lipofilling, additional peeling, dermabrasion, etc.

But they are feared by hesitating candidates, wishing lighter procedures, less of a concern, even if their effects are less spectacular and not so long lasting.

In addition, the introduction of techniques using dermofat grafts or lipofilling with concentration of fat cells, etc., allowed facial rejuvenation by filling hollows in aging patients who tended to lose facial volume; but in some cases, the exaggeration of these techniques led to an unnatural aspect of patients, who became suspicious and fearful!

35.5 More Targeted Facelifts

In front of patients who are reluctant of undergoing major facelifts, cosmetic surgeons have developed much more targeted and focused surgical procedures on specific areas. We know of facelifts of the lower part of the face, in order to deal with the deterioration of the neck and jowl area. Platysmal bands can be addressed quite simply by a direct approach.

Some of my colleagues also even attach strips of the platysma muscle to the hyoid bone.

We had done (with Patrick Knipper) an EMG study that showed that the platysma was overcontracted with aging, and the platysma bands are sensitive to the Botox or to a very low section, with lateral repositioning.

Temporal, peri-malar, periorbital, and superior facelifts have been described and widely used to respond to cases of beginning facial aging, in the level of a particular target area. These segmental surgeries gave great satisfaction every time in the immediate postoperative course, but the overall evolution of the face is toward an inevitable aging, with particular severity in the areas that had not been corrected initially.

35.5.1 The Dramatic Increase in the Methods of Aesthetic Medicine

This fear of heavy postoperative problems after traditional facelifting explains the dramatic increase in the methods of aesthetic medicine: Botox, fillers, wire threads by Sulamanidze technique, and other treatments by pulsed light, laser, etc. have replaced (in the mind of patients and eager-to-new-hopes journalists) the old (!) surgical techniques of facelifting because they are forgotten in old books of ancient plastic surgeon wizards!

35.5.2 Surgeries Well Associated with the Actual Facelift

Brow lift, eyelid lift, rhinoplasty, upper lip dermabrasion, and chemical face peel are part of the possible associated procedures during a facelift; they can contribute significantly to improve the appearance of an aging face.

All of these joint actions make the surgery more complicated but contribute significantly to achieve a better and more natural result and a single-stage procedure; the growing technical complexity of cervicofacial lifting also explains why many patients become reluctant of undergoing the procedure, a procedure that will last for 4 hours on the operating table and give unexpected follow-up that will keep them away from their professional environment and away from their families for a longer period of time.

35.5.3 A New Tool: The Biplane Microlift

Facelift is a great tool of rejuvenation; in a large biplane facelift with large undermining, the layers of the face are tightened after separation according to appropriate vectors (vertical to the level of the face, almost horizontal at the level of the neck); the results are splendid with a life cycle of major facelifts, which is an average of 10 to 15 years. Five percent of patients have a slight degradation between 6 months and 1 year, for which a surgical touch-up after 1 year seems very favorable.

Can we escape from the standard biplane facelift, which separates the skin from the SMAS and cut all the Furnas ligaments?

The answer is yes; we can use a “microlift” procedure!

To facilitate the surgery, we needed a modified minilift that I called a *biplane microlift*; it is a minimal facelift *without separation between the skin and* SMAS. They are pulled together, which allows a predesigned skin excision in order to correct the facial ptosis; the ligaments of Furnas are not severed, just gently elevated!

The fact of a designed skin excision prior to surgery guarantees a harmonious result and shortens the procedure duration.

This operation which I called “microlift” was invented in 2014 and presented in 2017 at the French Society of Plastic, Reconstructive, and Esthetic Surgery, in Paris, and published in 2018.

35.5.4 Conclusions

The facelifting procedure is far from being an outdated operation! It remains one of the most delicate procedures to be performed on willing and well-informed patients and is one of the most beautiful and rewarding procedures both for the rejuvenated patient and the happy and proud surgeon.

Remember our first biplane facelifts with extensive undermining, and our nights of anguish for the first cases that we have operated.

Now, with experience, we keep the pleasure in performing a beautiful surgical procedure, and look with satisfaction and proudness to the patients who are coming back 10 or 15 years later to ask for a secondary procedure: long-lasting effect is a goal that no thread lift can achieve.

So I will keep the SMAS biplane concept, and I hope that the major practicing group of international devoted colleagues in facial rejuvenation will approve my daring choice.

Chapter 36
The Technique and Legacy of the Lateral SMASectomy to Rhytidoplasty

Arnaldo Lobo Miró and Julio Wilson Fernandes

36.1 Introduction

There has been a great demand for facial rejuvenation surgery in the past decades, since it began to present excellent results, with an extremely natural appearance and fast recovery. However, this procedure had a major conceptual change after the publication of Mitz and Peyronie [1] in 1976, as those authors individualized the anatomical structure of the SMAS (superficial aponeurotic muscle system) and described its surgical functionality (Fig. 36.1). Facial rejuvenation went from a simple detachment and repositioning of the cutaneous tissue to a great mobilization of the deep structures of the face. In addition to this surgical improvement, which has brought great benefits to the surgical outcome, many other less invasive methods have also been described; and in some cases, such methods may postpone the need for later extensive procedures.

The greater knowledge about facial anatomy, cutaneous physiology, the aging process, and fat behavior when grafted on the face led to the publication of important works in the literature worldwide. Authors such as Pitanguy [2, 3], Pontes [4], Baker [5], Cardoso de Castro [6], Coleman [7], Owsley [8], Stuzin [9], Hamra [10], Nahai [11], Mendelson [12, 13], Tonnard [14], Bersou [15], Ramirez [16], Stocchero

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Fig. 36.1 The SMAS described by Mitz and Peyronie (1976)

[17], Auersvald [19], and many others have established new technical horizons, thus contributing to the evolution of facial rejuvenation surgery.

Nowadays, there are a large number of procedures at our disposal, with a greater or lesser degree of sophistication, for isolated or associated use, depending on the surgical indications and the patient's wishes and expectations: submental liposuction, facial fillings, botulinum toxin, laser resurfacing, endoscopy, peelings, short scar rhytidectomies, threads, MACS lift, rhytidectomies with mobilization of SMAS and platysma, and fat grafting, among others.

For many years, we adopted the treatment of the deep structures of the face in our surgeries with the aim to raise the ptosed tissues and to restore the facial volume lost by the action of time.

We were used to performing a closed liposuction in the submandibular and submental regions (Fig. 36.2) and to raising and pulling cranially a SMAS flap (Fig. 36.3). These procedures were usually associated with a partial resection of the subplatysmal fat and plication of the central bands of the platysma muscle (Fig. 36.4). These procedures were always followed by a conventional transcutaneous blepharoplasty, leading the whole to very good results (Fig. 36.5).

However, the classic and established undermining and superior traction of the SMAS was always a matter of some concern, whenever we faced a thin and fragile SMAS, prone to rupture and losing their expected function of traction and support.

This led us to adopt the lateral SMASectomy, an excellent solution for cases requiring superior traction of the lower third of the face, without the aforementioned drawbacks.

Fig. 36.2 Conventional “closed” liposuction of the neck and jowls

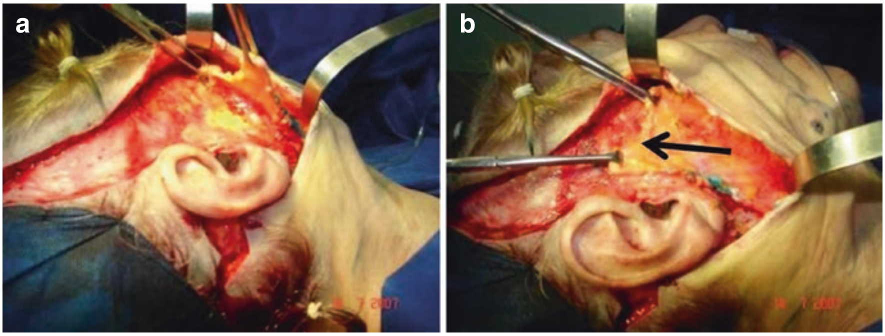

Fig. 36.3 The classical SMAS flap undermined (**a**) and cranially tractioned (**b**)

Fig. 36.4 The Platysmal bands are dissected and stitched at the midline (corset)

Lateral SMASectomy was first described by Daniel Baker in 1997 [5]. When it is properly indicated, it produces the same results we could achieve when we used the lifting and traction of the classic SMAS flap, but with the advantage of being a less invasive and much safer procedure.

The lateral SMASectomy procedure consists of the removal of a portion of SMAS tissue superficially to the parotid gland, beginning at the inferolateral border

Fig. 36.5 A 57-year-old patient, pre- and postoperative views

of the orbital region, towards the posterior part of the angle of the mandible, and reaching the anterior border of the sternocleidomastoid muscle.

Removal of this slice, which can measure between 2 and 4 cm wide, depending on the degree of sagging of the lower and middle third of the face, should have a parallel direction to the nasolabial groove. After suturing, this position allows for an antigravity tension with vectors contrary to the ptosis direction of aging tissues.

36.2 Procedural Description

We start undermining the skin by scissors, as described in many other techniques [2, 3, 4], thus exposing all the subcutaneous tissue.

Then, a long fusiform shape over the superficial fascia is drawn, beginning at the orbital rim and extending obliquely downwards, passing behind the mandibular angle, and reaching a few centimeters ahead of the anterior border of the sternocleidomastoid muscle, at the level of the parotid tail (Fig. 36.6).

It is paramount that this dissection occurs only in the superficial fascia, leaving the parotid fascia intact, protecting the branches of the facial nerve immediately below this anatomical plane.

We always infiltrate saline solution with epinephrine 1/500.000 in the outlined fusiform area, to facilitate the SMAS resection.

The resection evolves from the posterior to the anterior segment, being noticeable a very clear distinction between the more adherent posterior portion of SMAS on the parotid and the more mobile and critical region, which is frontal to the anterior border of the gland (Fig. 36.7).

After the SMAS resection, a non-absorbable 3-0 inverted stitch suture closes the raw area, achieving an effective traction of the most mobile portion of the SMAS, which is anterior to the parotid gland (Fig. 36.8).

We also undermine the platysma muscle, anterior to the border of the sternocleidomastoid muscle, lifting a flap to be tractioned and sutured to the mastoid aponeurosis, enhancing the jaw/neck definition.

Before the described procedures, as a routine, we perform conventional liposuction in the cervical and submental regions. When necessary, we perform a plication

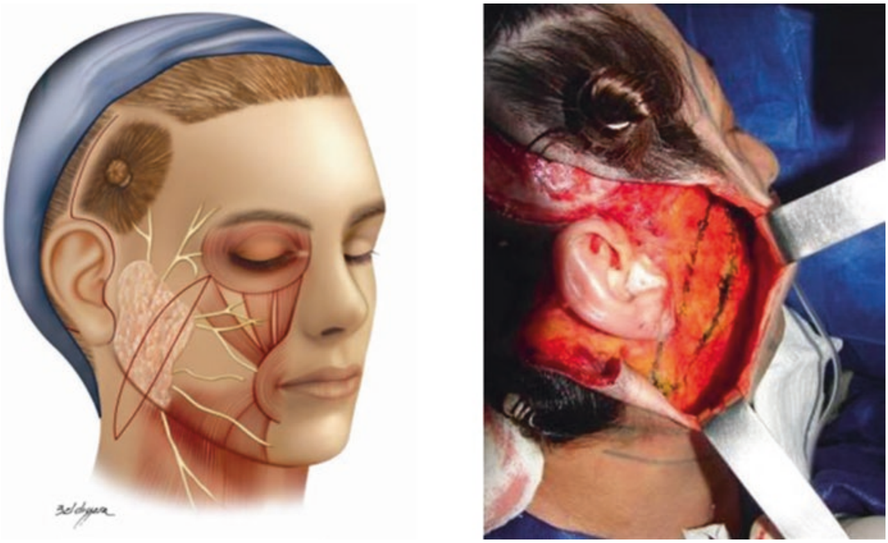

Fig. 36.6 Baker's lateral SMASectomy: a safer and less invasive SMAS treatment

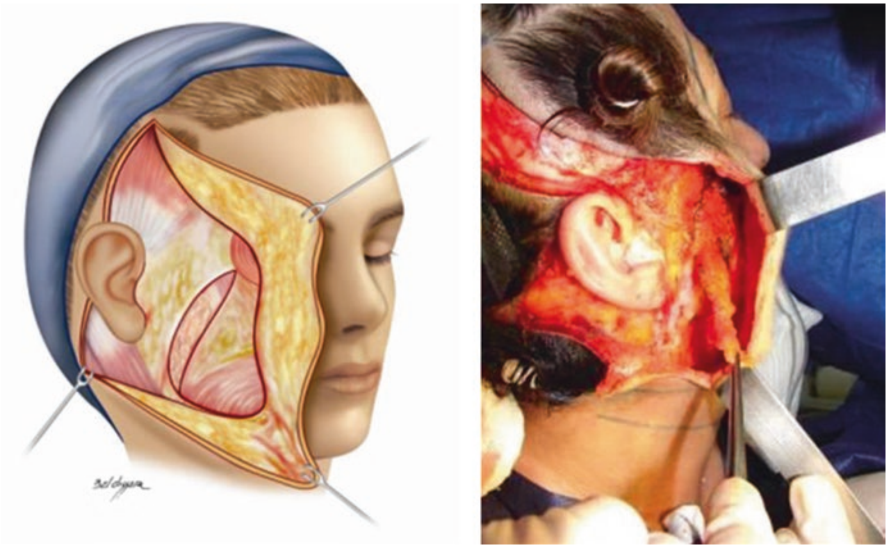

Fig. 36.7 Lateral SMASectomy a superficial resection over the parotid gland from the lateral border orbital rim to the mandibular angle and anterior border of the sternocleidomastoid muscle

of the anterior borders of the platysma muscle, subplatysmal fat partial removal, and, in some cases, digastric muscle plication as described by Labbé [18].

The suture of the edges of the platysma and their intersection at the height of the thyroid cartilage will give sufficient support for the maintenance of the cervical angle of the mandible (Fig. 36.9).

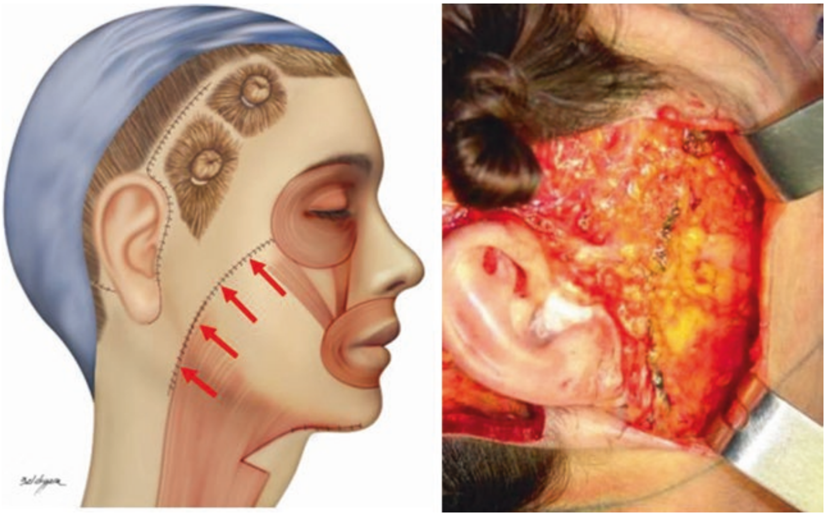

Fig. 36.8 The SMASectomy effect: the facial middle third is lifted and anchored to the still pre-auricular area

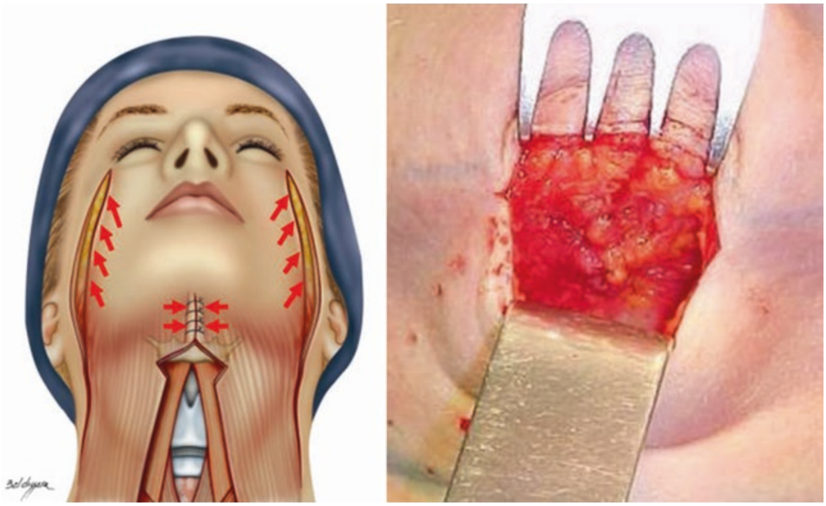

Fig. 36.9 The platysmal corset stitches, associated with the conventional liposuction, enhances the cervicofacial angle

It is relevant to mention that these procedures are very often accompanied by fat grafting in the malar region, nasolabial sulcus, and the “marionette grooves.” Occasionally, we may use fat grafts for a discreet filling of the lips (Fig. 36.10).

Blepharoplasties with a transcutaneous incision will most often be accompanied by a bilateral canthopexy to avoid the possibility of cicatricial fibrous retraction and ectropion (Fig. 36.11).

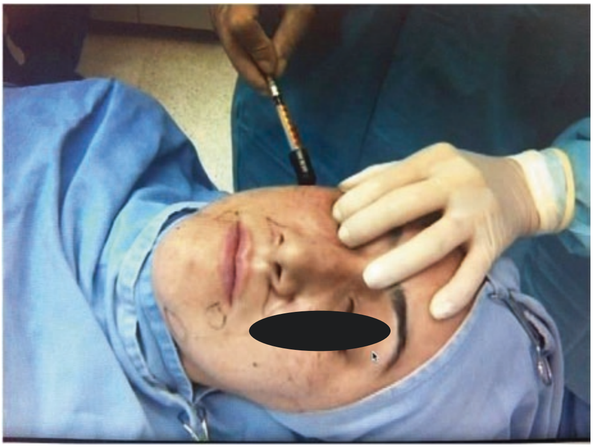

Fig. 36.10 Fat grafting, an ancillary procedure to the rhytidectomies

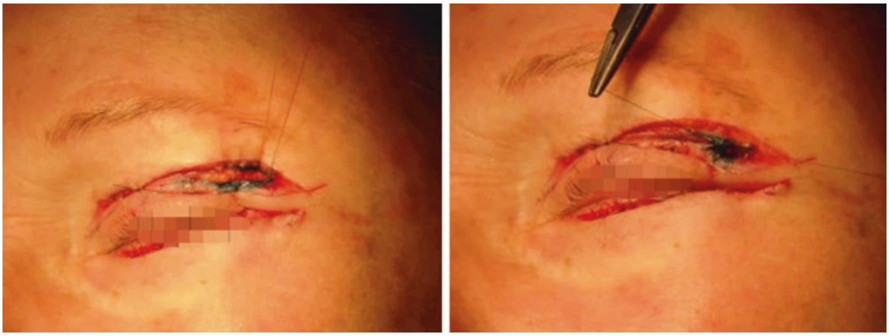

Fig. 36.11 Lateral canthopexy prevents scar retraction and ectropion

There are many advantages in favor of lateral SMASectomy compared to the classical SMAS flap.

Firstly, the procedure does not require extensive undermining of the underlying SMAS structures, thus avoiding any deeper structure damage. Moreover, the facial nerve lesions are very rare, since the SMAS resection is made superficially to the parotid gland and the terminal branches are ahead of the gland.

In addition, the integrity of the wound edges allows a strong and stable suture, and it leads to a predictable healing process. The procedure is safe, simple, and fast, and it offers the same flexibility of the classical undermined SMAS flap.

36.3 Complications

Hematoma – the onset can occur in the immediate postoperative period, and according to the statistics, it occurs in 3% of patients with normal arterial levels, being more frequent among men than women [20] (the concentration of epinephrine in the infiltrative solution should not be less than 1/500,000). The hematoma, if larger, requires a revision in the operating room for adequate treatment under direct vision. Smaller volumes, however, may be drained in the office. Any hematoma has to be drained, avoiding skin ischemia, ulceration, and necrosis.

Seroma – rarely occurs, being more frequently found in the cervical region. It has to be properly drained.

Cutaneous necrosis – statistics show 1% occurrence in the deepest surgeries and at 3.6% in the subcutaneous rhytidectomies [20]. It is related to excessive tension and very thin subcutaneous flap, often resulting from vascular diseases and/or chronic smoking. It should be evaluated, treated, and reoperated after complete healing.

Infection – occurrence is rare, but it may be caused by methicillin-resistant *Staphylococcus aureus* (MRSA) found in nasal secretions and by *Pseudomonas aeruginosa* prevalent in the ear canal [20].

Nervous lesions – these are rare complications, with less than 1% of incidence [10]. Occasionally, a rather broad undermining and/or deep manipulation of SMAS can cause paresis (temporary lesions). The rare lesions of the temporal, buccal, and mandibular branches of the facial nerve should be monitored and treated once they have important aesthetical and functional consequences. Injury of the accessory nerve is very rare and may reduce the shoulder abduction.

36.4 Unsatisfactory Results

The selection of patients to a rhytidoplasty should be very careful. Technical limitations and disturbances of behavior during the interview should be valued, as they may indicate the possibility of unrealistic expectations by the patient.

36.5 Discussion

We consider facial rejuvenation surgery a complex, delicate, and meticulous process that requires a great deal of attention in its preoperative analysis. As there is great expectation concerning its outcome, the patient should be thoroughly informed about every path to be followed until the end of his/her recovery and what to expect as a final result.

Our preference for the lateral SMASectomy, giving up the traditional SMAS flap, is due to safety, speed, ease of execution, and durability of the excellent results obtained. It presents a low rate of complications or possible intercurrences, and it has a short learning curve, requiring, however, an accurate knowledge of the local anatomy.

The described technique and methodology have been gratifying in the accomplishment of this established technique of facial rejuvenation.

36.6 Clinical Cases

Case 1 – A 49-year-old patient: Pre- and postoperative views after full face lift, lateral SMASectomy, neck liposuction, and platysma corset

Case 2 – A 64-year-old patient. Pre- and postoperative views after a secondary full face lift with lateral SMASectomy neck liposuction, subplatysmal fat resection, platysma corset, and mentoplasty

Case 3 – A 57-year-old patient after a full face lift with lateral SMASectomy, neck liposuction, subplatysmal fat resection, platysma medial plication, and chin implant

Case 4 – A 58-year-old patient. Pre- and postoperative views after a full face lift with lateral SMASectomy, neck liposuction, subplatysmal fat excision, platysma bands plication, and chin fat grafting.

Case 5 – A 71-year-old patient. Pre- and postoperative views after a primary full face lift with lateral SMASectomy, minimal neck liposuction, and platysma bands plication

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Part IV
The Final Scars After Face-Lifting

Chapter 37
History of Rhytidoplasty

Juarez M. Avelar and Lybio Martire Junior

From the earliest civilizations, the human being has been concerned with its appearance, as we can see in the Egyptian paintings, the baths with goat's milk, which Cleopatra was used to do, referred to in history and several other information since long time, as others.

Other cultures, such as the Greek, the Roman, and the Arab, also left traces of their doubts with aging and with the search for ways that could retard or reverse it.

The legendary quest for the fountain of youth by medieval alchemists is another reliable example of mankind's concern in keeping its youth and youthful appearance.

Although it is a reconstructive plastic surgery, even achieving aesthetic effects, the oldest surgery described in detail in the history of medicine – reconstruction of the nose, with frontal flap, detailed in the book of Sushruta, sixth century BC. Going back to India's knowledge of the second millennium BC, plastic surgery, made with the intention of rejuvenating, will appear much later, only at the dawn of the twentieth century. Notwithstanding it being the latest within the ample arsenal of plastic surgery, it became the most iconic, fertilizing the imagination of people in general [15].

Of course, although the desire to rejuvenate existed from the beginning, no one would want to undergo a purely aesthetic surgery before the era of anesthesia and antisepsis, due to suffering atrocious pain and being at risk of infection. Therefore,

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only from 1846 with the knowledge of anesthesia and 1867 with antisepsis that the development of surgeries with a purely aesthetic objective happened.

The first surgery aimed at rejuvenation could not have appeared more forcefully to show its importance and especially the strength of human will, because it was born under the guidance of a patient uncomfortable with his or her appearance and desiring to rejuvenate.

In 1901, a Polish aristocrat lady sought the German surgeon Eugene von Hollander (1867–1932), asking him to remove a spindle of skin in front of her ear, improving the sagging of her face. This was the procedure that the surgeon was reluctant to perform initially, saying that there was nothing described about it. However, the patient's insistence made him comply with the request, and later, he would say in a jocular tone that he had been a victim of the power of female persuasion, and with that he became a pioneer of facial rhytidectomy [15].

In 1906, another German surgeon, Erich Lexer (1867–1937), has faced a similar experience that had occurred. An actress asked him to remove those strips of glue on her face for her presentations improving facial flaccidity. She asked the surgeon to have surgery in order to obtain that result. Also, she said that when those strips were placed, a skin fold was formed in the zygomatic region, so she taught the surgeon where to incise and he made an "S" incision in the temporal region, passing through in front of and behind the ear until the implantation of the scalp. According to Lexer the result was satisfactory [15]. This was how facial rejuvenation surgery started.

As a matter of curiosity, in that same year, 1906, Charles Conrad Miller (1880–1950) in Chicago, USA, was also a pioneer in another surgery of rejuvenation, the blepharoplasty, although this term had been created in 1829, by the German surgeon Johann Fricke (1790–1841) [15].

Another American, Kolle, wrote in 1911 the book *Plastic and Cosmetic Surgery* [23]. The Brazilian José Rebelo Neto is also among the pioneers of plastic surgery worldwide, due to his graduation thesis entitled "Aesthetic Surgery," 1915, which supports this position [15].

In 1917 Raymond Passot, who had worked with Hippolyte Morestin, made a scientific description of the surgery performed by Von Hollander, though with reservations to a procedure that contemplated solely vanity. However, in 1919, Passot (Fig. 37.1) also developed a procedure improving the submentonian and submandibular region that motivated the title of his book *Sculpteur de Visages - les secrets de la chirurgie esthétique* (*Sculpture of the Face – The Secret of the Aesthetic Surgery*) which suggests some of the glamour and fantasy that would be plastic surgery at least in the yearning of many people. Therefore, it is correct to credit to Passot the new era for facial rejuvenation procedures.

In spite of any criticism, the incipient rhytidoplasty started to have adepts who also bequeathed their contributions. Initially the techniques made small preauricular cutaneous excisions, and, of course, the results were limited with more apparent scars [4].

Jacques Joseph, in 1921 [23], bequeathed his contribution by extending the preauricular scar to the temporal region, as well as bypassing the ear to the mastoid.

Fig. 37.1 Dr. Raymond Passot (1886–1933)

Malignac, in 1932 [23], reported the resection of fat and skin out of submental region improving the cervical region's outcome.

Padgett and Stepheson [23] mentioned in 1948 the combination of submentonian lipectomy similar to Passot's concepts with the plication of the platysmal bands in the midline. Also, Pierce [23] in 1947 described the correction of glabellar wrinkles by performing resection of the corrugator muscle.

It is worth remembering that in France there was a great female surgeon, Suzanne Noel (1878–1954), a pioneer in plastic surgery, who had worked in World War I performing repair surgeries. After the conflict ended, she was dedicated to aesthetic surgery and became a famous and very active surgeon. She performed rhytidoplasty and she had herself undergone surgeries for facial rejuvenation. In 1926 Suzanne published the book *La Chirurgie Esthétique: Son Rôle Social* (*The Aesthetic Surgery: Its Social Environment*). The book became a success and was translated into German in 1932. It describes a technique to improve cervical flaccidity by making a vertical spindle skin retreat in the posterior region of the advancing neck within the scalp [15].

Rebelo Neto, in 1930, created the first plastic surgery infirmary in Brazil, at Santa Casa de Misericórdia in São Paulo. His wax masks, for study of his patients, as was common at the time, showing his performance and contribution to facial surgery [15].

Fig. 37.2 Prof. Ernesto F. Malbec (1909–1995)

Mayer and Swanker in 1950 were the first to use the term "rhytidoplasty" in the *Plastic and Reconstructive Surger*y journal. This term would later be changed to rhytidectomy, which means excision of wrinkles and folds, but this definition is not applicable to our contemporary facial surgery style [23].

Prof. Ernesto Malbec (Fig. 37.2) from Argentina in 1957 with his original scientific works was a pioneer in Latin American continent called "Wrinkles of the Face" (Arrugas de la Cara) with descriptions of surgical principles similar to the techniques used until today. Therefore, he opened a wide field with valuable contributions in rhytidoplasty operations.

The 1960 decade was quite profitable for technical advances in rhytidoplasty. Gonzalez-Ulloa in 1962 emphasized the importance of plication of deep tissues of the face improving the results of a rhytidoplasty.

Ivo Pitanguy (Fig. 37.3) ([19], [20], [21] and 1971) introduced new concepts which are useful technical development in rhytidoplasty improving the outcome, until today. He described a rotation of the temporal flap to "block" avoiding elevation of hair implantation. Even he emphasized the importance of adequate placement of the scars similar to Malbec's concepts.

From the 1970s many surgeons introduced substantial contributions to rhytidectomy: Millard (Fig. 37.4) in 1972 with submentonian and submandibular lipectomy achieving harmonious facial and neck contour. The Brazilian surgeon Badin [3] also described extensive submentonian and submandibular lipectomy to remodel the cervico-mandibular angle.

Fig. 37.3 Prof. Ivo Pitanguy (1923–2016)

Fig. 37.4 David Ralph Millard, Jr. (1919–2011)

Fig. 37.5 Jose Guerrerosantos (1929–2017)

Skoog in 1974 published his experience acquired in the previous decade with a deep flap to draw the platysma.

Guerrerosantos (Fig. 37.5) [6] proposed useful improvement on rhytidoplasty through treatment of muscular approach for neck lift.

At the same time, remarkable improvement was introduced by Mitz and Peyronie in [16], with important description in detail of the SMAS (superficial aponeurotic muscle system), whose treatment would be incorporated to rhytidoplasty, improving its results, which is a substantial technical evolution. In fact, those authors opened a new era in rhytidoplasty with new concepts in biplane of treatment improving facial rejuvenation results. Following Mitz and Peyronie's concepts, most of surgeons all around incorporated to rhytidoplasty procedures, such as Connell, Owsley, Lemmon, and Hamra from the USA [4], and other authors followed the original publication of Mitz and Peyronie and developed the use of SMAS in their clinical practice.

Tessier (Fig. 37.6) [26] was a pioneer to work on subperiosteal plane would be reached who gave importance to the facial deep important contribution.

A few years later, Illouz (Fig. 37.7) [7–10] developed, described, and popularized the technique of liposuction that was a great evolution for body and facial contour surgery.

Using the technique of liposuction, Avelar [1, 2] published its isolated application in remodeling face and neck and also it in association with rhytidoplasty.

Fig. 37.6 Prof. Paul Tessier Paris (1905–2004)

Fig. 37.7 Prof. Yves Gerard Illouz (1929–2015)

Likewise using liposuction, Martire [12, 13] published a paper showing how the rhytidoplasty may be less broad and aggressive when associated with liposuction, proposing the treatment of the frontal region without coronal incision using the fat grafting.

Soon the subperiosteal plane would be reached; Tessier in France was also a pioneer who gave importance to the facial deep structures, as in Brazil, Psillakis and Mateo Santana [4] did too. Ramirez and Little [4], both from the USA, entered the face's third dimension with different maneuvers, such as skeletal enlargement, soft tissue transplantation, and also reopening and imbrication of facial structures.

Valuable technical contribution was introduced by Stocchero [25] who presented a methodology with little cutaneous detachment of the face and neck with subcutaneous plication, using a special needle developed by him. Following Stocchero's principles, other authors have published similar procedures.

Martire [14] published conduct for facial rhytidectomy without the temporal incision, treating the face's middle third by the eyelid. Pontes [22] although he has previously developed, but it is published his "peninsula" approach which is an important evolution for secondary and primary rhytidoplasty in order to preserve sideburn in female and male patients.

Many other surgeons had and still have merit in developing different variations of rejuvenating procedures in Brazil, the USA, and many other countries.

Thus, substantial contributions have sculpted the history of facial rejuvenation surgery to make it an important procedure in the arsenal of plastic surgery with full acceptance by the patients.

For all this, over time, facial rejuvenation surgery has become an icon of plastic surgery for society in general being a source of inspiration in its imaginary.

A reflection of this is noted in the cinema, because there are a great number of films exploring the theme through the most varied entanglements.

In the twentieth century's last decades, rejuvenation surgery expanded its range reaching deep planes; incorporated endoscopy, laser, and liposuction; and became less aggressive, and then came the minimally invasive procedures acting together with it.

Among the complementary conduct for the rhytidoplasty, to treat the skin's most superficial layer, the mechanical or chemical or radiofrequency or the laser peeling can be mentioned. Other conducts were added, such as fat grafting and wrinkle fillers.

Although until the 1970s making a "plastic," as this surgery is popularly known by lay people, was a reason for secrecy and people used to hide it, today, instead, fortunately for us, plastic surgeons, who also undergo a facial rhytidectomy, take pleasure and pride in boasting to the four winds the status of reconquered youth [15].

Brazil, it should be remembered, is a country that continues to inspire the world imagination as a reference in plastic surgery, largely because of the charisma, technical contributions, outstanding surgical results, and legacy of the Brazilian Ivo Pitanguy.

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Chapter 38
Importance of the Pontes Peninsula in Rhytidoplasty

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38.1 Introduction

The elevation of the sideburn in the rhytidoplasty postoperative period is an unpleasant sequel that stigmatizes patients. As a consequence of rhytidoplasty with excessive traction of the temporal flap, the patients present an increase in the distance between the mandibular angle and the hairline, resulting in a face with an elongated aspect [1].

In order to treat this alopecic area, different types of scalp flaps have been described: rotation, transposition, and advance from the preauricular and temporoparietal regions, performed in a secondary surgery to provide a solution for this unpleasant problem that can arise after surgeries for facial rejuvenation [2–4].

Not satisfied with the necessity to submit patients to another surgery, in 1999, Professor Ronaldo Pontes developed a technique that allows to preserve the hairline implantation on the sideburn in secondary rhytidoplasty (Fig. 38.1) [5, 6].

Subsequently, this technique has become consolidated as an indispensable tool for treating patients with a high hairline or with excessive flaccidity in the middle third of the face that needs extensive skin resection. From its inception until the

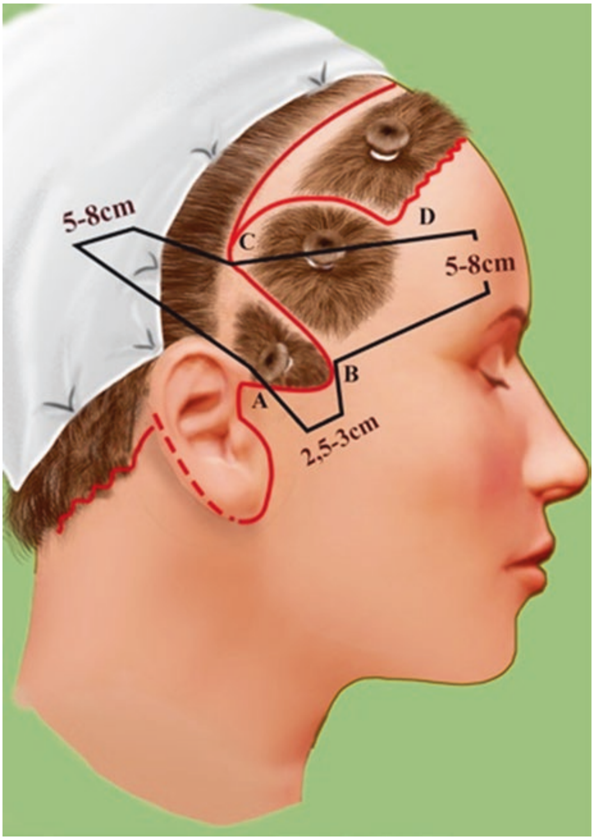

Fig. 38.1 Variants of the peninsula

present day, the peninsula has already been used on over 7000 faces operated by Professor Ronaldo Pontes.

38.2 Anatomy of the Peninsula

The peninsula constitutes only a part of the set of incisions performed during rhytidoplasty. It is a fundamental pillar for treatment of the middle and lower thirds of the face, and its measurements are not rigid, but must be maintained within the parameters indicated, as it allows cutaneous verticalization of flap traction.

Irrigation of the peninsula is ensured by superficial temporal artery branches, and its innervation depends on the auriculotemporal nerve.

38.2.1 Classification of Preauricular Hairline Implantation

Aiming to achieve an adequate indication of the peninsula technique, the classification of patients was proposed in accordance with the height of the hairline implantation in the preauricular region (Table 38.1) (Figs. 38.2, 38.3, and 38.4).

The peninsula technique should be used for all patients classified with high or medium sideburn implantation. We may also use it for patients with low implantation, in which there is more freedom to define the height of the new capillary contour, but, in these cases, the technique is not mandatory. On the other hand, a failure to indicate the peninsula in the aforementioned cases can lead to an unaesthetic elevation of the hairline and a detriment of the final result.

38.3 Definition: Indications

It is a hair peninsula in the temporal region that is respected and delimited by the incisions during the rhytidoplasty. Its base accompanies the hairline running from point A to the point B; the distance varies from 2.5 to 3 cm. Its cranial limit is

Table 38.1 Classification of the sideburn hairline implantation. Note: fluff and thin hair are disregarded in the classification

Implantation type	Description	Indication for peninsula
High	The lower limit is a line between the lateral canthus of the eye and the root of the helix	Always
Medium height	The lower limit is a line between the lateral canthus of the eye and the beginning of the tragus	Always
Low	The lower limit is a line between the lateral canthus of the eye and the end of the tragus	Optional

Fig. 38.2 High sideburn implantation

delimited by the B–C segment drawn in the temporoparietal region, and this ranges from 5 to 8 cm.

Nowadays, peninsula technique is used by many plastic surgeons when it is desired to treat the middle and lower thirds of the face to keep the hairline in the original position, thereby avoiding potential stigmatization generated by the surgical procedure.

The following are absolute indications for peninsula: secondary rhytidoplasty, high sideburn implantation, and excessive flaccidity of the tissues in the middle third of the face that require major resections.

38.4 Objective

The application of the peninsula technique in rhytidoplasty is aimed at maintaining the preauricular hairline implantation. With its deployment, one can avoid creating additional flaps and further operations that would increase the scarring areas and prolong the patient's recovery.

Fig. 38.3 Medium sideburn implantation

38.5 Operating Technique

38.5.1 Temporal Peninsula

The temporal peninsula technique is indicated in both primary and secondary surgery. Figure 38.5 represents the drawing with the original measurements. A line is drawn starting from point B in an anteroposterior direction to point C, which is situated perpendicular to point A. The B–C dimension is 5 to 8 cm in length, varying in accordance with the capillary implantation line in the temporoparietal region. The distance between points C and D is defined by an arched line, whose curvature varies in accordance with the degree of need to raise the eyebrow tail.

In rhytidoplasty, it is routine to commence with dissection of the retro-auricular and preauricular regions, the face, and then the previously drawn temporal peninsula.

As regards treatment of the SMAS, anteriorized sickle plication is performed with separate sutures utilizing PDS 3.0, followed by continuous suture to improve support.

Fig. 38.4 Low sideburn implantation

For traction of the peninsula, it is fundamental to return the point B to its original position, thus avoiding any type of step in the capillary implantation, and it is fixed with a 5.0 nylon suture. This point is the initial assembly mark for the peninsula. Afterwards, the assistant pushes the flap in the posteroanterior direction, and the surgeon applies traction to the flap in the anteroposterior direction. This set of maneuvers causes reasonable tension, essential to achieve the objective of the technique.

The traction of the face starts in the cervical region, and the flap is fixed in the retro-auricular region, followed by removal of cutaneous excess. After finalizing the cranial traction, traction and preauricular cutaneous resection are performed.

The resection follows a harmonious line, avoiding rectification of the scar, which could affect the principles of the technique. After the fixation of the point A is done the resection of the peninsula flap. There must be no tension in the AB segment in order to achieve an imperceptible scar. The earlobe and preauricular points are demarcated, likewise without any tension (Figs. 38.6 and 38.7).

Fig. 38.5 Marking of the temporal peninsula

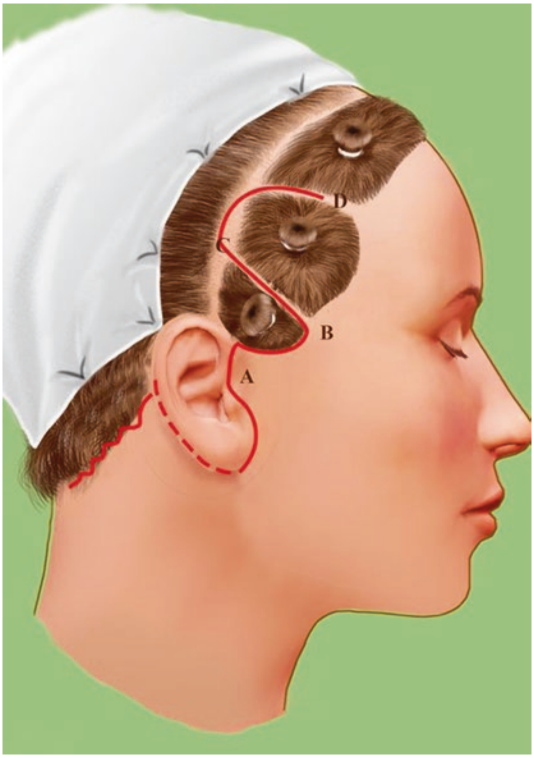

Fig. 38.6 Pre- and 1-year postoperative period of the temporal peninsula – anterior view

Fig. 38.7 Pre- and 1-year postoperative period of the temporal peninsula – lateral view

38.5.2 Frontal Peninsula

The frontal peninsula technique begins with marking the A–B segment, already described. Next, an oblique line is drawn from point B to point C in the anteroposterior direction. Then, a curved line is drawn to contralateral point C, defining the technique, as shown in Fig. 38.8.

Point B is emboldened and repeated to demonstrate its importance for the dynamic of the technique. The supra-galeal dissection is performed above point B and on the superficial plane below this. Between the two dissection planes, a Y pedicle is preserved through which the temporal branch of the facial nerve passes through (Figs. 38.9, 38.10, and 38.11).

38.5.3 Frontal Peninsula with Precapillary Incision

The frontal peninsula with precapillary incision merges with the temporal. The jagged incision next to the frontal capillary implantation penetrates around half a centimeter into the capillary implantation line. This technique is indicated for patients with a broad forehead, whether due to previous surgery or not.

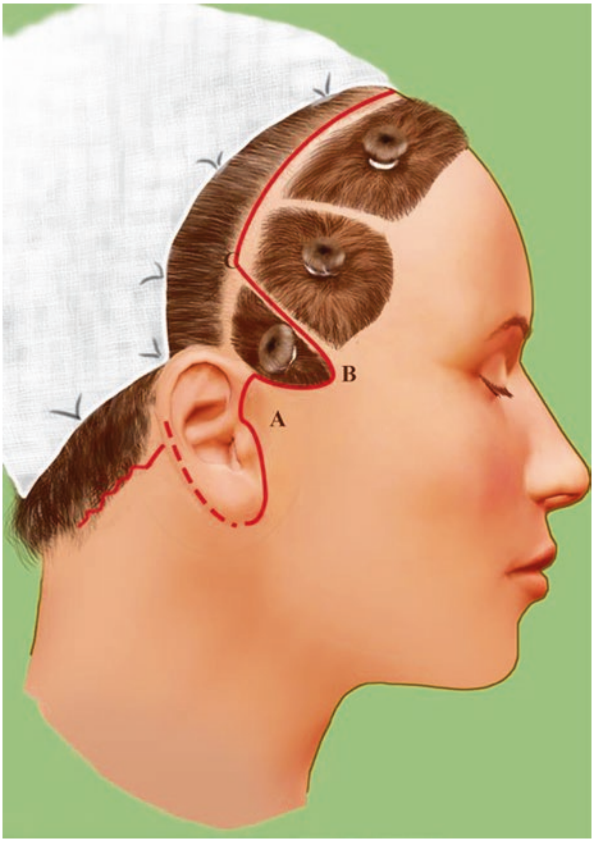

Fig. 38.8 Marking the frontal peninsula

The surgical sequence begins with the dissection of the neck, followed by the preauricular region and the peninsula, and ends with frontal incision, as displayed in Fig. 38.12. A wide release of the flap is made, along with treatment of the frontal and interciliary musculature (corrugator and procerus). Afterwards, resection of the scalp segment is performed, and this is closed with anchored running suture (Figs. 38.13 and 38.14).

38.6 Complications

The complications of the surgery are minor, the same as in any other facial lifting. The principal ones reported are hematoma, epidermolysis, hypertrophic scar, and nerve damage. Until today, there has been no evidence of suffering in the area corresponding to the peninsula, due to the rich vascularization of the scalp.

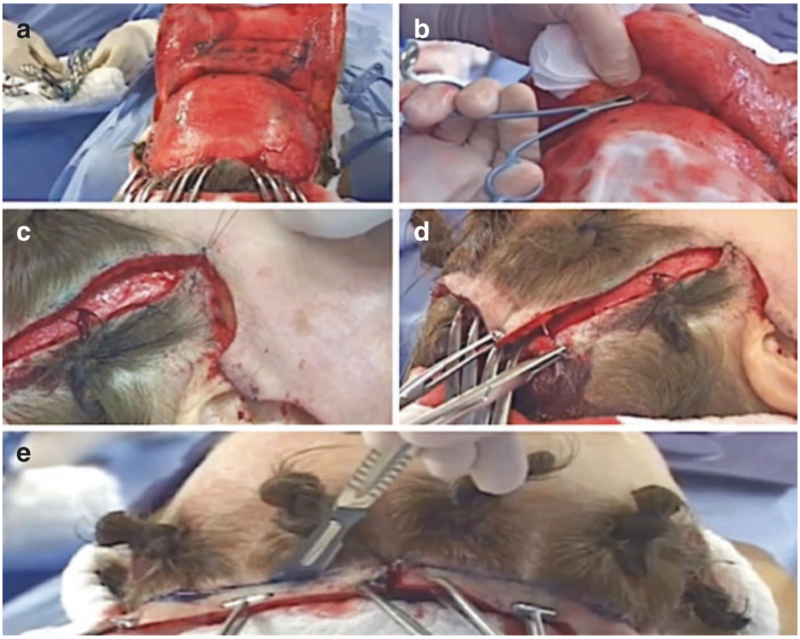

Fig. 38.9 Sequence of intraoperative photos of a frontal peninsula. (**a**) Frontal dissection and front musculature treatment. (**b**) Treatment of the corrugator and procerus muscles. (**c**) Return from point B to its place of origin. (**d**) After fixation of the point B to its place of origin, we do the traction and resection of the excess of skin in the temporal and frontal regions. (**e**) Resection of the excess of frontal skin

Fig. 38.10 Pre- and 1-year postoperative period of the frontal peninsula – anterior view

Fig. 38.11 Pre- and 1-year postoperative period of the frontal peninsula – lateral view

Fig. 38.12 Marking of the frontal peninsula with precapillary incision

Fig. 38.13 Pre- and 1-year postoperative period of the frontal peninsula with precapillary incision – anterior view

Fig. 38.14 Pre- and 1-year postoperative period of the frontal peninsula with precapillary incision – lateral view

38.7 Discussion

Several techniques have been described for treatment of facial aging. However, the majority of them result in elevation of the hairline, a serious consequence of the rhytidoplasty that stigmatizes patients [2–4].

For correction of this defect, different authors have developed techniques that allow repositioning of the hairline to the ideal location. In 2002, Rodriguez-Camps described the transposition of a triangular flap from the retro-auricular region as an alternative approach to correction of this problem [7]. However, the consequence of this technique was a new scar in the temporal region, besides the risk of suffering of the transposed flap.

In 2005, Radwanski and co-authors proposed hair transplantation. In this technique, a spindle-shaped piece of the scalp is removed from the occipital region, and after that the follicular grafts are prepared with the aid of a microscope [8]. Despite being the technique that manages to correct the temporal capillary implantation line, this has the disadvantages of a resulting occipital scar, the high cost of the procedure, and the need of specific teams for preparation of the follicles.

Some authors have described techniques in which tissue expanders are used for correction of the alopecic area, but they are seldom utilized due to cost, intercurrences associated with the expanders, and patient discomfort [9].

In the midst of this scenario, the peninsula technique emerges as a feasible, viable alternative that maintains the capillary implantation line, thereby optimizing the rhytidoplasty results, as well as decreasing the need for further surgery to correct this fault.

38.8 Conclusion

The peninsula became an excellent resource for plastic surgeons, as it allows greater cutaneous resection of the middle third of the face and overall facial treatment, minimizing surgical procedure sequels. Its principal advantage is that it keeps the original hairline position.

It is most beneficial in patients with high capillary implantation or in secondary face-lifting, but it can be routinely utilized across the entire spectrum of facial surgery.

The technique is simple, safe, and reproducible with a short learning curve and may be used in a broad range of the latest rhytidoplasty.

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Chapter 39
Round Block Approach in Rhytidoplasty

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39.1 Introduction

39.1.1 The Easy Lift

Wishes of human beings are highly variable. They mainly depend on an inner desire and, secondly, free time, environmental and economic factors, pain management, fear of anesthesia, colleagues' opinions, and the impact of changes. That leads to an array of analyses behind the decision to undergo a procedure carrying a high visibility, like facial rejuvenation. It might represent the willingness for a great change or simply to erase some marks and rhytids that arise due to genetics or aging.

The idea of round block SMAS suspension originated from the need to attend to a patient who rejected the scars that would result from the well-known round lift (Fig. 39.1), described by the eminent Professor Ivo Pitanguy [15], a classic technique in facial rejuvenation surgery. Due to her low hair density, the patient believed that scars would be too visible, especially after a longer period of time. We analyzed her expectations and concluded that she needed a SMAS treatment which would lift her middle third, treat her jowls, and highlight her mandibular angle, besides improving the upper part of her neck. Although she was a smoker, her skin was of good quality and was not very lax. Once we had made a sketch and drawn the facial points to be lifted, we observed that they contoured the ear in more than half of their outline. Considering that the facial area is more flaccid, the concept of the SMAS [13], and the fact that anchoring the tissues in firm structures (like the scalp and the retroauricular and mastoid regions) might be very useful, we followed the lines in the sketch and concluded that a circular suture around the ear would allow for facial suspension, tissue support, and concentric closure encircling the auricle. Therefore,

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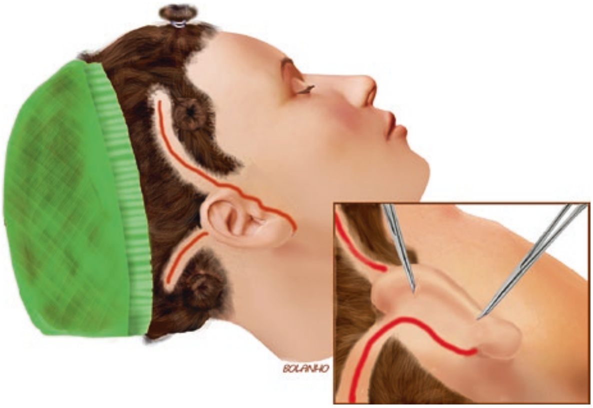

Fig. 39.1 Round lift – Pitanguy technique

our technique was born, with just a periauricular final scar, which fully attended to the patient's wishes [17].

Word of mouth soon spread, with more patients looking for the same solutions, which enabled us to standardize the indications for short scar facelifts [18].

Round block SMAS suspension has been effective in the vast majority of cases. Treating the SMAS and treating the skin are completely different steps in many cases. When the skin has good elasticity without great excess, small undermining will be enough to perform the purse-string suture in the SMAS and lift the skin above together as a unit, thus maintaining cutaneous blood supply and adequate skin trophism.

Initially, we thought of the suspension as being directly related to the facial ligaments described by Furnas [5]; with time, and the remarks made by Bryan Mendelson [12], we were able to notice that the greater efficiency of SMAS repositioning was due to sliding of the submasseteric space, the ligaments of which become lax with aging.

In case the skin quality is not ideal (i.e., inelastic, wrinkled), the undermining will have to be larger; however, SMAS suspension may be done the same way as with good quality skin.

39.2 Method

39.2.1 Patient Selection

More and more, women and men seek an appearance that is compatible with their self-identification, due to a new phase in their lives, with new children, or to a new job perspective. Nevertheless, such desires carry pretty variable intensities. Frequently, they look for small adjustments; and, most times, those wishes are genuine. The greatest mistake one can make is to believe that the patient would be satisfied with a smaller procedure, when this was not the case! Frustrated hopes [20] are determinant against the surgeon! Trying to understand the patient's real intentions is paramount. And be sure to take good, well-standardized preoperative pictures [27].

The procedure described here is indicated for suspension of the middle and lower thirds of the face, acting on the proximal cervical third (Figs. 39.2, 39.3, 39.4, 39.5,

Fig. 39.2 53 years old

Fig. 39.3 54 years old, 9 months after short scar facelift

Fig. 39.4 53 years old

Fig. 39.5 54 years old, 9 months after short scar facelift

39.6, and 39.7). It is important to distinguish suspension from plication; suspension refers to pulling of areas distant from one another, while plication means approximating contiguous regions. The procedure may be done with different surgical approaches, from the closed lift to the coronal incision, which, after contouring the ear, may extend up to the mastoid region. The most frequently used approach is the

Fig. 39.6 53 years old

Fig. 39.7 54 years old, 9 months after short scar facelift

so-called short scar facelift (Fig. 39.8). The choice of surgery must be discussed in the preoperative evaluation, as its benefits and limitations must be thoroughly analyzed in order to prevent preoperative frustrations. The closed lift should only be warranted in situations when skin quality is good without great excess, and to enable

Fig. 39.8 Short scar facelift – diagram

the patient to attend social meetings that will be too near to allow for full recovery, or when a slight improvement will already be satisfactory (Figs. 39.9 and 39.10).

39.2.2 Surgical Technique

It is not the goal of this chapter to show results, but to teach the clear execution of the technique (as in a 1949 *Atlas of Surgical Operations* by Zollinger and Cutler, which I inherited from my parents, both physicians, and from whose drawings I learned so much about surgery) [33], showing its potential and leaving for those who will perform it to verify their own findings.

The demarcation of the area to be undermined should be the smallest possible! It is done with the surgeon's finger pulling the skin from the central part of the patient's face toward the upper pole of the ear, sliding their finger up to the closest point of the pole that can keep the desired traction; this point is then marked on the skin. Descending toward the mandible, another two or three gentle pulls will complement the markings. After that, it will be necessary to mark one point below and behind the earlobe (Fig. 39.11).

39.2.3 Short Scar Facelift

The procedure can be performed under local anesthesia (in this case, remember to infiltrate above the ear, along the path of the needle), local anesthesia with sedation, or general anesthesia. Usually, the surgery can be done within two and a half hours.

Fig. 39.9 Closed lift – thread tightened

Fig. 39.10 Closed lift – final

Fig. 39.11 Short scar facelift – markings

We start the procedure with a trichophytic incision that begins perpendicular to the sideburn and contours the ear, running upward in its posterior portion until the point of projection of the anterior part of the incision [19, 21, 29]. Placement of the incision in relation to the tragus is according to the surgeon's preference. The author's choice is the supratragal incision in women and the pretragal incision in men, in the latter keeping a glabrous skin strip around the ear.

Subcutaneous undermining should be the smallest possible in order to obtain the desired result in the face, leaving the SMAS quite evident up until the border of the parotid gland; behind the ear, an undermined area about 3 cm from the ear will be enough.

39.2.4 Selecting the Type of SMAS Treatment: Follow the Pinch Test

This is the rule! If pinch tests done in the SMAS (using a toothed forceps) below the mandible, right above it, and below the malar region all show great structural mobility, the round block SMAS treatment will be found to have its perfect indication.

If pinch tests done in the parotid region or right ahead of it show only vertical gliding, a sectorial SMAS plication will be warranted, as described in different approaches by several authors [3, 6, 16, 30–32].

In case tractions in the aforementioned regions do not provide satisfactory mobilization to change the aspect of the face as desired, dissection of the SMAS must be associated with SMASectomy [1].

Once the round block SMAS treatment is indicated, a 2.0 Nylon suture will be passed, starting at the transverse retroauricular incision, in a caudal direction and then contouring the earlobe, keeping at least a 2.5-cm distance from it, then running frontward and away from the ear, while the SMAS is pulled with a toothed forceps in order to test its approximation. Next, the needle is passed in a 45-degree angle, firmly grasping the SMAS and running toward the anterior limit of the transverse sideburn incision. This loop of the suture is pulled so as to ensure that there is good tissue ascension (Fig. 39.12).

The Stocchero needle (either ½ or ¾ circle – Fig. 39.13) is passed from front to back, entering at the anterior limit of the transverse incision in the face and moving in an adequate curve so that the tip of the needle exits at the posterior limit of the transverse retroauricular incision. The free end of the suture is passed through the eye of the needle, which is then withdrawn, thus bringing the suture anteriorly and completing the circle (Figs. 39.14 and 39.15). After that, both ends of the suture are pulled and tied (Figs. 39.16, 39.17, and 39.18). Undermining of occasional skin attachments may be done, if necessary. Next, skin excess is treated (Figs. 39.19 and 39.20).

Fig. 39.12 Short scar – open suture

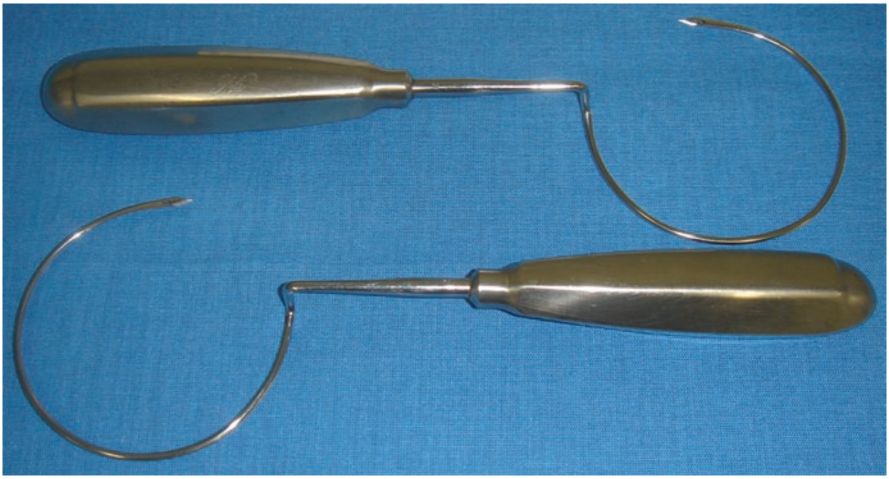

Fig. 39.13 Stocchero needles

Fig. 39.14 Short scar – thread passed and needle pulling it

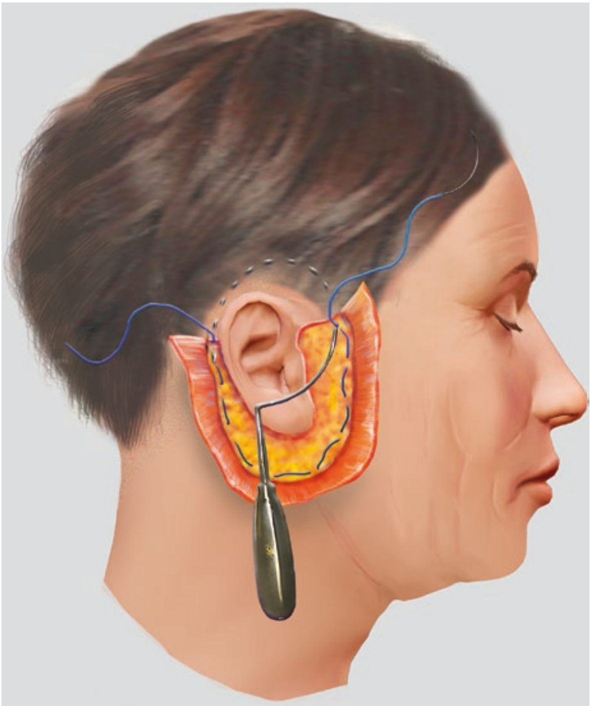

Fig. 39.15 Short scar, open – needle passed

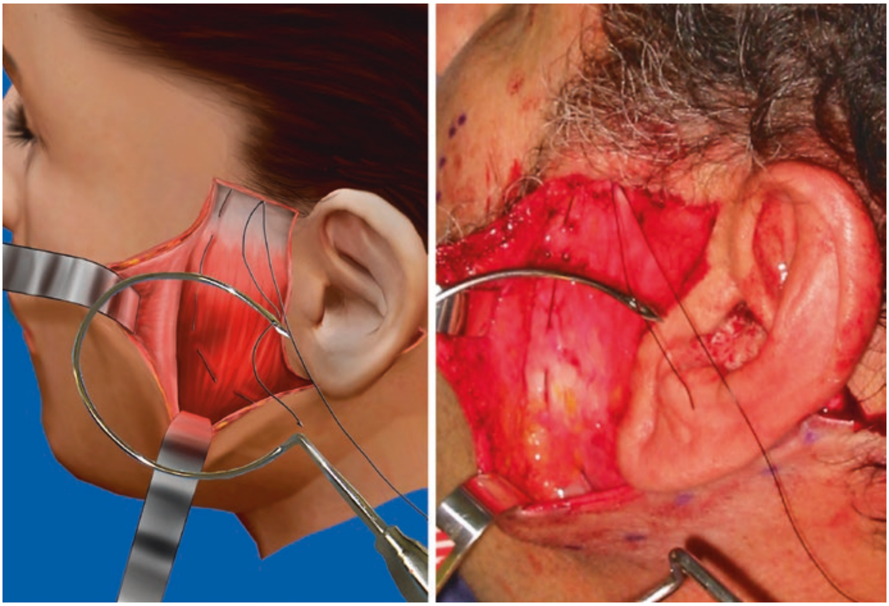

Fig. 39.16 Short scar, open – thread tied

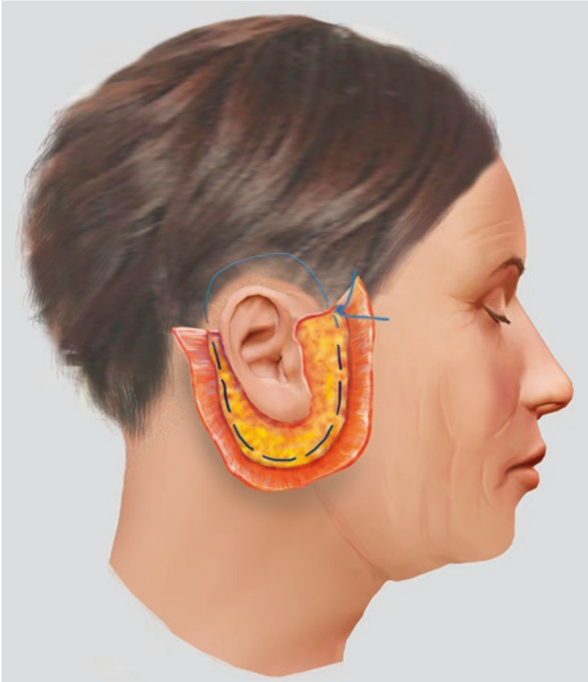

Fig. 39.17 Short scar – round block suture completed

There are situations in which skin excess may warrant a second circular suture in front of the first one, overlapping the primary suture after being pulled and tied. Never forget to evaluate the possible benefits of complementary tractions [7].

A suggestion for procedures in men is to leave a small 3-mm strip of deepithelialized skin in the facial flap so that it may be attached under the preauricular flap, thus enabling hair follicles to grow through the scar.

39.2.5 Round Lift Associated with the Round Block SMAS Treatment

After doing the incisions and undermining in the classical manner published by eminent Professor Ivo Pitanguy, we will have the SMAS exposed and perfectly adequate for the round block SMAS treatment in full view, which greatly facilitates the passing of the suture in the supra-auricular region. Cutaneous tractions will complement the lift.

In all options, the final adjustments should be made as preferred by each surgeon (Fig. 39.21).

Since dead space is quite small in the vast majority of cases, no drainage is necessary.

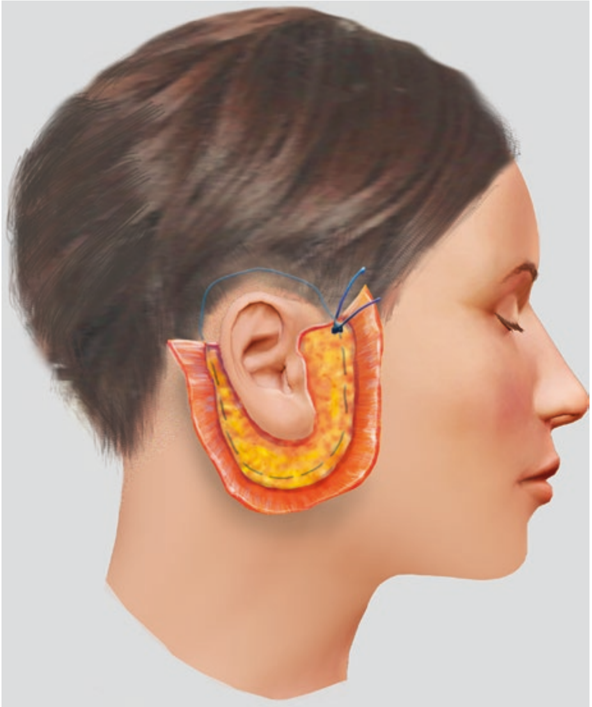

Fig. 39.18 Short scar – thread already tied

Fig. 39.19 Short scar – skin to be resected

Fig. 39.20 Short scar – skin traction

Fig. 39.21 Short scar – final sutures

A comfortable, lightly compressive, helmet-shaped dressing is indicated, mainly in cases where general anesthesia is used.

39.2.6 Closed Lift

It is usually performed under local anesthesia; total surgical time is under 1 hour.

The closed lift starts with a transverse incision adjacent to the sideburn anteriorly, followed by another transverse incision in the retroauricular area, approximately at the same height of the first one. A supra-SMAS dissection is then carried out before the ear, extending slightly below the earlobe. Using the Stocchero needle (either ½ or ¾ circle), the SMAS is grasped from front to back, up to the posterior incision (it is also possible to follow the opposite direction). Next, a 2-0 Nylon suture is passed through the eye of the needle, which is then retreated until it exits the insertion point, bringing the suture along with it. After that, the needle is passed from front to back, contouring the upper pole of the ear (keeping at least a 2.5-cm distance from it) and exiting through the posterior incision (it is also possible to follow the opposite direction). At this moment, the free end of the suture is passed through the eye of the needle, which is then withdrawn again, carrying the suture along with it. Now, both ends of the suture are pulled and firmly tied (Figs. 39.22 and 39.23). There will be a resulting skin excess ahead of the ear, which may be smoothed out through blunt dissection using a cannula, preferably one with a flat tip. After suturing the incisions, excess skin may be managed with microporous tape, maintaining the compression for 3 days postoperatively. Normally, the skin will accommodate after 3 weeks [4]. Helmet-shaped dressings are not necessary.

39.3 Complications

Considering the small undermining and reduced dead space that are both part of the technique, complication rates are low:

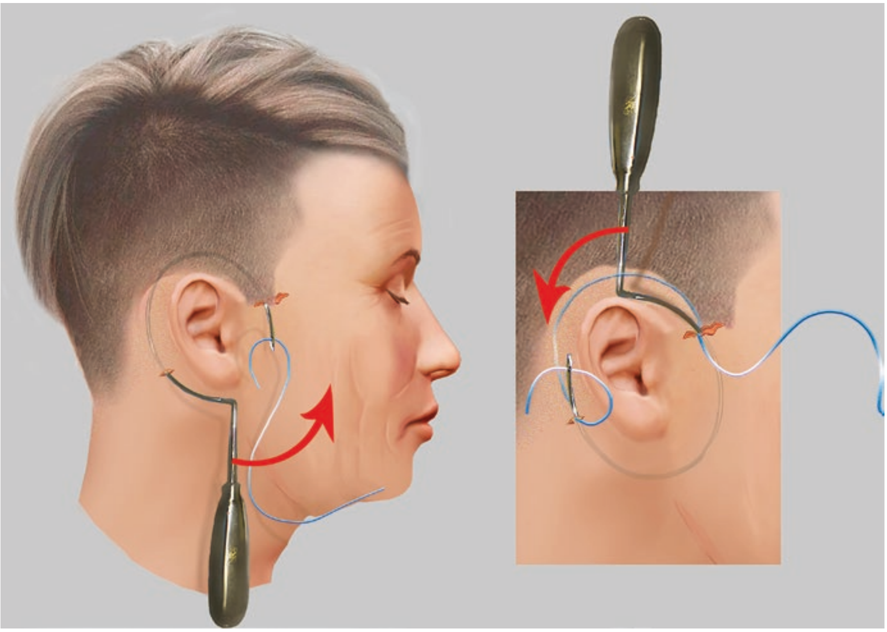

Fig. 39.22 Closed lift – passing threads with needles

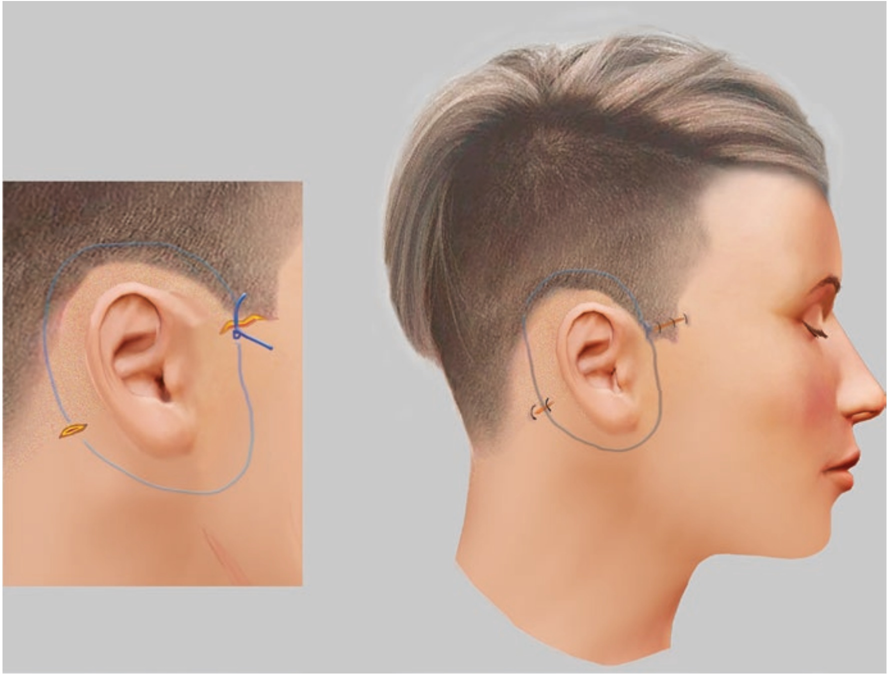

Fig. 39.23 Closed lift – thread passed (loose/tightened)

- Hematoma and hypertrophic scars – 4%
- Bruising and transitory alopecia – 2%
- Enlarged scars and transitory earlobe edema – 1.5%
- Lesion of the great auricular nerve and earlobe dehiscence – 1%
- Transitory paresis of the marginal mandibular branch of the facial nerve, partial skin necrosis – 0.25%

39.4 Discussion

39.4.1 Facelift and Necklift

Performing a facelift without addressing the neck is perfectly feasible in selected cases, employing preauricular incisions, supra-parotid undermining, and purse-string SMAS sutures, with the help of Stocchero needles, which will be useful in the supra-auricular and retroauricular passings.

In smoker patients who do not want hospitalization, or who are not willing to stay away from their daily duties (when a full facelift may be inconvenient), it is useful to indicate a two-stage procedure, both under local anesthesia. In the first stage, the facelift is carried out, while in the second one, the necklift is done, using retroauricular trichophytic incisions in the mastoid region. Results are quite good, and the cutaneous flap has shown viability even in thin skin types and in smokers.

This technique has the advantages of being highly safe and easily reproducible, thus making it suitable to be taught as an initial approach to rhytidoplasty for plastic surgery residents, which is attested in several training programs throughout the world. A frequent comment is that, after the adoption of this technique, "professors were able to sleep better after a facelift done by their residents."

39.5 Conclusions

In a time when evidence-based medicine is highly valued, our technique has been proven to reduce the undermined area by about 38%, a measurement not yet taken with other approaches [28].

It has also become an option for some well-respected plastic surgeons [9–11, 14], owing to the natural results [8, 11] that the concentric and ascending traction may offer to patients. On account of the continuous suture, each point of traction becomes a vector, and the resultant force, together with motion provided by the muscles of facial expression, will produce a more youthful look, yet preserving the characteristics of each patient. Therefore, it is a dynamic lift, besides being eutrophic [2] and easy to perform.

There are dozens of published papers on the round block SMAS treatment, written in several languages, which makes our technique even more accessible to your comprehension [22–26]. And trying it is compelling.

Acknowledgments To Professor Juarez Moraes Avelar, for his generous invitation to collaborate on this valuable work.

To my son, Dr. Guilherme Flosi Stocchero, plastic surgeon, for his intense participation in the elaboration and translation of this chapter.

Conflict of Interest The authors have no conflict of interest to disclose.

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Chapter 40
Cut Face Lift (Closed Undermining Face Lift with Avelar's Detacher)

Waldir Teixeira Renó

40.1 Method

Along the last 10 years, 30 patients were selected to submit on surgery with closed undermining technique and skin flap fixation to SMAS to evaluate my personal approach to the technique. The average age was 62 years and ranged from 51 to 75 years. Most of the patients operated on were female (28), 2 patients were secondary lift, 6 patients were smokers, 7 were hypertensive, and 1 was seropositive.

All patients were photographed during the preoperative, intraoperative, and postoperative periods.

All patients agreed to sign an informed term and received explanation about the procedure with the help of photos.

The patients were followed for at least 1 year. The first postoperative visit occurs on the fourth postoperative day, repeating at 4-day intervals for 2 weeks. Then, without any intercurrences, the visits are monthly until the third month. The patient returns in the sixth month and the first year.

40.1.1 Surgical Operative Technique

The operation is performed with the patient under local anesthesia associated with venous sedation or under general anesthesia. In both anesthesias, infiltration with saline solution is always performed. A strong solution for use along the preauricular, temporal, and mastoid marked areas is prepared with 10 ml of lidocaine 2%, 30 ml of saline solution 0.9%, and epinephrine 1: 200,000. A weak solution for use

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in the areas of dissection is prepared with 10 ml of lidocaine 2%, 200 ml of saline solution 0.9%, and epinephrine 1: 200,000. As recommended by Juarez, a special cannula must be used to infiltrate the solution in the subcutaneous layer.

Then, a needle 18G x 1 ½ perforates the skin along the marking, spaced 1 cm (Fig. 40.1a). Each perforation is expanded with the tip of a Stevens scissors (Fig. 40.1b). Through these expanded perforations, the regions to be undermined are infiltrated with saline solution (Fig. 40.2a) as mentioned above utilizing a cannula 1.5 mm x 10 cm [5, 11]. Next, a Stevens scissors is introduced in each expanded perforation forward into de subcutaneous in a 45° down until to meet a loose areolar plane about 6 to 8 mm under the skin. From there the scissors move parallel to the skin 2.5 cm forward. In the auricular magnum nerve site, this maneuver is very

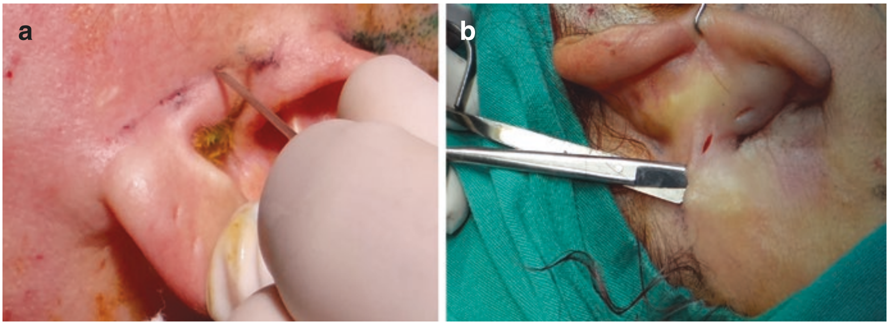

Fig. 40.1 Intraoperative view: (**a**) a needle perforates the skin about ten points along the mastoid, retroauricular, preauricular, and temporal markings. (**b**) The perforated points are expanded with the tip of a Stevens scissors that advances anteriorly in the subcutaneous

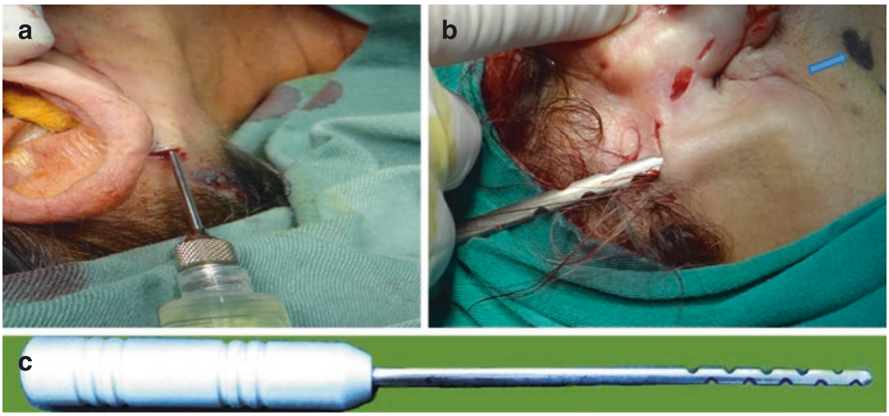

Fig. 40.2 Intraoperative view: (**a**) infiltration with saline solution through expanded points, and (**b**) the Avelar's detacher is introduced into a mastoid perforation and is moved forward (blue arrow indicates the mandibular angle). (**c**) The Avelar's detacher: a blunt and flat instrument with five semicircular holes in each distal border

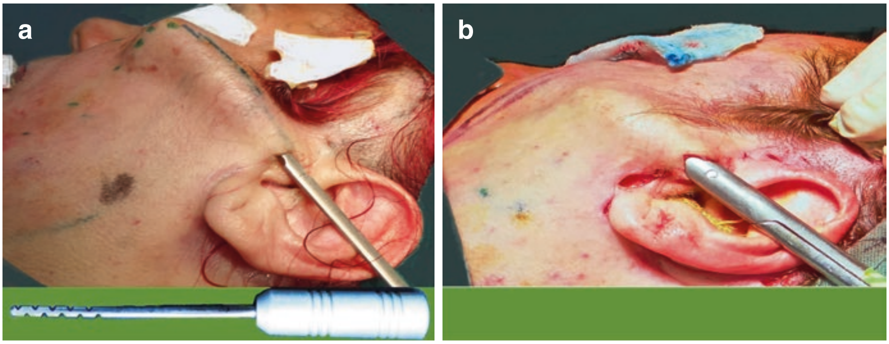

Fig. 40.3 Intraoperative view: (**a**) the Avelar's detacher is introduced through the expanded perforations with forth and back movements. (**b**) After that, a curved Kilner scissors is introduced and advances in open and close movement in the same perforations

efficient. Continuing on the same route, the Avelar's detacher, a blunt and flat instrument, is passed to the full extent previously marked on the face and neck (Fig. 40.2b, c and 40.3a). My preference is the Avelar's detacher model with five semicircular holes in each distal border. The detacher must be passed gently as it is sliding in the butter and keeping in mind the maintenance of a depth between 6 and 8 mm. It is very important to cross the detacher in oblique and horizontal axis. After then, the undermining is completed with curved Kilner scissors 12.5 cm long, which runs forward closed and back open (Fig. 40.3b). Only now the incisions are performed along the marked lines preauricular, temporal, retroauricular, and their mastoid continuity (Fig. 40.4a), and the flap is elevated through special retractors developed for facial surgery [11] (Fig. 40.4b). The procedure is practically no bleeding.

Now, the SMAS treatment is performed. If smasectomy is the option, the Baker procedure is the choice [7, 9, 10].

After that, a network of threads similar to modiolus is carried out in the face and neck through sutures between the skin flap and the SMAS. For this, anteriorly the suture is passed in the subcutaneous until near the subdermal plane and posteriorly is fixed in the SMAS and Lore's fascia (Fig. 40.5a). The sutures begin in the cervical region and end in the malar region forming nets that transport the skin from anterior to posteriorly and in an ascendant plane. Each suture group is interconnected with the other (represented by blue arrows in Fig. 40.5b, c) in order to obtain a firm and stable network to promote long-lasting mobility of the flap. Final suture is done without any tension (Fig. 40.5d).

At the end of operation in each side of the face and neck, a homeostatic plate named POSTRAUM apparatus dressing (PAD) is applied over the operated area (Fig. 40.6a) and is kept on site for 4 days when it is then replaced by a POSTRAUM removable mask (Figs. 40.6b and 40.7a, b). This removable mask should be used for 1 month and can be removed periodically for hygiene purposes.

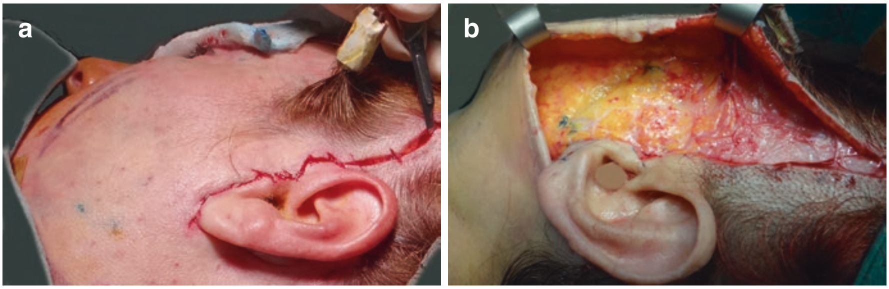

Fig. 40.4 Intraoperative view: (**a**) incision done along the marked and perforated lines after the closed undermining technique (**b**) after the incision the cutaneous flap is elevated showing the preservation of the anatomic layers, the vascular network, and the nerves

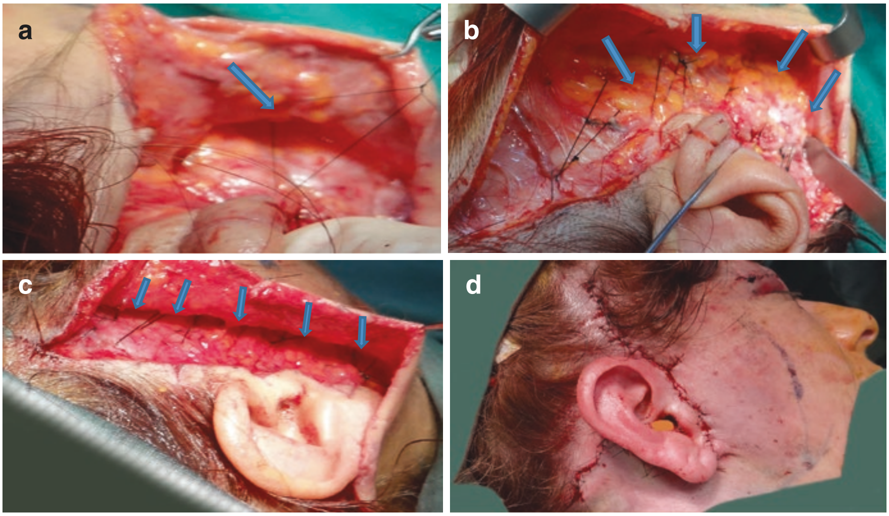

Fig. 40.5 Intraoperative view: (**a**, **b**, **c**) a network of threads is sutured from front to back between the cutaneous flap and the SMAS and are interconnected with each other (blue arrows), (**d**) the final suture without any tension

40.2 Results

In these 30 patients, the following observations were noted:

- Sensory nerve injury, 0
- Motor nerve injury, 0
- Expanding hematoma, 0
- Seroma, 0
- Skin slough, 0
- Infection, 0 (all were given intraoperative antibiotics and steroids)

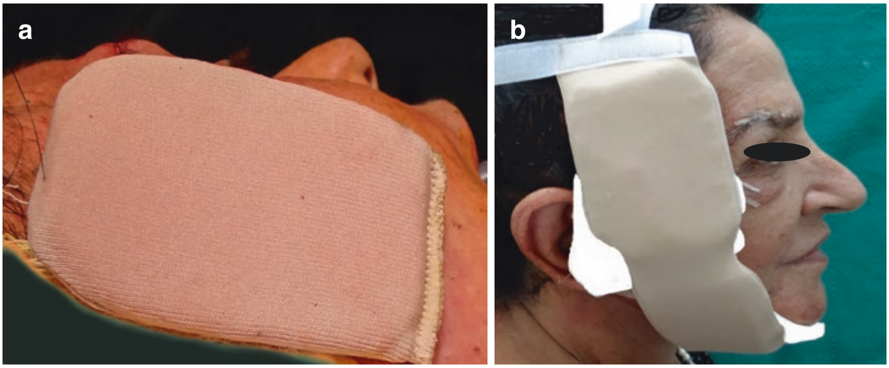

Fig. 40.6 Dressing application: (**a**) at the end of the operation in each side, a special pad dressing (POSTRAUM) is applied; (**b**) around the fourth day, the pad is replaced by a removable mask

Fig. 40.7 Dressing application: (**a**, **b**) removable mask (POSTRAUM) should be used for 1 month

- Large ecchymosis, 3 (hypertensive patients)
- Scar revision, 0

Skin suffering, 2 (small retroauricular skin suffering on one side in one extremely thin patient and another smoker (Fig. 40.8), which restitutio ad integrum in 3 weeks)

Hypertrophic scars, 2 (a small left retroauricular and another in the submento, with extension less than 2 cm and total remission with steroid infiltration in the second month).

Some skin depressions are expected in the first two postoperative months due to subdermal sutures.

The rate of complications is low, because there is meticulous planning, and all dead space is sealed with sutures and POSTRAUM dressing.

Fig. 40.8 (**a**, **b**) A 52-year-old heavy smoker woman presenting face and neck flaccidity with broken jawline and marionette grooves before surgery. (**c**, **d**) Ninth month after rhytidoplasty with the cut face lift technique

Over time the surgeon reads the patient's eyes and perceives the degree of satisfaction. Patient satisfaction has been good, but it is advisable to inform patients about the expected evolution, especially in the first months.

Figures 40.14 and 40.15 demonstrate the sequence over time, including 10 years postoperatively.

40.3 Discussion

The blunt dissection of the face and neck with Avelar's detacher [3, 6] proved to be efficient in avoiding the risk of facial nerve injury and excessive thinning of the flap [1, 4]. In addition, the procedure is practically free of bleeding. All care should be taken to avoid the deepening of the detacher, especially in angular areas such as the mandibular contour and the neck. In this way, the introduction of the detacher on vertical axe should be reserved to lobule and mastoid regions.

The realization of sutures in network has three purposes. The first is to reduce the tension in the suture margin, the second is to stabilize the position of the flap, and the third is to reduce the dead space [8].

The sutures in network are based in the natural and dynamic properties of the skin that lead to an expansion of the skin under the influence of the action of the muscles directly attached to the skin resulting in precocious sagging. The sutures in network fix the repositioned skin to the SMAS to reduce this expansion (Fig. 40.5).

In male patients with closed beard, the use of the Juarez detacher is more critical because it finds greater resistance and there is a risk of deepening.

Finally, at the end of the surgery, I replace the hemostatic network of Auersvald [2] with a stabilizing dressing named POSTRAUM. The use of POSTRAUM apparatus dressing (PAD) solved a great problem in surgical rejuvenation, that is, fixation of facial soft tissues. POSTRAUM is applied over the operated area at the end of operation in each side and is kept on site on an average of 4 days (Figs. 40.6a) when it is replaced by a removable mask. Immediately after the surgery, it acts as a bleeding contender during the Valsalva maneuver and when the patient awakes from anesthesia. In continuity, POSTRAUM acts as a homeostatic system reducing dead space, edema, and ecchymosis. No drain was used.

40.4 Conclusions

The goal of the face lift operation is to rejuvenate the face and neck to the limits of each age, without giving the patient the illusion of having the image of a young person through more aggressive procedures. Therefore, the goal of rejuvenation procedures is to leave a natural and harmonious look, with minimal evidence of surgical intervention (Figs. 40.8, 40.9, 40.10, 40.11, 40.12, 40.13, 40.14, 40.15, and 40.16).

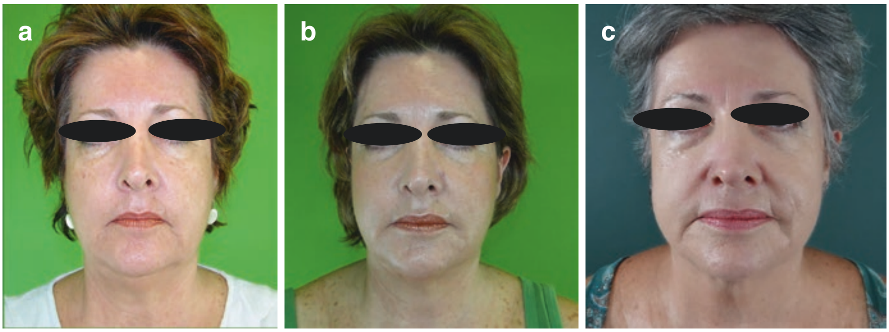

Fig. 40.9 This 56-year-old woman presented with midface ptosis, broken jawline, jowls, and lips atrophy. (**a**) One year (**b**) and 10 years (**c**) after rhytidoplasty with the cut face lift technique and fat grafting into the vermilion of the lips

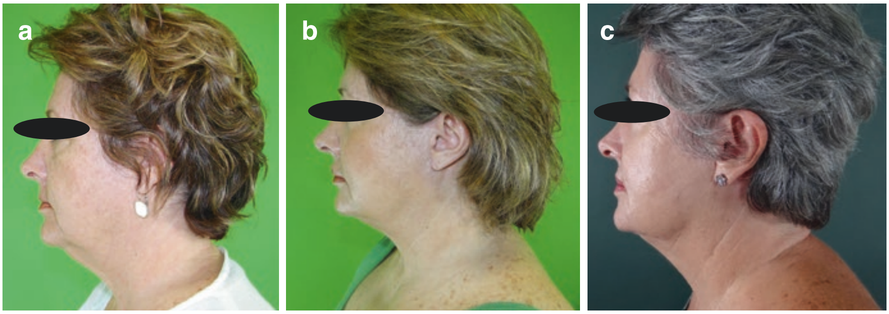

Fig. 40.10 The same 56-year-old woman presented Fig. 40.9 with midface ptosis, broken jawline, jowls, and lips atrophy. (**a**) One year (**b**) and 10 years (**c**) after rhytidoplasty with the cut face lift technique and fat grafting into the vermilion of the lips

Fig. 40.11 Preoperative view of a 63-year-old woman presenting ptotic and atrophic face (**a**, **c**). One year and a half after rhytidoplasty with the cut face lift technique with SMAS grafting into the inferior lid and upper lip, cutaneous resection above the lateral vermilion and submentoplasty to correct witch's chin (**b**,**d**)

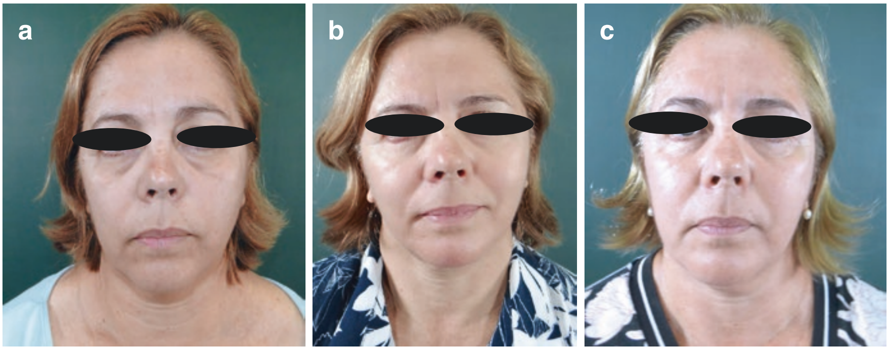

Fig. 40.12 A 53-year-old woman presenting facial and neck flaccidity (**a**); sixth month and fourth year after rhytidoplasty using the cut face lift technique (**b**, **c**)

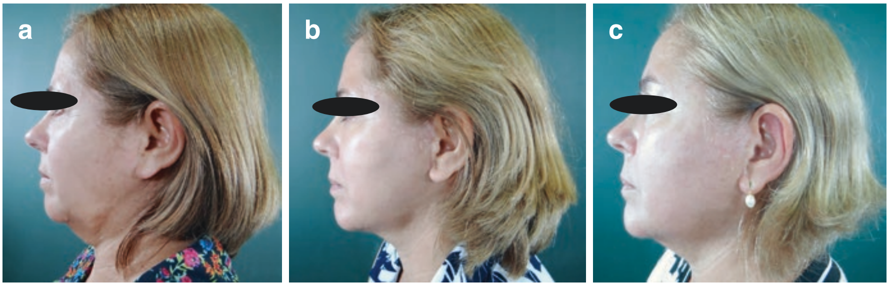

Fig. 40.13 The same 53-year-old woman of Fig. 40.12 before rhytidoplasty (**a**), sixth month (**b**) and fourth year (**c**) after rhytidoplasty using the cut face lift technique

Fig. 40.14 A 56-year-old patient with facial flaccidity and atrophic lips (**a**). Two years and a half (**b**) and fifth year (**c**) after rhytidoplasty with the cut face lift technique and SMAS grafting on vermilion of the upper and lower lips

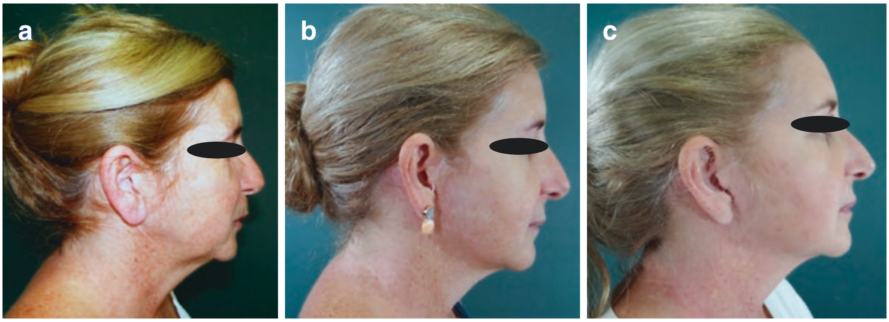

Fig. 40.15 The same 56-year-old patient of Fig. 40.14 with flaccidity and atrophic lips (**a**). Two years and a half (**b**) and fifth year (**c**) after rhytidoplasty with the cut face lift technique and SMAS grafting on vermilion of the upper and lower lips

Fig. 40.16 A 71-year-old patient presenting aging facial flaccidity and atrophy of the lips (**a**, **b**). Two years after rhytidoplasty with the cut face lift technique and fat grafting into the lips and mentum (**c**, **d**)

I think that the surgeon must rejuvenate the face and neck as a whole, avoiding segmental procedures. Furthermore, it should employ techniques that preserve the anatomic insertion of muscles and fascia. In this way, in all my cases, the use of Juarez detachers associated with the closed undermining technique preserved the vascular patency and without nerve damage.

Thus, I can state that the closed undermining technique (CUT FACE LIFT) with Avelar's detacher is a safe and objective procedure that, when associated with the sutures in network, promotes an upward and long-lasting movement of the flaps with natural rejuvenation of the face and neck.

40.5 Abstract

The essence of face and neck rejuvenation surgery is to mobilize the loose and ptotic tissue and direct it into a posterior and superior vector to secure it strongly to last for a long time. In this way, an anatomical and clean field is desired, and the tunnelization technique of Juarez offers this possibility. In association with Prof. Juarez technique, I adopted a closed undermining of the flap and skin flap fixation to the SMAS by making an interconnected network of sutures in order to reduce facial musculature action in the skin shift. In addition to stabilizing the skin flap, it prevents the formation of postoperative hematoma that is the most frequent complication of rhytidectomy.

Finally, at the end of the surgery, I replace the hemostatic network of Auersvald with a stabilizing dressing named POSTRAUM.

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Part V
Complementary Approaches During Rhytidoplasty

Chapter 41
Rhitidoplasty with Fat Grafting and Platelet-Rich Plasma on Every Face

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41.1 Introduction

Rhytidoplasty is thorough surgery that should have the incisions placed accurately. The great challenge in facial cosmetic surgery is proper treatment. Understanding the physiology of aging is a prerequisite for a good surgical approach, as well as the experience and good judgment of the surgeon [1].

This aging is complex and involves several structures, among them we can mention: all the bony structure of the face, muscular planes, ligamentous tissues, musculoaponeurotic, subcutaneous, and skin. Several factors influence this aging, such as the genetics of the individual, sun exposure, smoking, ionizing radiations, and so on [2].

The dermis undergoes significant thinning due to the degeneration of elastic fibers. The facial fatty tissue, however, undergoes several changes in its disposition over time, being atrophic and ptotic [3].

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41.2 SMAS Anatomy

An important anatomical structure called the cell membrane was already recognized before the nineteenth century. In 1859, Gray called it the subcutaneous superficial fascia. Mitz and Peyronie, residents of renowned French plastic surgeon Paul Tessier, described a subcutaneous superficial fascia that included the platysma musculature and fused to the outer surface of the parotid fascia. They called it the superficial musculoaponeurotic system (SMAS) [4].

The SMAS includes the platysma musculature in the neck and in the malar region. Previously, SMAS thinned and ended up covering the muscles of facial mime. Laterally, SMAS fuses to the parotid capsule. Superiorly, the SMAS terminates above the zygomatic arch, joining the temporal surface fascia. This structure is of paramount importance for performing the rhytidectomy [5].

41.3 Muscles of Facial Mimic

The facial mimetic muscles can be divided into superficial and deep. The superficial layer includes the major and minor zygomatic, the lift of the upper lip, the risorio, and the depressor of the oral angle, in contact with orbicular and oral oculi muscles. The deep layer is composed of the levator muscle of the oral angle, buccinator, depressor of the lower lip, and mentonian [6, 7].

41.4 Face Support Links

Facial fat and skin receive support from the muscular fascia, but the subcutaneous fat depends on the presence of osseocutaneous ligaments that cross the dermis toward the periosteum in certain areas. These ligaments are called sustaining ligaments.

The most prominent are the zygomatic, the parotid, the mandibular cutaneous, and the zygomaticocutaneous (malar membrane). Along the border of the mandible, there is a membrane called the mandibular septum that separates the fat from the central portion on the face of the cervical region [8].

41.5 Innervation and Areas of Danger

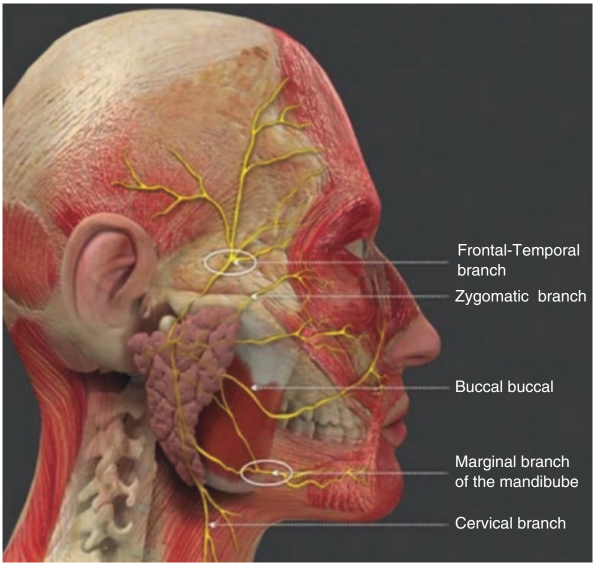
The facial nerve is the seventh cranial nerve. Its exteriorization occurs in the stylomastoid foramen. When it passes through the parotid gland, it separates, forming a division superior and inferior one, going to distribute itself in the muscles of the face.

In most individuals there is an arcade innervation that connects the upper and lower divisions of the facial nerve, representing a reserve capacity against neurological damage resulting from traumatic processes such as the surgical act.

On the other hand, the frontal branch of the superior division and the mandibular branch of the inferior division are terminal and without collateral innervation.

They are, therefore, more likely to suffer definitive neurological lesions. The sensory innervation of the central portion of the face and the auricular pavilion involves three nerves [9].

The auriculotemporal sends superficial branches to the pre-auricular portion. The large auricular, originating from the cervical plexus, innervates the lower portion of the auricle, and the smaller occipital innervates the upper portion of the ear.



It is very important to recognize the regions on the face with the greatest potential for neurological damage. They can be reached during surgical dissection and are known as danger zones.

The damage of the main branches of the facial nerve, especially when closer to the point of its exteriorization in the face, can cause serious facial deformity, sometimes irreversible. In certain situations, contracture and shortening of muscles may lead to permanent distortion of the facies, even if recovery of muscle function is achieved [10].

In turn, the interruption of sensory nerves can result in paresthesias and dysesthesias and even in permanent pain. Several techniques have been described over the years some have been abandoned, and others have evolved and been sedimented.

Evolution has brought us cervical lipectomies, surgeries on the platysma muscles, the aponeuthetic muscle system or deep structures, and the use of endoscopy and subperiosteal procedures.

When we schedule a rhytidoplasty, we must therefore think about how much skin we will remove, re-establish the volume of the fatty tissue that has been lost over the years, as well as improve the patients' skin quality. In view of these issues, we began, at the end of all ritidoplastias, the lipoenxertia with the inclusion of PRP (platelet-rich plasma) throughout the face, so that we could achieve a more harmonious and lasting result in our surgeries.

41.6 Methods

In the period from November 2017 to December 2018, ten patients, 100% female, were submitted to rhytidectomies at the Santa Casa de Misericórdia Hospital in Goiânia (Goiânia, Goiás).

In the intraoperative preparation for intra-pilose incision in the frontal and temporal regions, we perform the positioning of the hair in such a way that it does not act the necessity of its cut.

The marking of the incision positioned in the temporal region has a slight concave anterior to about 4–5 cm of the capillary implantation line and should reach the projection of the supercilioid groove.

As for pre-auricular marking we maintain the auricular contour not deforming the tragus or the auricular lobe, we follow the protrusions of the region and opt for the post-tragal incision.

The marking should accompany the ear lobe implantation line and then follow where it ascends in a slightly curved line over the ear shell returning to the skull toward the scalp in the region of the posterior auricular muscle almost at right angles.

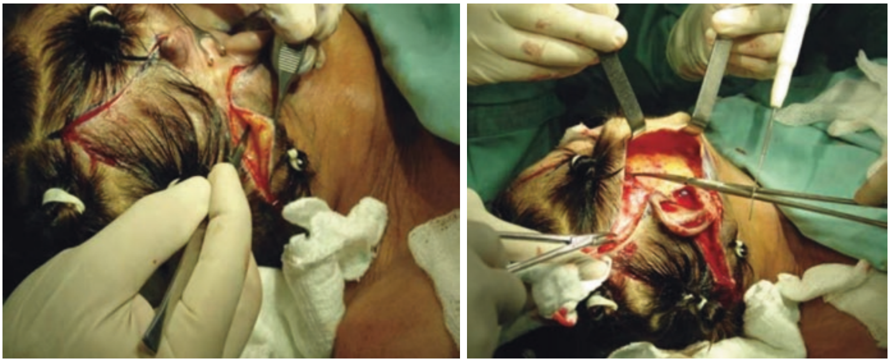
Next we mark the area that we want to take off. In the middle third, it distances 2–3 cm medially to the parotid. Inferiorly, it follows the mandibular contour to the anterior median line.

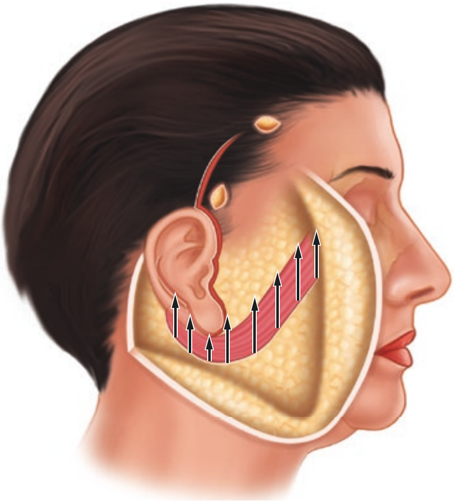
All patients underwent surgery under general anesthesia. The infiltration was performed with 0.5% lidocaine and 1: 200,000 epinephrine, in a total injected between 200 ml and 300 ml.

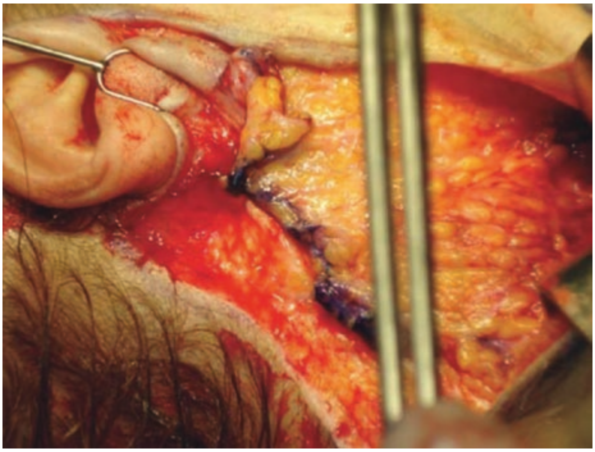
A transverse submental incision was performed, with a mean extension of 3 cm, followed by cutaneous cervical dissection within the previously demarcated limits. We begin the incision and continue with the subcutaneous dissection of the middle third of the face until the positioning of the hooks is allowed.

The dissection follows with metzenbaum scissors blunt-tip curve facing the deep plane to the previously demarcated area. It is important to remember that the more you walk to the median plane of the more superficial face, you will find the branch of the facial nerve.

After displacement the hemostasis is done with rigor, with electrocautery. The electrocoagulation process of the vessels in contact with SMAS should be rapid, avoiding that the facial nerve is reached.



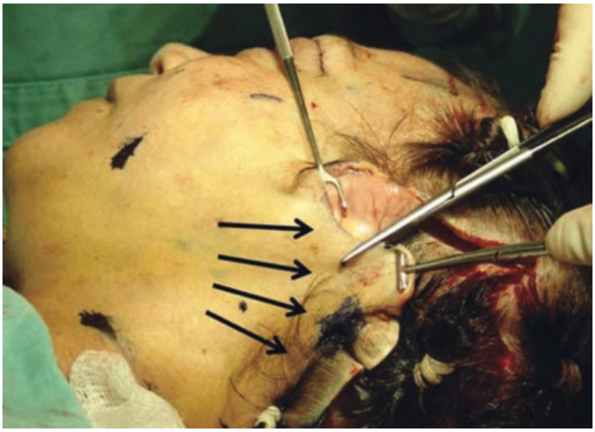




After termination of the dissection, the entire detached area is visualized, and hemostasis is reviewed. The plication of SMAS is performed by drawing two lines, one parallel to the zygomatic arch and the other parallel to the mandible. We made simple stitches with 3–0 nylon for SMAS repositioning.

The cervical region was tractioned obliquely, securing the SMAS under traction in the posterior region of the ear.

After all the dissection, hemostasis, and repositioning of tissues through the sutures, we close the skin. The suture of the skin of the region should be performed with 4–0 subdermal nylon stitches separated and, after intradermal suture, continues with 4–0 nylon.



41.6.1 Fat Graft and Platelet-Rich Plasma

After the end of the surgery and the sutures, we collected about 100 ml of fat in the infraumbilical region of the abdomen by the tumescent technique of liposuction. The removed fat was subjected to the centrifugation process for 3 minutes at 3000 RPMs. (Fig. 41.1).

We also collected 50 ml of patient's blood and subjected to centrifugation for 15 minutes at 2000 rpm to obtain PRP (platelet-rich plasma) (Fig. 41.2).

At the end of the whole process, we have at hand 20 ml of PRP and 100 ml of pure fat. We then mix and homogenize these two substances (Figs. 41.3 and 41.4).

The graft is performed with a 1.8 mm diameter microcannula, beginning with the frontal region, after subperiosteal detachment. Deglaze this, which is extended by the glabellar region to all nasal subcutaneous region. In the middle and lower thirds of the face, we performed the grafting in every subcutaneous plane.

In the malar and zygomatic arch region, a 10 ml graft is performed on each side in a supraperiosteal plane. We also performed grafting in regions of nasogenian sulcus, upper and lower lip, and chin region.

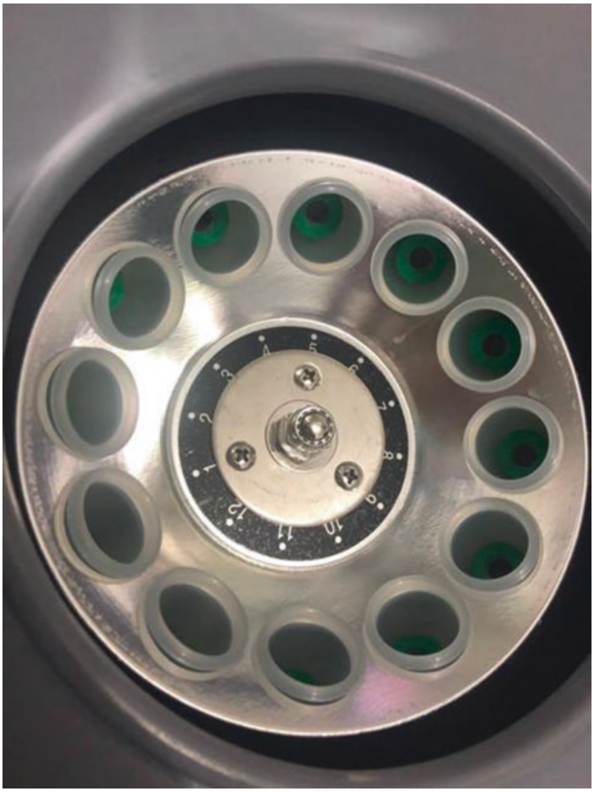


Fig. 41.1 Centrifuge

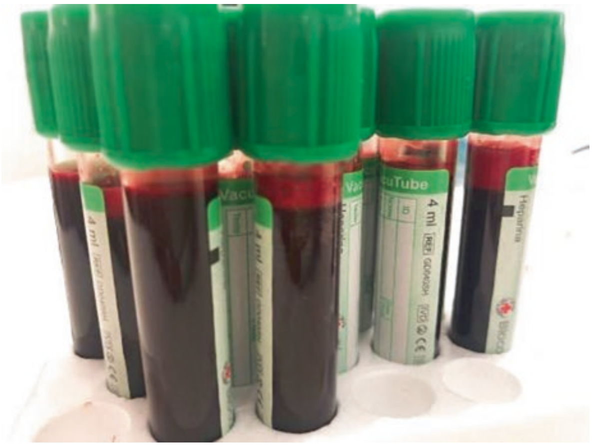


Fig. 41.2 50 ml of blood collected in vacuum tubes with heparin

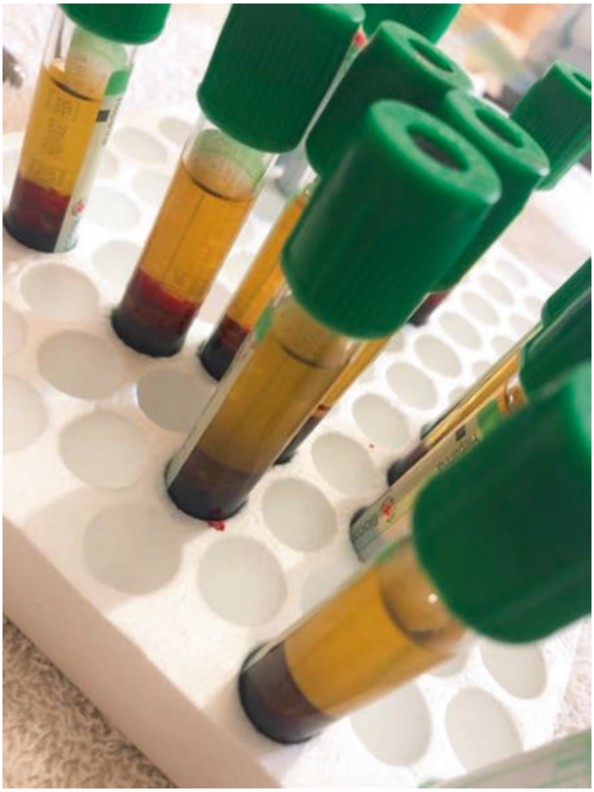


Fig. 41.3 PRP (platelet-rich plasma)

41.7 Complications

Regarding the complication rate, in one of the operated cases, a hematoma occurred in the face region. The treatment of this complication was performed with puncture and aspiration of hematological contents outpatient, with good satisfaction of the same.

The patient was also instructed to use warm water compresses and lymphatic drainage daily. There were no cases of retouching or reintervention in the patients studied.

41.8 Discussion

Before the evolution of plastic surgery, facial remodeling was traditionally performed through procedures associated with longer recovery time and high morbidity; this technical evolution provided us with several methods to correct, mitigate, or even eliminate defects that arise over time.

Fig. 41.4 Fat mixing with PRP

Rhytidoplasty began to require highly trained and experienced surgeons with deep knowledge of the anatomy of the face and with good judgment. Today we have several methods to perform this surgery. Technological evolution continues to progress day by day.

The accurate diagnosis in detailed and precise planning is as important as the surgical act. Both diagnosis and planning gain importance so the surgeon knows exactly what he can offer.

The use of lipoenxertia had its increase after liposuction was integrated into the arsenal of plastic surgery. In many ways, fat is the one we have closest to an ideal fill. It is readily available, is autologous, and, therefore, without causing an immune response, is safe and not carcinogenic. It can be easily obtained with minimal invasive procedures. Extensive comparative studies on the best donor area were performed without consensus, with the abdominal area being one of the most used.

The use of fat grafting on the entire face proved to be of great value for the recovery of facial volumetry, also improving the skin quality of all patients (Figs. 41.5, 41.6, and 41.7).

Fig. 41.5 Pre- and postoperative with interval of 4 months

Fig. 41.6 Pre- and postoperative with interval of 4 months

Fig. 41.7 Pre- and postoperative with interval of 4 months

41.9 Conclusion

The surgical technique used, with fat grafting and platelet-rich plasma on the whole face in the subcutaneous plane, promotes a substantial improvement in the quality of skin and volume of the whole face.

The aesthetic results showed good patient satisfaction and low complication rates. It is, therefore, another good option, quite reproducible and easy learning curve for the treatment of facial deformities caused by aging.

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Chapter 42
Rhytidoplasty with Fat Grafting

Luiz Toledo

42.1 Introduction

When I lived in Dubai from 2005 to 2020 my clientele changed. In my last year there 42% of my patients were locals from the UAE, 15% were from the UK, and the rest were from 105 different countries. This has forced me to adapt the techniques that I used before in Brazil to a new reality because each of these countries has their own concepts of beauty and we have to know exactly what our patients want before we treat them. Patients seeking facial rejuvenation are 65% of my practice. Patients between 31 and 40 years old are 33% of my clientele, from 41–50 years old are 21% of my clientele, 51–60 years old are 8%, and 61–80 years old are only 4% of my practice. 15% of my patients are male and 85% female. Rhytidoplasty with blepharoplasty takes about 18% of my practice either combining facelift with blepharoplasty, facelift alone, face and neck lift, and facelift with fat grafting. We start treating patients at a younger age, utilizing smaller noninvasive procedures, such as botulin injection, fillers, or fat grafting [1, 2]. Many patients need only a facial liposculpture to improve their looks, i.e., aspiration and injection of fat (Fig. 42.1a, b). This approach is very useful for men, who do not want the scars of the facelift (Fig. 42.2a, b, c). Once they reach an age when these procedures are not enough, and they have excess skin that has to be removed through a rhytidoplasty, they are used to medical procedures and not afraid of undergoing surgery.

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Fig. 42.1 (**a**, **b**): A 35-year-old patient before and 1 year after syringe liposculpture to aspirate excess fat from the submental area and injection into the chin and nasolabial folds. The patient also had barbed threads on her neck

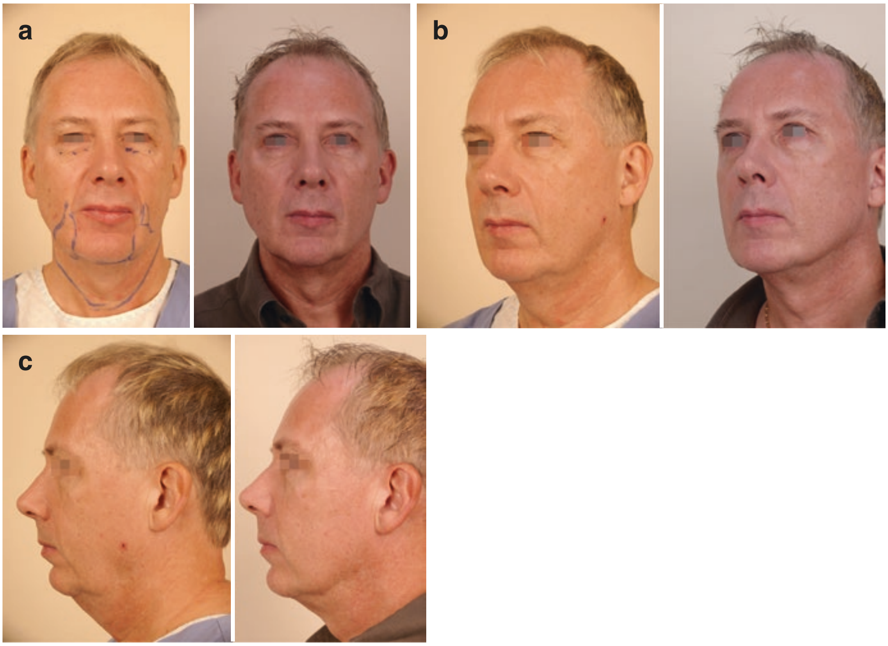

Fig. 42.2 (**a**, **b**, **c**): Facial liposculpture is very useful for men, who do not want the scars of the facelift. In this before and 1-year-after of this 46-year-old man, fat was aspirated from the neck and jowls and injected into the nasolabial folds and nasojugal folds

42.2 Method

Anesthesia: We combine general anesthesia with local anesthesia. The local anesthesia formula is 500 cc Ringer lactate, 20 ml lidocaine 2%, 5 ml of sodium bicarbonate, and 1 ml of adrenaline 1/1000. With this formula, we inject about 150 ml on

Fig. 42.3 We use 3 mm gauge cannulas to aspirate fat

the neck and submental area, and we aspirate the excess fat prior to doing the facelift incisions. We inject local anesthesia first in the neck and submental area and then on the rest of the face and occipital area. Since we use syringe liposuction, we aspirate the excess fat before we do the long incisions. We use 3 mm gauge cannulas (Fig. 42.3) to aspirate fat. We will inject the face and the occipital area with the same anesthesia formula to ease the dissection of these areas and avoid bleeding. We dissect the skin from the SMAS and the platysma [2].

Incisions: We inject the neck liposuction anesthesia through 3 mm incisions in the submental area and behind the earlobes. The choice of incisions for rhytidoplasty varies according to the sex and age of the patient and according to the problem areas. In the past, we used to combine the temporal incision together with the face and neck incision. About 15 years ago, I changed this technique, and I rarely perform a temporal incision. Most of my facelifts are with the preauricular incision around the sideburns, then, for women, mostly a retrotragal incision, then behind the ear and into the occipital area. Before opening the neck, I will perform, when needed, liposuction of the submental area and neck through three incisions, one submental and one behind each earlobe. The fat obtained through syringe liposuction can be used later for fat grafting. If it is not enough, we can aspirate more fat from the abdomen or flanks.

In the last 5 years, I have started using for temporal area a Serdev Suture [3], a braided polyamide thread, which is passed utilizing a Reverdin needle, without any incisions in the temporal area (Fig. 42.4a, b, c). We anchor this suture to the periosteum of the temporal area and then pass it between four different points and elevate the midface area and the mandible line with this suture. This is a simple technique and long-lasting technique, and it gives a nice elevation of the malar area and the temporal area. The sideburns stay in place. To perform the suture in front of the hairline, we bevel the scalpel at 45 degrees as prescribed by Andre Camirand [4], so that we can allow the hair follicles to grow into the skin, hiding the scar in this region (Fig. 42.5a, b, c). Then we follow the scar in the border of the tragus and then around the earlobe behind the ear and go into the occipital area. I prefer the retrotragal incision for women because it is the less apparent. However, it has to be done

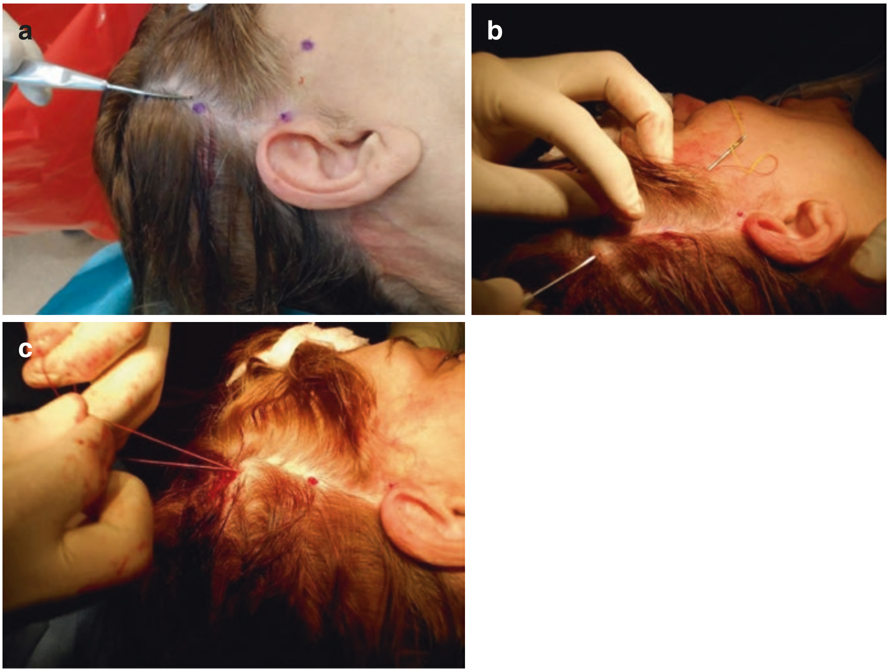

Fig. 42.4 (**a**, **b**, **c**): In the temporal area, I use a braided polyamide thread suture 1, which is passed utilizing a Reverdin needle, without any incisions in the temporal area. We anchor this suture to the periosteum of the temporal area and then pass it between four different points to elevate the midface

properly to avoid distortion of the tragus and an exposed ear canal (Fig. 42.6a, b, c, d, e, f). The skin that will cover the tragus is usually thicker than the normal skin of the tragus so we have to thin it with either No.15 blade or with scissors. Then we create a small depression in front of the tragus and suture this skin with a 6.0 nylon, so that the tragus does not seem flat in front of the ear, looking more natural.

I like to place the occipital incision perpendicular to the retroauricular incision Fig. 42.7. The retroauricular incision is designed 8 mm over the concha to avoid its displacement. Instead of following the hairline, it goes inside the hair in the occipital area. I think this is a good way of hiding the scar so patients can wear their hair up.

I operate on many patients for the second, third, or fourth time. These cases are more difficult, and we have to follow their pre-existing scars, most of the time (Fig. 42.8).

Dissection: We start the skin dissection with #15 blade and continue with Metzenbaum scissors exposing the SMAS and platysma area (Fig. 42.9). Hemostasis is performed with electrocautery. I perform limited dissection on the SMAS/platysma area, and when necessary I will combine the neck dissection with liposuction of the excess fat of the neck. I have been doing mostly plication of SMAS and platysma instead of dissection. I will use Vicryl 2.0 in a vertical vector to plicate SMAS

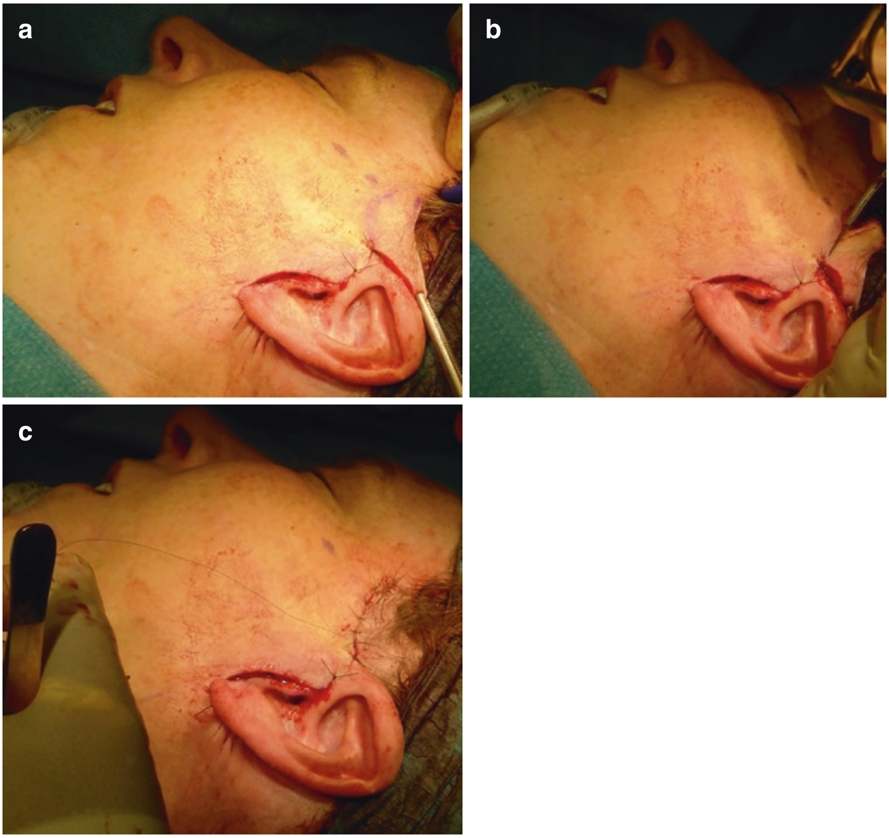

Fig. 42.5 (**a**, **b**, **c**): The incision around the sideburns avoids its disappearance and consequent stretched look for the patient. The best incision is a beveled incision at 45 degrees, thus allowing the hair follicles to grow in front of the new scar hiding it

and suturing the cervical mental angle horizontally pulling it back to the mastoid area, so that we can have a long-term rejuvenation of the neck. After hemostasis, we will measure and remove the excess skin. An important point in this area is the treatment of the tragus because there should be no tension in there. To treat the earlobe (Fig. 42.10), we should just release it and leave it loose, without suturing it to the skin, to avoid stretching the earlobe, which is one of the telltales of a bad rhytidoplasty.

Suture: We plicate the SMAS/platysma with Vicryl 2–0 or Quill barbed suture 2–0. Skin sutures are done intradermally with Monocryl 4.0 or with separate stitches of Nylon 4.0, to be removed after a week. If we use Nylon, the preauricular suture is done with Nylon 6.0. I rarely use drains.

Fat grafting: One of the problems of the old-style facelift would be that the skin would look stretched but not rejuvenated, because the face loses volume with aging, and this volume must be replaced. For this, we combine fat grafting with the

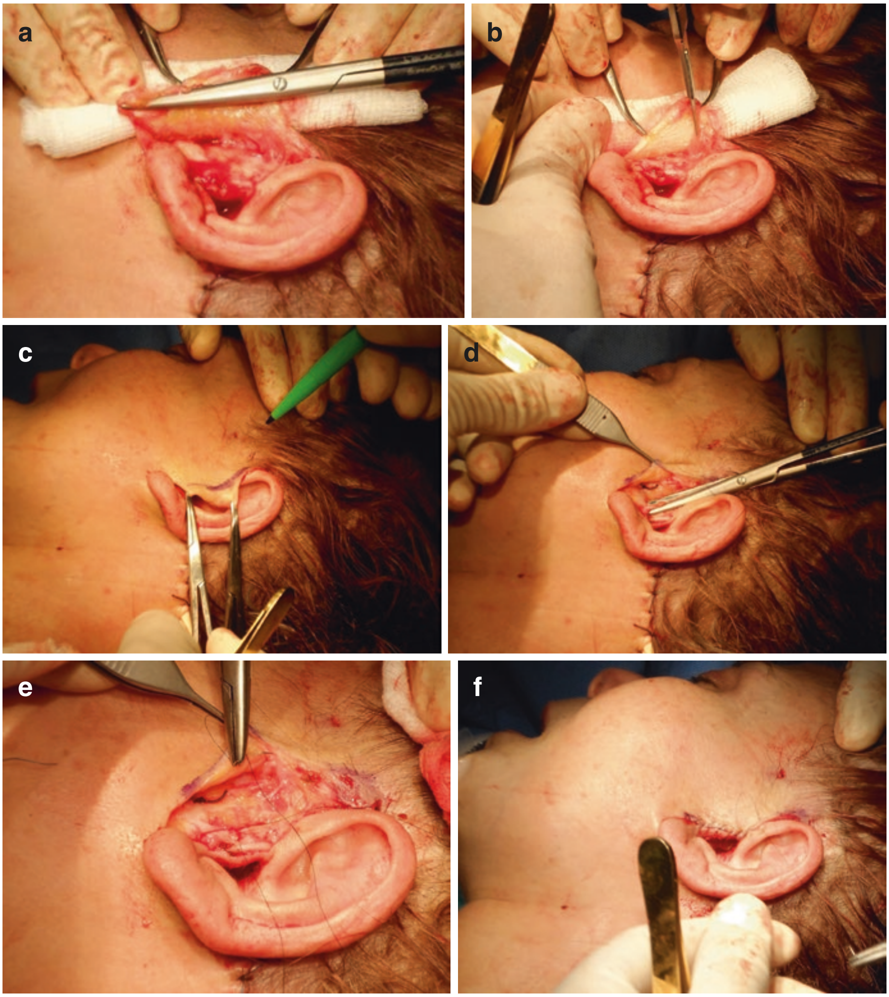

Fig. 42.6 (**a**–**f**): The skin that will cover the tragus will be thinned with scissors or blade (**a** and **b**). We remove the excess skin without tension (**c**). We carve a small depression in the pretragal area (**d**), and a 6–0 Nylon suture is placed there to give a curve to the tragus (**e**). After the final suture with Nylon 6–0 (**f**)

rhytidoplasty. We inject fat in the periorbital area, in the malar zygomatic area, in nasolabial folds, and especially in the perioral area, lips and chin. Without fat grafting we can't obtain a good rejuvenation of this area.

The usual amounts of fat injection are in the zygomatic malar area; I will inject about 3 to 5 cc of fat each side, in the nasojugal area about 1 cc of fat per side, in the lips probably 2–3 cc of fat into each lip, and 3–5 cc on the chin. A more refined fat grafting, passed through smaller transfers, is used to accentuate the Cupid's bow

Fig. 42.7 The occipital incision is perpendicular to the retroauricular incision. The retroauricular incision is designed 8 mm over the concha to avoid its displacement

Fig. 42.8 A patient's fifth facelift 5 days postoperative. We followed the pre-existing incisions. Suture was intradermal with Monocryl 4–0

and philtrum. Another possibility is injection of 3 to 5 ml of fat into each mandible angle to redefine this angle when necessary (Fig. 42.11a-f).

Treatment of the sad mouth: Usually it is difficult to elevate the corners of the mouth, and we see patients who had facelift, without treating to mouth. We combine two different techniques to treat this. First, we remove a triangle of skin from the corners of the upper lip (Fig. 42.12), and through this incision we section the *depressor anguli oris* muscle (Fig. 42.13, a, b) and suture its cephalic part to the

Fig. 42.9 I perform plication of SMAS and platysma instead of dissection. I use Vicryl 2.0 in a vertical vector to plicate SMAS and suturing the cervical mental angle horizontally pulling it to the mastoid area

Fig. 42.10 After pulling the excess skin over the ear, we have to free the earlobe. The best way to do this is to aim the scissor to the chin and slowly divide the skin excess, until the earlobe is free without need for suturing. If this incision is too long, the earlobe will look stretched, one of the signs of bad surgery

zygomaticus major muscle. The result is very rejuvenating and complements the facelift (Fig. 42.14 a, b).

Results: Since my practice consists of patients of different backgrounds, it is necessary to adapt each technique to the needs and wishes of each patient. We do not have one technique that fits all. For every patient we have to tailor different approaches. Here are some examples of different patients (Figs. 42.15, 42.16, 42.17, 42.18, 42.19, 42.20, and 42.21).

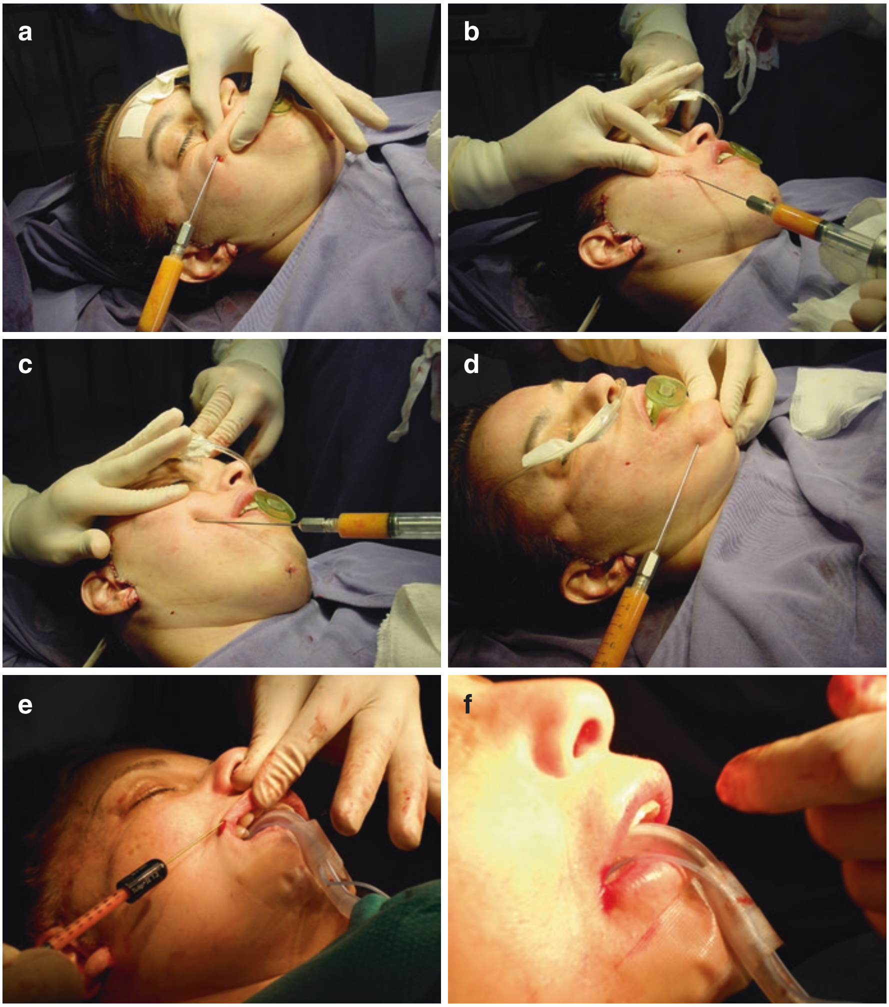

Fig. 42.11 (**a**, **b**, **c**, **d**, **e**, **f**): Fat injection is always a complement to the facelift. Fat is injected perpendicular and parallel to the nasolabial folds (**a**), in the malar and zygomatic areas, protecting the eye from the blunt needle (**b**, **c**), into the chin (**d**), and lips and perioral area (**e**, **f**)

42.2.1 Complications

The most common immediate complication of rhytidoplasty is hematoma. Hematomas can be drained, but most times, it is necessary to reopen sutures and catch the bleeders. Sometimes it is easy to find the bleeding vessel, sometimes very difficult. When there is too much fat reabsorption, we treat it with a second or third fat grafting after 3 to 6 months [5, 6]. Hypertrophic scars have to undergo scar revision. Complications that are more serious would be temporary paresthesia of the

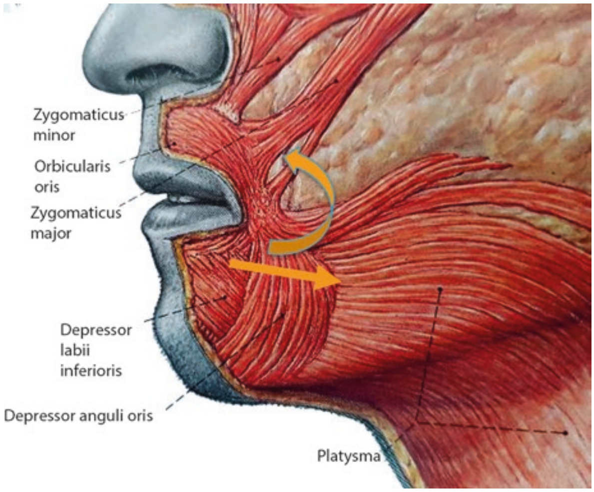

Fig. 42.12 Anatomy of the muscles of the mouth

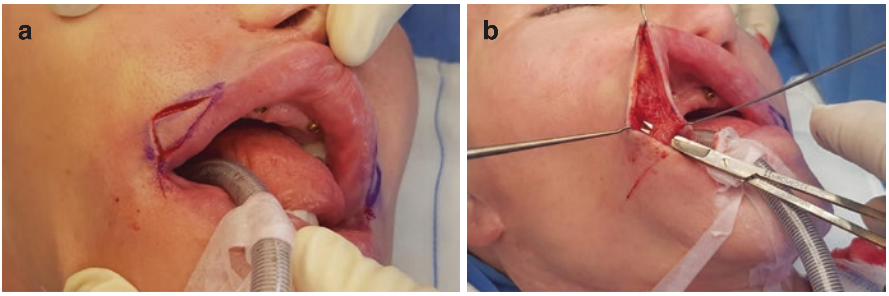

Fig. 42.13 (**a**): We resect a skin tringle above the corners of the upper lip (**b**): We transect the *depressor oris* muscle and suture its cephalic part to the *zygomaticus major* muscle

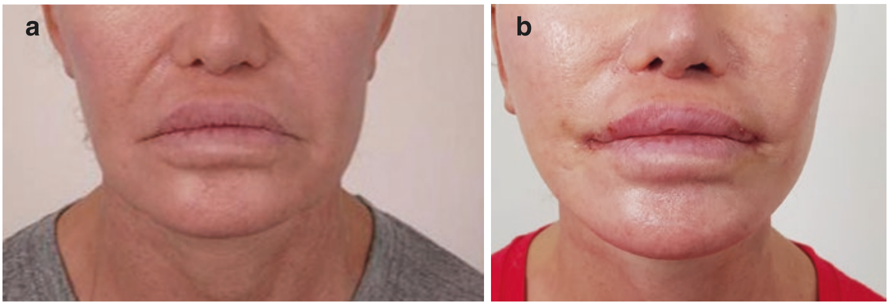

Fig. 42.14 (**a**, **b**): The result was very pleasing. We eliminate the patient's sad mouth, complementing the result of the facelift

Fig. 42.15 Before and 4-year postop of rhytidoplasty and blepharoplasty on a Serbian patient

Fig 42.16 (**a**, **b**): Before and 1-year postoperative of rhytidoplasty with fat grafting of nasolabial, malar, and nasojugal areas in an Iranian male patient. Notice the improvement on the skin quality due to fat grafting and the nasojugal fold smoothness

Fig. 42.17 (**a**, **b**, **c**, **d**): Before and 1 year after rhytidoplasty with fat grafting on a British patient. Notice the improvement on the perioral and lips areas, impossible to obtain without fat grafting

Fig. 42.18 Before and 6-month postop of rhytidoplasty with extensive submental and neck liposuction on a 42-year-old Saudi patient

Fig. 42.19 Before and 1-year postop of rhytidoplasty with fat grafting on a 52-year-old Sudanese patient

Fig. 42.20 Before and 1 year after rhytidoplasty on a 62-year-old German patient

Fig. 42.21 Before and 11 days, 3 years, and 7 years postoperative on a 50-year-old American patient. The last picture was when she came at 57 for a secondary facelift. We can compare the flatness of her face in the pre-op with the more attractive postoperative photo 7 years later. Volume lost was replaced with fat grafting

mental nerve, which can happen after liposuction of neck and submental area. Fortunately 99% of the time, the paresthesia is temporary and will resolve after 2 months. Another serious complication can be a parotid fistula that could happen during the dissection; I have had only two cases, and that complication involves a lot of hand holding with the patient for the first 2 to 3 weeks, until it stops leaking saliva when the patient sees food.

42.3 Summary/Conclusions

Rhytidoplasty has changed in the recent years when we realized that stretching the skin was not a solution for a patient to look younger. The patient will only look stretched. The ideal technique is a combination of removal of excess skin and reposition of fat that was absorbed or displaced with time. Although there is not one technique that fits all, our favored method is a combination of excess skin removal, plication of SMAS and platysma, and fat grafting. It is a simple method and a quick procedure that takes between 2 and 2.5 hours, and it can be very satisfying to the patient.

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Chapter 43
Cervicofacial Laxity Reduction with Thermotherapy with Diode Laser (λ = 975)

Moisés Wolfenson and Fernando Cerqueira Norberto dos Santos Filho

43.1 Introduction

Knowledge of the pathophysiology of skin flaccidity shows that despite the various theories, there is no consensus regarding the etiology of anatomical changes. Several factors contribute to this occurrence: smoking, sedentary lifestyle, pregnancy, hormonal disorders, obesity, and overexposure to the sun, among others [1]. Skin aging, almost always associated with sagging, is directly related to chronic and uncontrolled sun exposure [2].

However, it is important to remember that laser photothermal radiation in the hypodermis causes a retraction in the superficial and deep planes of the skin, by heating the fibrous septa, reducing bleeding in the area treated by cauterization of small vessels [3].

Histological studies in patients who were treated with laser to reduce flaccidity showed positive effects, such as coagulation of small vessels of adipose tissue, reorganization of the reticular dermis, and coagulation of the collagen of the subcutaneous tissue [5].

43.2 Objectives

To evaluate the photothermal laser therapy by using a diode laser with λ = 975 nm in the skin flaccidity of the face and cervical region

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43.3 Methods

43.3.1 Study Design

The research is a clinical trial, interventional, prospective, monoblind and self-controlled, single-center study.

43.3.2 Casuistic

43.3.3 The population was composed of patients with cervicofacial flaccidity who, in order to rejuvenate, sought the outpatient surgery of the Clinical Hospital of the Federal University of Pernambuco (UFPE), in Recife, between June 2013 and February 2018, and who met the criteria of eligibility for the study.

43.3.4 Ethical Aspects

The study design was approved by the Research Ethics Committee of the Federal University of São Paulo, Escola Paulista de Medicina (Unifesp. No. 436,441).

43.3.5 Inclusion Criteria

The inclusion criteria were sagging in the middle and lower regions of the face and in the cervical and submental regions in patients aged between 45 and 65 years, of both genders, with body mass index (BMI) between 18.0 and 30.0 kg/m^2.

43.3.6 Sampling (Sample Size)

Sampling was for convenience because of the procedure requiring diode laser apparatus, equipment available in the public hospital surgery service, for a limited period of time, which made the procedure viable to low-income patients.

The size of the series was defined by the total number of patients who met the eligibility criteria, who attended the UFPE surgery service, from June 2013 to

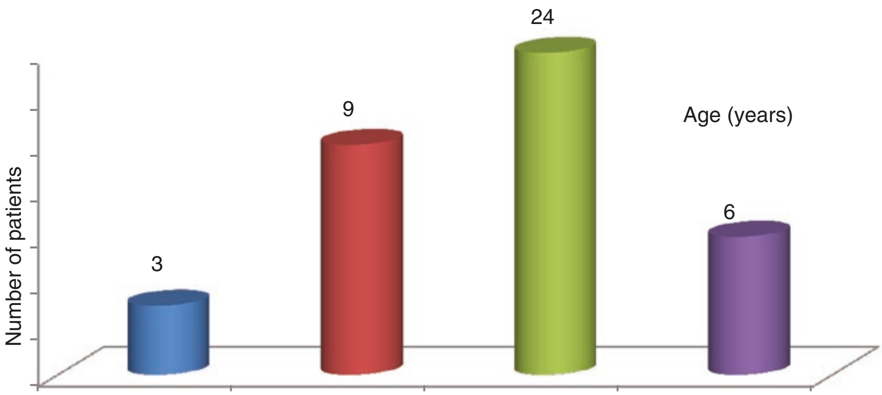

Fig. 43.1 Age distribution of patients

February 2018, when the device was available for the study, resulting in 142 patients. The mean age was 53.4 years. A higher frequency of patients between the ages of 56 and 60 years was identified, with a BMI between 18.5 and 25.1 kg/m^2 (Fig. 43.1a). The white color was present in 54.7% of the sample.

43.3.7 Direct Verification of Cervicofacial Lines

To obtain the dimensions, direct measurements of four cervicofacial lines were performed on both sides of the face, identified by the abbreviations L1 to L4 (Fig. 43.2).

The L1 line was defined in the middle third of the face, joining the labial commissure to the ipsilateral eyelid commissure. The L2 line was positioned in the lower third of the face, starting from the central point of the mentum region (mental protuberance) until the insertion of the earlobe. The L3 line was defined in the anterior cervical region and joins the hyoid bone to the mental protuberance. Finally, the L4 line was positioned in the lateral cervical region, connecting the body of the hyoid bone to the insertion of the earlobe (Fig. 43.2).

Based on the direct measures of facial lines, the areas of the regions to be submitted to laser thermotherapy were determined, since the maximum accumulated energies depend on the facial region to be treated [7].

Figure 43.3 shows the facial regions, identified by the letters A through D, and their anatomical relationship with cervicofacial lines and local innervation (designated by numbers 1 to 5). It is observed that region D maintains contiguity with the auricular nerve (identified by number 1); region C is contiguous to the mental nerve (number 5); region A is close to the path of the zygomatic branches of the facial nerve; and finally, region B is related to the mandibular branch of the facial nerve (number 3)

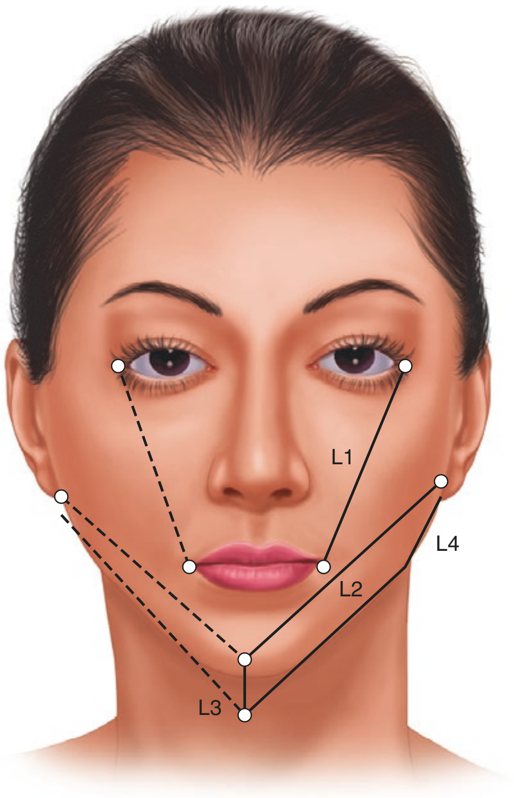

Fig. 43.2 Positioning diagram of cervicofacial lines

Areas (A, C, and D) for the application of the laser in safety for the absence of innervation

43.3.8 Treatment with Photothermal Laser Diode λ 975

Treatment was performed in a single session using diode laser with λ = 975 nm (SlimLipo®, Palomar Medical Technologies, Burlington, MA), licensed in the United States of America by the US Food and Drug Administration (FDA) and in Brazil by the National Sanitary Surveillance Agency (Fig. 43.4).

In a surgical setting, the patients were submitted to sedation with intravenous midazolam (Dormonid®; Roche, Rio de Janeiro, Brazil) at a concentration of 5 mg/mL at a dose of 5 mg per patient. After antisepsis with chlorhexidine, the regions identified to be submitted to laser thermotherapy, based on the measurements of the cervicofacial lines, areas of 10 and 50 cm^2, in a total of 60 cm^2, were marked on the skin on each side of the face with bright color (Fig. 43.5).

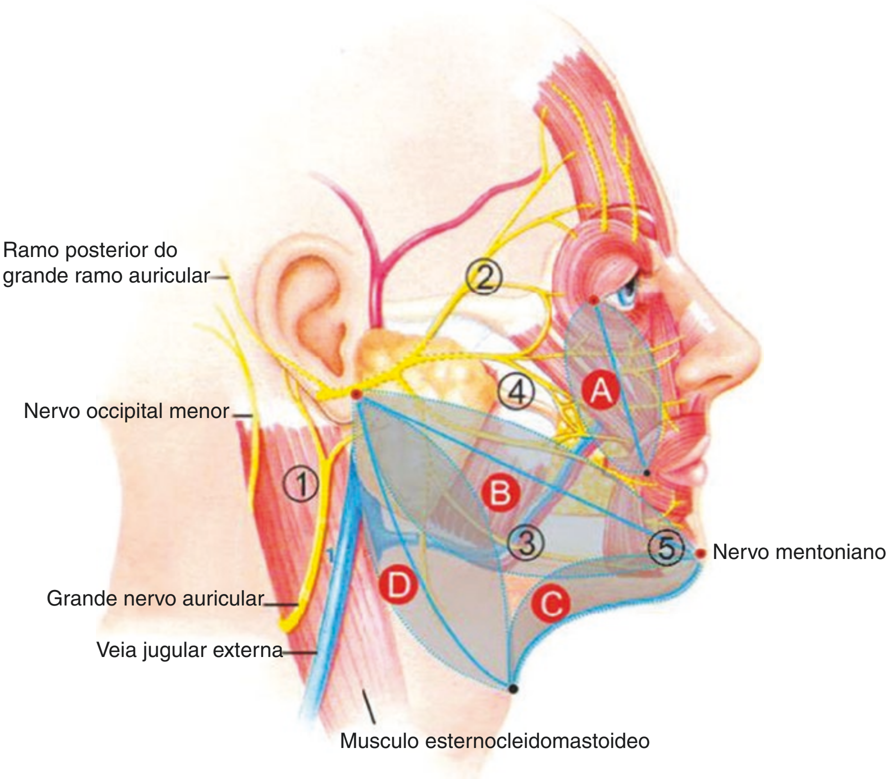

Fig. 43.3 Areas corresponding to the four cervicofacial regions for laser application. Caption: The numbers show the points with risk of injury to the branches of the facial nerve: (1) auricular, (2) temporal, (3) mandibular marginal, (4) zygomatic branch, and (5) mental nerve. Areas A, B, C, and D, with anatomical relation with lines L1, 2, 3, and 4 and local innervation. They correspond to the four regions for the application of the laser safely: region A, the free region of the zygomatic branches of the facial nerve; region B, maintains relation with the mandibular branch of the facial nerve; region C, the free region of the mental nerve; and region D, the free region of the auricular nerve (Source: Seckel [8])

A 100 ml solution containing 10 ml of 1% lidocaine diluted in 90 ml of 0.9% saline solution at 4 °C was infiltrated on each side of the face.

Before the laser procedure, with the aid of a True Core® needle, biopsies were performed in different demarcated and anesthetized areas in 15 patients.

A punctate hole was made on the skin with a 40 × 12 G (1.20 × 40 mm) hypodermic needle. The laser tip was inserted into the skin by this pertute. A 1.5-mm-diameter cannula and two different length tips (80 and 180 mm) were used, allowing treatment of small areas on the face and mid-neck areas (Fig. 43.6).

The patients were evaluated at 24 hours, 15 days, and 90 days after the procedure for possible complications, such as ecchymosis, erythema, bleeding, and necrosis, and the data were recorded in the medical records.

Fig. 43.4 Diode laser with double wavelength λ = 975 nm and λ = 924 nm can be used alone, with Platform and Tip. Platform Overview (ASPIRE), with 40 W and display. And detail of the tip, top of the laser (SlimLipo), in the hand: tip (Tip) 1.5 mm thick and 7 cm long, pen (blue) and optical fiber that attaches to the platform. (Source: Palomar Medical Technologies Burlington, MA)

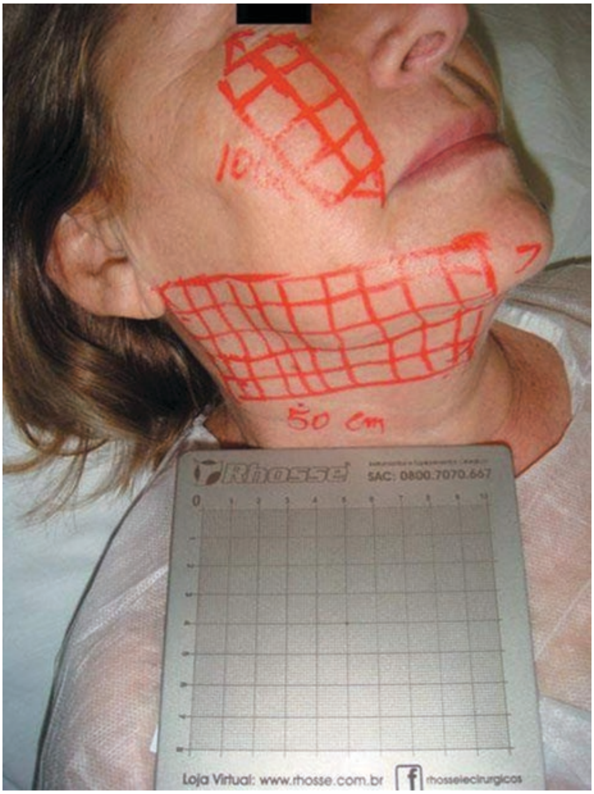

Fig. 43.5 Marking on the face and neck in areas of 5 × 2 cm and 10 × 5 cm = 60 cm^2. Below, ruler plate for comparison of marked areas, sized 80 cm^2

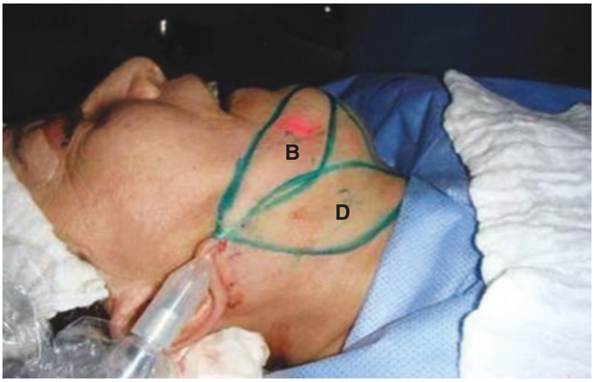

Fig. 43.6 Prioritized markings B and D: Patient sedated with two areas demarcated with dye. Area demarcation (B), laser energy of diode (mandibular), and area (D)

For the statistical analysis of the direct cervicofacial measurements, the data were organized in a spreadsheet with the program Excel for Windows® and analyzed with the program Statistical Package for Social Sciences (SPSS®), version 21.0. The variables at the nominal or ordinal level were presented as absolute and relative frequency distributions. The dependent variables, expressed in reasons scale, were presented as statistical measures.

The summary of the descriptive statistics (mean and standard error of the mean or median and interquartile range, depending on whether the distribution was normal or not). To analyze the differences in measurements, the Wilcoxon test was used for paired samples. The level of significance adopted for this statistical test was 5% ($p < 0.05$) for rejection of the null hypothesis of absence of alterations between the three evaluations.

The data obtained for the morphometry were organized using the Microsoft® Office Excel 15.0 (2013) program and analyzed statistically by the paired Student's t-test with a significance level of 5% ($p < 0.05$) with the program GraphPad Prism® 3.0, since each patient was their control.

43.4 Results

43.4.1 Difference of Lengths of Cervicofacial Lines

Determining the differences in the length of the cervicofacial lines between the three measurements showed a greater retraction of all the lines after 24 hours as well as after 90 days of the procedure, compared to those preceding the procedure, and the differences between the initial 90 days were significant. However, when the cervicofacial measurements were compared after 90 days of the procedure and after 24 hours of the procedure, it was found that in L3 and L4 lines, there was a loss of statistical significance due to the expansion of the lines, which was better evidenced in Fig. 43.7.

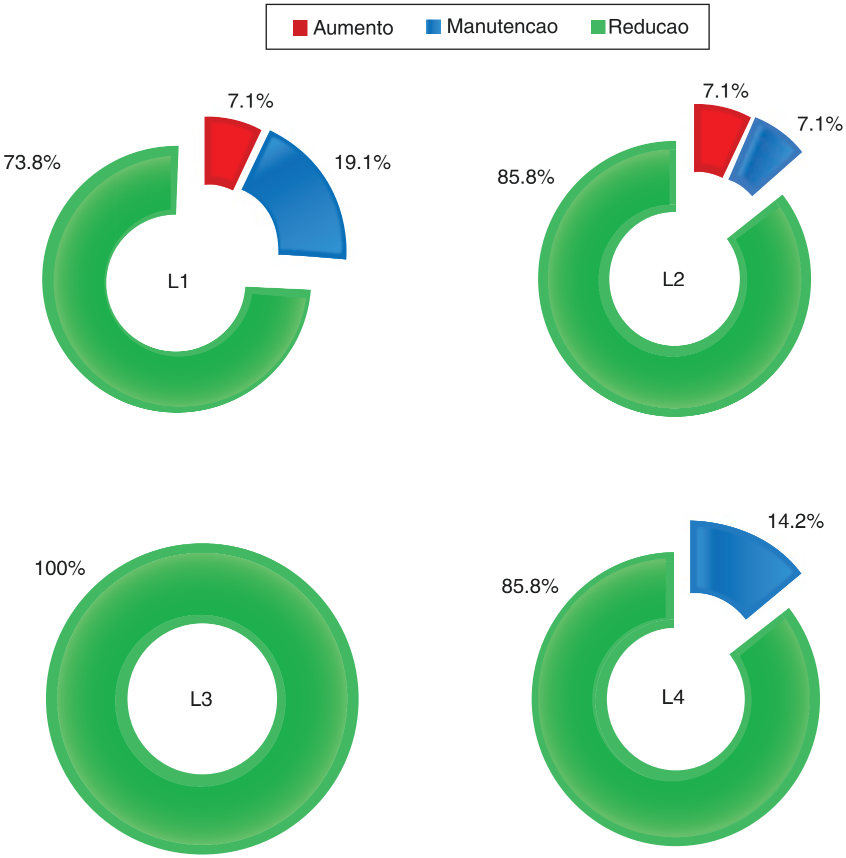

Fig. 43.7 Results of subtractions between the means of cervicofacial line lengths measured at moments before and after 90 days of treatment Caption: The green color represents the reduction percentages of the four lines. The blue color indicates that there were no changes, and the red color represents an increase of the cervicofacial lines. The L3 line had a 100% reduction

43.4.2 Morphometric Analysis

With regard to the histopathological analysis of the skin, in the dermis, the alteration promoted by the laser thermotherapy presented as an intense pattern of arrangement of the collagen fibers. Before the laser thermotherapy, a pattern of discontinuous and small collagen fibers with dermal spaces was observed due to the less diffusion of collagen (Fig. 43.8a). In the 90-day post-laser thermotherapy, the quantitative arrangement presented a pattern of long and compacted collagen fibers (Fig. 43.8b).

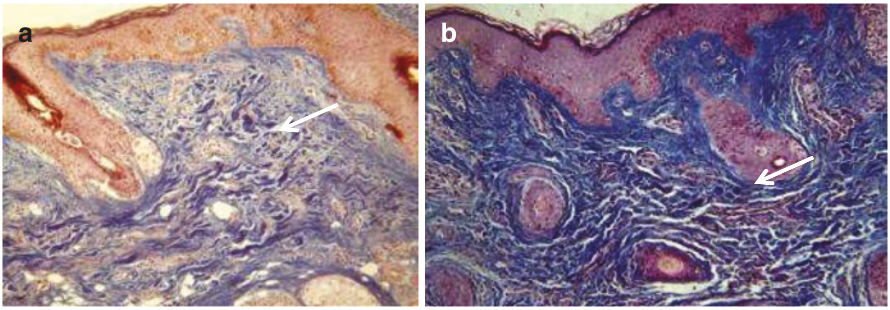

Fig. 43.8 Photomicrographs of the skin, blue color of Masson's trichrome with a 200× magnification, before laser treatment (pre-laser), left arrow indicating area of low collagen with small staple fibers and laser, on the right, arrow indicating fibers of long and compact collagens due to the greater production of collagen

Table 43.1 Complications

Complications	Frequency	%
Seroma	0	0
Hematoma	0	0
Infection	0	0
Edema	1/42	2.4
Erythema	25/42	59.6
Early complication +	26/42	62%
Early complication –	16/42	38%

43.4.3 Complications

There were no cases of hematomas, secondary anemia due to bleeding, or tissue necrosis resulting from the procedure. Small changes occurred in two patients, represented by edema and erythema that persisted for up to 3 months (Table 43.1).

Complications were reduced with 0.9% saline infiltration with 1% lidocaine at 4 °C and classified as early and late. In 25 (59.52%) patients, erythema disappeared and disappeared at 30 days (Table 43.1). As a late complication, in one patient, hyperchromias were observed in the treated areas, which were resolved with 15% glycolic acid as depigmenting agent.

In Table 43.1, the frequencies of early complications (disappear within 90 days) are presented.

43.4.4 Photograph of Areas with Flaccidity

Photographic examples of results obtained with laser treatment, correcting face and neck deformities, are shown in Figs. 43.9, 43.10, 43.11, and 43.12.

Fig. 43.9 Pre- and post-laser diode treatment (λ = 975) of 90 days, same patient of profile and front, in a 54-year-old patient

43.5 Discussion

The diode laser with a wavelength (λ) of 975 nm acts predominantly in the dermis, promoting the heating by its thermal effect [7]. Acting with specificity, as already pointed out, this type of laser eliminates most of the risks associated with its use [4].

In the present study, the temperature control with digital thermometer did not exceed 32 °C, in an area infiltrated with 0.9% physiological solution at 4 °C. The

Fig. 43.10 Pre- and post-laser diode treatment (λ = 975) of 90 days in the front and 3/4 patient profile, in a 49-year-old patient

Fig. 43.11 Pre- and post-laser diode treatment ($\lambda = 975$) of 90 days in a 63-year-old patient

energy emitted by the laser, monitored by a digital thermometer, extra- and intradermally, causes dermal heating, contracting the skin and stimulating collagenesis, as described [5, 9] and identified in several studies by Wolfenson et al. [6, 7, 10]. With the use of a diode laser ($\lambda = 975$ nm), compliance with the parameter 3000 J/100 cm^2, recommended since its approval by the FDA, in October 2006, is directly involved in the safety of skin flaccid treatment [10]. In the study, the application of laser prioritized the anatomic distribution of cervicofacial regions: A, B, C, and D, although contiguous to branches of the facial nerve [8] do not offer an increased risk of thermal damage, as long as the laser tip is not used near the auricular, temporal, and zygomatic branches of the facial nerve. Near the mandibular branch (treatment area B, risk region 3), the accumulated energy is reduced to 1 kJ/100 cm^2, with the power of the laser of 4 W and cutaneous and subcutaneous temperatures of 32 °C [7].

43.6 Conclusions

Photothermal laser therapy using a diode laser with $\lambda = 975$ nm promotes skin retraction and reduces sagging.

Fig. 43.12 Pre- and post-laser diode treatment (λ = 975) of 90 days in a 52-year-old patient

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Chapter 44
Bichectomy: An Alternative for Facial Harmonization

Edith Kawano Horibe and Kose Horibe

Electronic Supplementary Material The online version of this chapter (https://doi.org/10.1007/978-3-030-57973-9_44) contains supplementary material, which is available to authorized users.

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44.1 Introduction

There are many scholars who, to this day, try to find a way to standardize the concept of beauty, using and creating parameters for it. It is known, however, that human standards for the definition of beauty are influenced by cultural, geographical, and temporal forces.

Facial harmonization by bichectomy depends mainly on its precise indication and technical ability, although it is a simple procedure. In summary, it consists of the partial removal of Bichat's fat pad. The face evaluation method known as Phi mask is very useful in surgical planning, although this geometric measurement does not fully reflect on facial beauty.

The main purpose of bichectomy is the search for facial beauty and harmony. It is also very important in the occurrence of a "bite" of the buccal mucosa during chewing.

The mask developed by Marquardt [9] became known worldwide and is based on mathematical sequences, in order to determine whether a face is beautiful or not. Also known as the "Phi" mask, it follows the golden measure (phi) or "divine proportion" of 1.618 (Fig. 44.1).

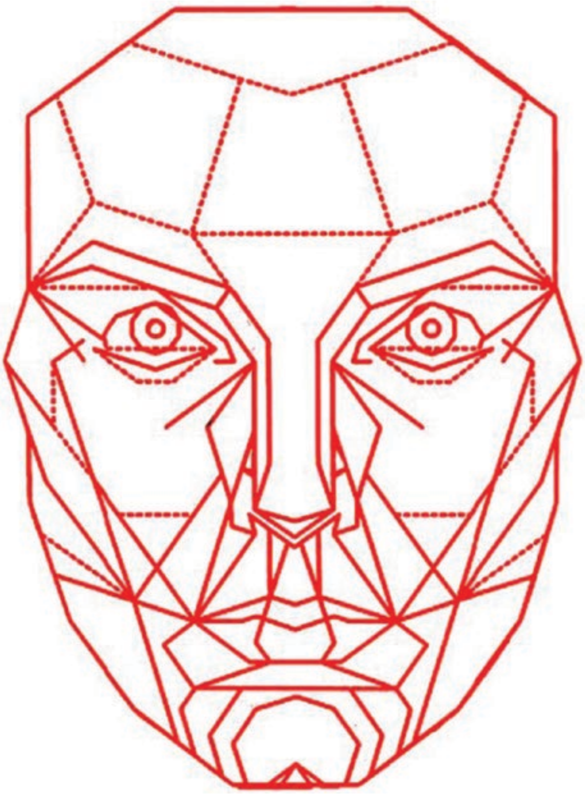


Fig. 44.1 Phi or Marquardt mask

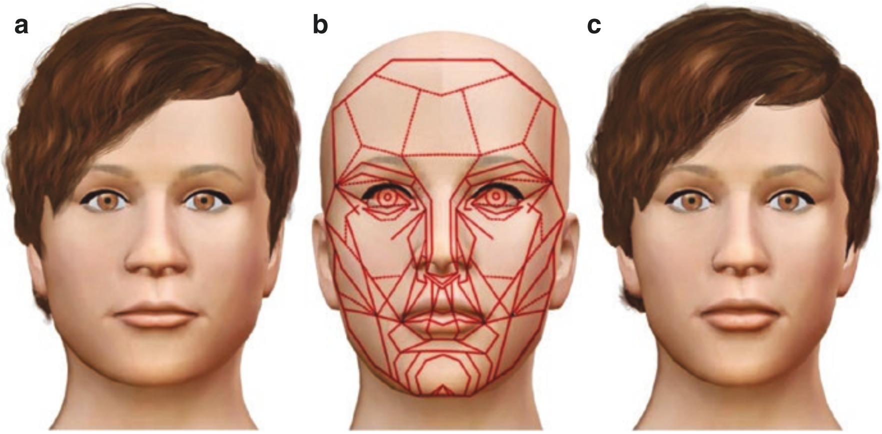


Fig. 44.2 (**a**) Original face without harmony. (**b**) Phi or Marquardt mask overlap. (**c**) Post-correction getting beauty with facial harmony

This mask would have a relation to the base of the triangle with its sides found everything in nature. The characterization would occur by overlapping it to the studied face and seeking to determine regions that can be worked, if necessary, being diminished or increased (Fig. 44.2).

In the past, it was much used by the Greeks, even as a base when building the Parthenon. Even before, the pyramids of Egypt possessed these proportions, applied in the size of the stones used in their construction. The mask uses the "golden triangle" as standard, where the ratio of the major side to the minor side is 1.618.

The incessant pursuit of beauty or ideal proportion, which has identified this relationship in nature, was very well described by Fibonacci in the middle of 1200 (?), that when studying the creation of rabbits, found the relation 1, 2, 3, 5, 8, 13, 21, 34, and so on, always adding a number to the previous number, resulting in the Fibonacci sequence. Coincidentally, scientists find these proportions everything in nature.

44.2 The Relative Beauty

Beauty is in the eye of the beholder — Plato, Athens (348–347 BC)

Despite this statement – philosophical and wise – there are peculiar characteristics in which the face's shapes are consensus, and they are considered attractive and beautiful.

Criteria are cited as:

- The height of the forehead = height of the nose
- Nose height = 1/3 lower face

- Width of the nose = width of the eyes
- Interocular distance = nose width
- Distance between eyes = width of eyes
- Width of the mouth = 1.5× width of the nose (Marquardt considers 1618 – proportion Phi)
- Face width = 4× nose width

44.3 Anatomy

The buccal adipose body is an anatomical structure that was first described in the literature in 1732 as a glandular tissue, which was then called the molar gland. It was only in 1802 that its adipose nature was discovered by Bichat and from that point on, the structure received several synonyms such as Bichat's ball, adipose body of chewing, buccal adipose body, etc. [8].

This structure is covered by a thin fibrous capsule, which delimits it in its totality, being provided with a central body and four processes: buccal, pterygoid, deep temporal, and pterygomaxillary. The anatomical location of its central body resting on the periosteum of the alveolar bone of the maxillary molars and under the most superior fibers of m. buccinator facilitates access to this structure for use as a pedicle graft. In addition to that, its rich vascularization, which comes from the buccal and temporal branches of the a. of the transverse facial branch of a. temporal and small branches of a. facial, explains its high degree of success when used as a pediculated graft (Figs. 44.3 and 44.4).

Fig. 44.3 Anatomy

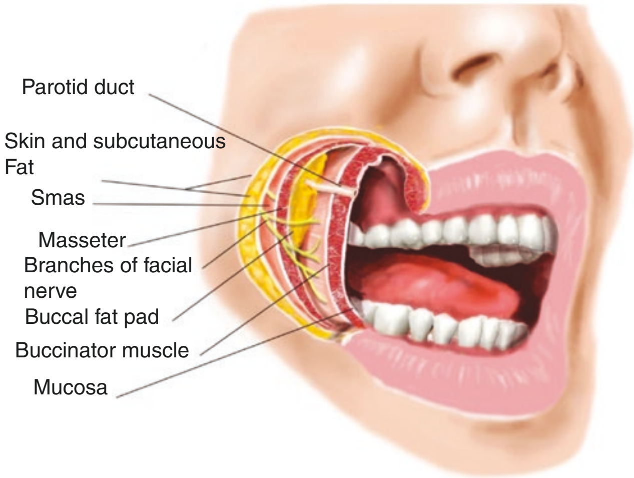
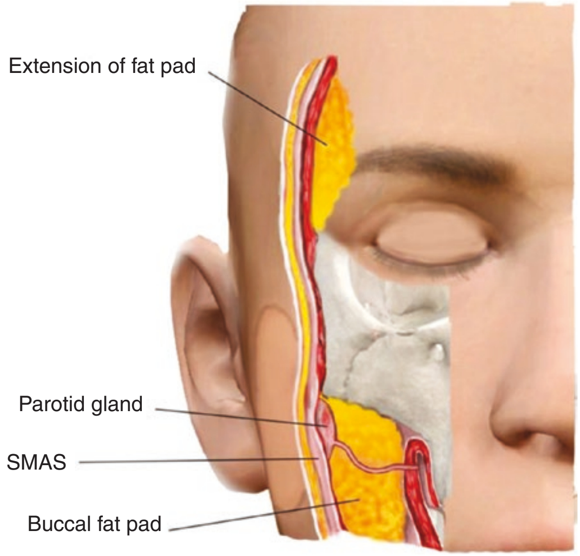


Fig. 44.4 Anatomy



44.4 Method

44.4.1 Indications and Contraindications

The main indication for bichectomy is patients with facial disharmony due to cheek hypertrophy.

We can associate procedures such as chemical peeling in patients with solar melanoses, giving a more complete result.

The main contraindications may be listed as:

- Patients with health problems
- Patients with false expectation
- Pregnancy
- Infection
- Severe psychological problem

The success of aesthetic procedures often depends not only on the diagnosis and technique of the physician but also on numerous psychological factors.

During medical consultation, we have to conduct an examination not only of the patient's physical but also his/her emotional and, going a little further, spiritual conditions. Thus, we have the global view of the patient as a human being and not just as an organism to be operated on.

We have to take special care of patients with false expectations.

There are also patients who feel the most varied types of fear, such as anesthesia, results, frustrations caused by surgery, and others.

In these situations, in addition to detailed medical explanations, information leaflets, and consent, we refer patients for psychological consultation and preparation. If, however, unrealistic expectation persists, we contraindicate surgery [6].

44.5 Preoperative Care [6]

Careful anamnesis is of paramount importance.

One must research the patient's previous surgical treatments, allergies, habits, and diseases.

Diseases, such as diabetes, asthma, hypertension, cardiopathies, pneumopathies, hyper- or hypothyroidism, and others, should be appropriately treated and controlled prior to surgery.

Patients taking aspirin or aspirin-containing drugs that interfere with platelet function have an increased risk of hematoma formation after surgery and a tendency for excessive intraoperative bleeding. These medications should be discontinued 2 weeks before surgery.

Smoking should be discontinued 2 weeks before surgery until 1 week after the operation.

It is important to perform a thorough physical examination of the entire face, noting the existing disharmony. The preoperative photographs are extremely valuable for preoperative evaluation and surgical planning, documentation of the current preoperative state, and postoperative discussion with the patient who often does not remember the preoperative aspect and, if necessary, as medical-legal document.

We do the preoperative psychological preparation with the use of meditation technique, so that the patient is totally relaxed during the surgery [7].

44.6 Operating Technique

The technique to be described was presented by us at the Brazilian Congress of Plastic Surgery in 2016.

Mark the incision approximately 1.5 cm in its greatest extent, at the level of the premolar just below the parotid duct and in the posterior direction.

The anesthesia is local (Fig. 44.5).

Incision on the demarcation, interesting only for the oral mucosa (Figs. 44.6 and 44.7)

Dissect the anatomical planes with parsimony using atraumatic instruments such as blunt scissors or Kelly's tweezers, avoiding injury to noble structures such as the branches of the facial and maxillary artery, parotid duct, and facial nerve that are in the vicinity.

Detached the adipose body with a soft tissue apprehension clamp and a delicate incision of the surrounding fibrous capsule.

Fig. 44.5 Local anesthesia

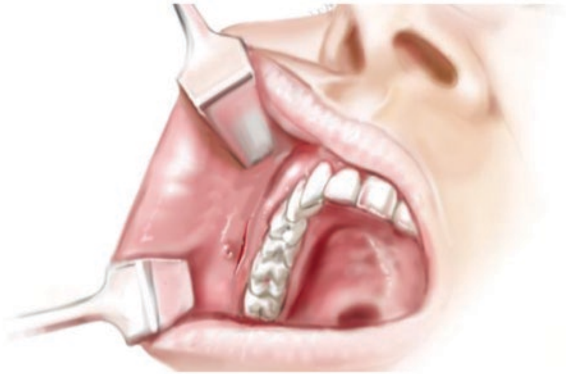


Fig. 44.6 Incision on the demarcation

Fig. 44.7 Incision

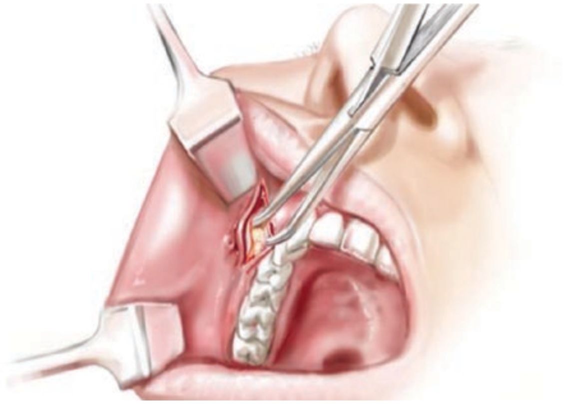


Fig. 44.8 Externalization of Bichat's fat pad

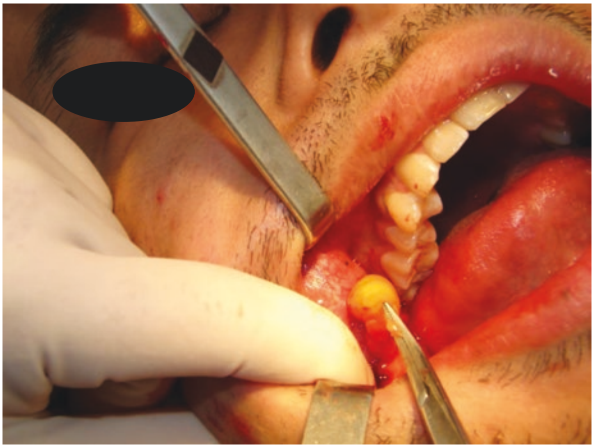


Fig. 44.9 Externalization of Bichat's fat pad

Circular movements are performed externalizing the ball of Bichat (Figs. 44.8 and 44.9).

We pinch a large part of Bichat's fat pad that is removed preserving in average 1/3 of the total volume or more depending on the case (Figs. 44.10, 44.11, and 44.12).

Measure the quantity removed on the right and left side of the cheeks, using the Luer syringe (Fig. 44.13).

44.6.1 Cauterization

5-0 catgut thread is used with separate stitches to perform the synthesis (Figs. 44.14 and 44.15).

Fig. 44.10 Bichat's fat pad removal

Fig. 44.11 Bichat's fat pad removal

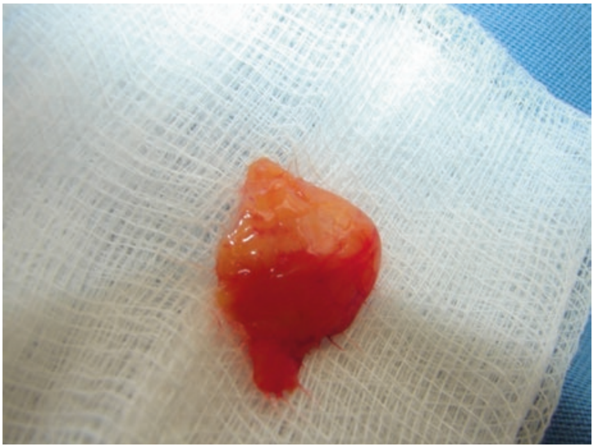


Fig. 44.12 Removed Bichat's fat pad

Fig. 44.13 Measurement of the removed quantity

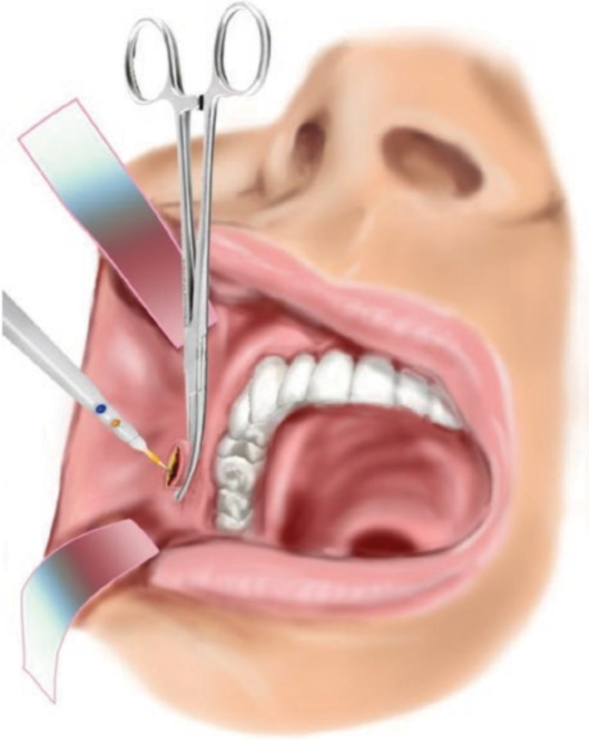


Fig. 44.14 Cauterization

Fig. 44.15 Cauterization

44.7 Postoperative Care

The main postoperative care is:

- Use of antibiotics, anti-inflammatories, and analgesics
- Use of gel mask to reduce edema and bleeding
- Elevated decubitus to decrease edema
- Lymphatic drainage to reduce edema

The patient is discharged on the same day [14].

44.8 Results

The results are generally highly satisfactory [4] (Figs. 44.16, 44.17, 44.18, and 44.19).

44.9 Complications

The following conditions were considered complications by literature: seroma, infection, lesions of the buccal nerve and parotid duct, and asymmetry.

In our experience, we have had no complications.

Fig. 44.16 (**a**) Preoperative bichectomy of a 22-year-old patient with cheek hypertrophy. (**b**) Postoperative bichectomy with good results, getting facial harmonization

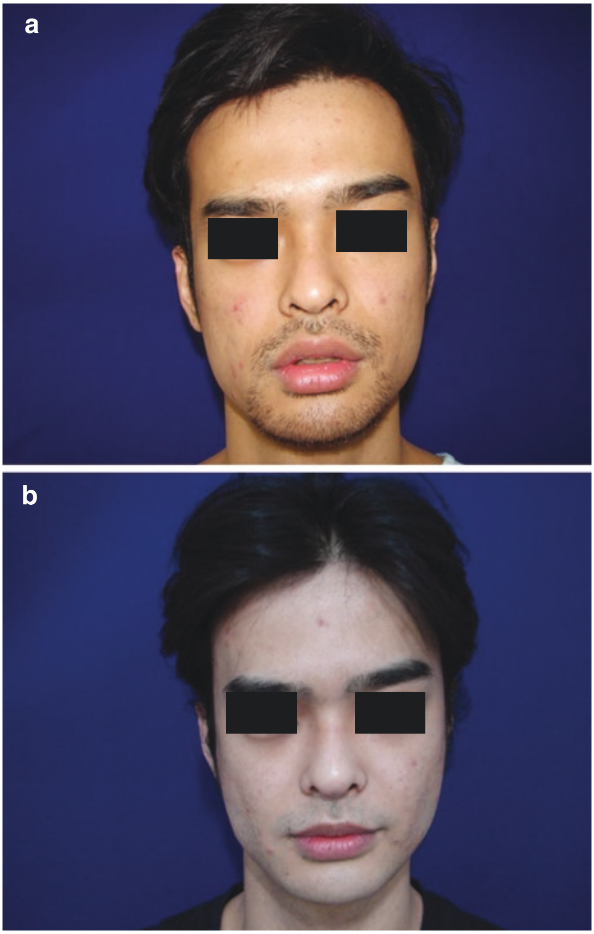


Fig. 44.17 (**a**) Preoperative bichectomy of a 31-year-old patient. (**b**) Postoperative bichectomy

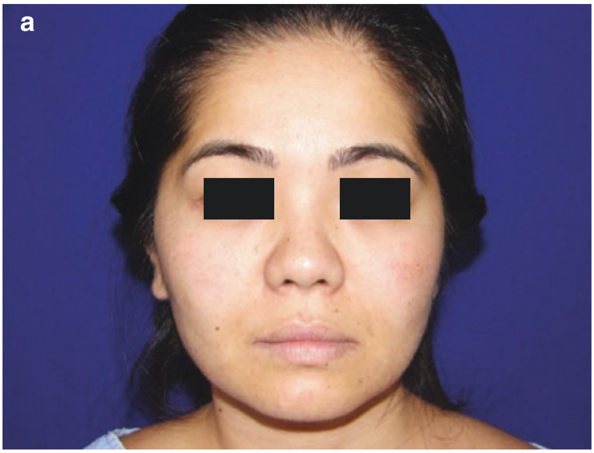


Fig. 44.17 (continued)

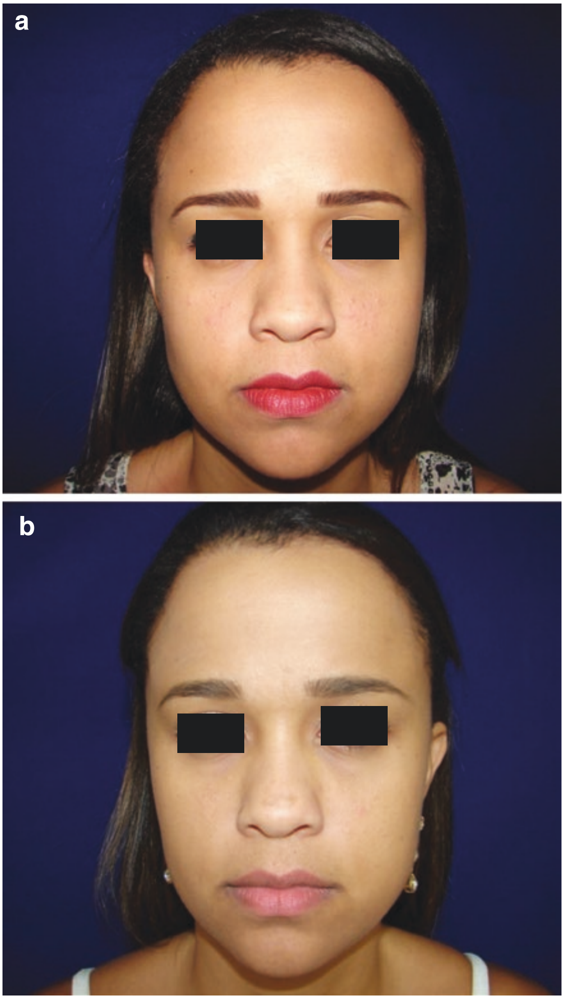


Fig. 44.18 (**a**) Preoperative bichectomy of a 29-year-old patient. (**b**) Postoperative bichectomy

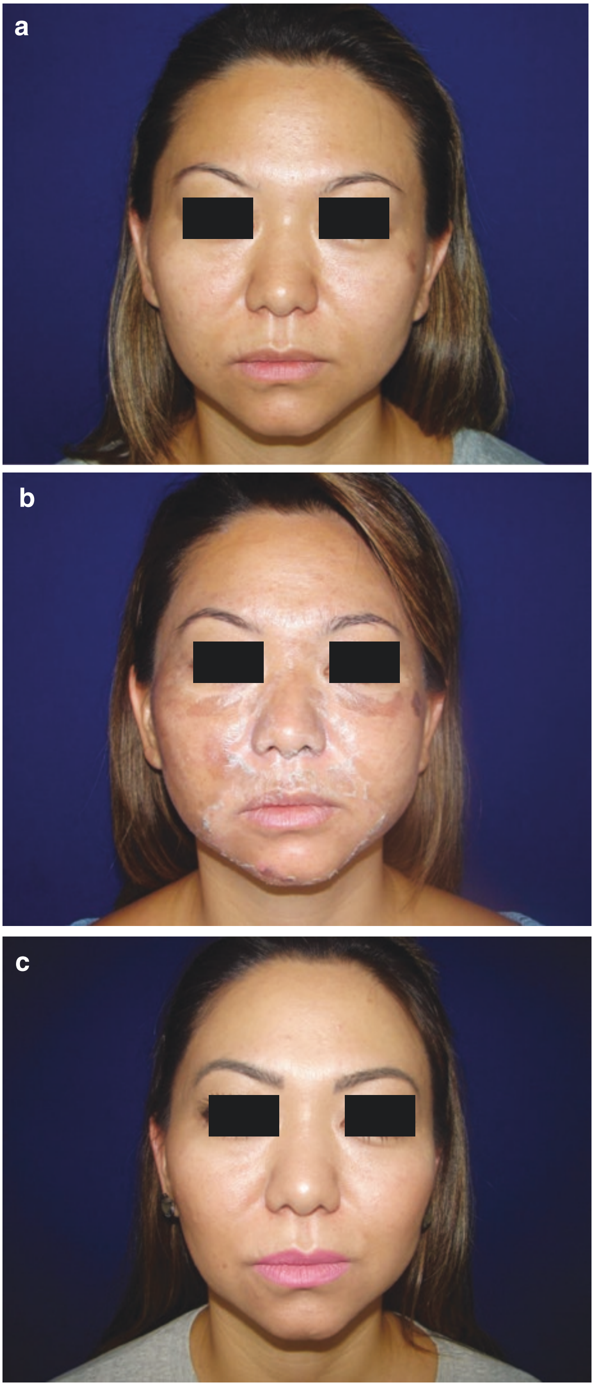


Fig. 44.19 (**a**) Preoperative bichectomy of a 38-year-old patient with cheek hypertrophy and melasma. Pre-bichectomy in association with a chemical peeling. (**b**) Post 2 days with edema and skin peeling. (**c**) Post 2 months with highly and completely satisfactory result due to skin aesthetics

Faria CADC et al. [4] presented a case of hematoma in the immediate postoperative period with spontaneous regression in 7 days. Alvarez GS et al. [1] observed that 7.5% of the complications were reversed in less than 2 weeks postoperatively.

44.10 Discussion

Some experts criticize Bichat's withdrawal of the fat pad because it may be missed in the future, during the aging process. Also, this structure is located in a delicate area of the face, in the midst of nerves and salivary channels. "Bichat's fat pad" was named after the French anatomist Marie François Xavier Bichat (1771–1802), who discovered that the structure is a fatty tissue located in the region of the cheeks in front of the masseter muscle and superficial to the muscle buccinator. Its function is little known, and it is believed that even though it is a fatty tissue, its volume varies little with the oscillation of weight, so even if it has the ideal weight, the individual can have a rounded face. Due to its location, Bichat's ball presents an intimate relationship with very important facial elements such as terminal branches of the facial nerve, parotid duct, and blood vessels.

Zhang et al. [15] detailed the anatomy of this region. The same anatomical study was performed by Dubin et al. [3] and Jackson [8], among others.

The correction of the round face, frequent in Orientals, was described by Thomas et al. [13].

The partial removal of the Bichat's ball sculpts the face in its lower third and reduces rounding, a factor of aesthetic improvement [9]. The procedure is related to the concept of an "inverted triangle of youth" that can increase beauty.

Regarding the results, Alvarez et al. [1] reported a 93.22% patient satisfaction. In our opinion, although the result is subtle, it offers a great satisfaction to the patient, which justifies the procedure.

The possibility of removing Bichat's fat pad together with aesthetic improvement of the neck and face (liposuction) was reported by Guerrerosantos [5] and Tapia et al. [12].

Bradley [2] in a review of the literature points out that Bichat's fat pad is very important in the repair of oro-maxillary defects.

However, it is important to note that there is a lack of knowledge regarding the long-term effects of the procedure and its role in facial aging.

Alvarez and Siqueira [1] report transient complications of 7.5% in 27 operated cases, all of which are reversed in less than 2 weeks postoperatively, which is very favorable.

The oral route has the preference of the majority which allows a broad view and facilitates the removal of Bichat's fat pad.

Because it is a surgery under a local anesthesia, preoperative preparation, especially mental relaxation, is very important [7].

In conclusion, all studies reported that removal of Bichat's fat pad through bichectomy has a highly satisfactory result, giving harmonization in relation to facial aesthetics.

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Chapter 45
Nasolabial Fold: Options of Treatment Concerning Aesthetic Facial Contour

Nelson Letizio and Jaime Anger

45.1 Introduction

The nasolabial sulcus is tenuous or even absent in the newborn, disappears in facial paralysis, but is usually defined and constant in adult life. Microscopic studies show dense fibrous tissues in the sulcus region and muscle fibers that are superficialized toward this fibrous thickening and which come from the levator of the upper lip and orbicularis of the mouth muscles [1–4].

The nasolabial sulcus is a physical sign of aging, and the minimization of this aspect has become one of the goals of cosmetic plastic surgery. Three factors are imputed in this process: redundant skin in the malar region, ptosis of adipose tissue of the cheek and visibility in the skin with the increase of the age, and retraction caused by the lip lift muscles [5].

The entanglement of muscle fibers in the subcutaneous groove densification favors changes in the dynamic aspect of the lip with the aging process. Absorption of tissue and falling of the cheek, during the act of speaking and smiling, makes the groove deeper, and similarly other folds and pits are created.

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The effects of the aging process are similar in the lower lip and labiomentonian groove. The involved muscles are the lip's depressor, lowering of the mouth's angle, mentalis, and the platysma.

Treatment involving the nasolabial and nasomental sulcus may be by surgery or by cosmetic procedures. Cosmetic methods are summarized in fillers, with alloplastic substances or autotransplantation of adipose tissue and the use of botulinum toxin for the paralysis of the involved muscles [6, 7].

45.2 Surgical Treatment

The experience gained in aesthetic surgery correcting the face and the neck shows that there is a need for a strategy not only focusing on the traction or tissue tension but rather on recreating the forms and angles that were previously pleasant and jovial. Often good judgment and the observation of dynamic facial expressions become as important as theories, standardized measures, or calculations.

Most facial procedures are combined, where improvement of the affected grooves and cervical region is the main goal. Surgical management can be directed to an isolated or multiple anatomical areas, depending on the needs of each patient and the diagnosis of the surgeon.

The smoothness of the tissues, the naturality of the expression, and the harmony of facial structures as a whole should be observed in each patient considering the visual change associated with age, gender, and race.

The knowledge of the superficial and deep anatomical structures of the face is extremely important to program the surgical procedure. The superficial musculo-aponeurotic system (SMAS), the retentive ligaments pointed out by Mendelson and the submental deep structures (Feldman) [1].

Conceptually, we divide the face into two areas, the lateral that is more motionless and the medial and anterior, located around the face's natural orifices, where the signs of aging are more noticeable (Fig. 45.1).

It is important to know the different facial structures, the anatomical levels, and location of the retentive ligaments, which must be released in association with large detachments. The application of the five vectors will provide good results and long duration.

The concept of mobilizing deeper facial structures began in the 1970s with the use of SMAS which, once triggered, resulted in the repositioning of altered facial anatomy structures, especially peri-buccal areas and grooves with long-lasting effects [8]. The SMAS was initially submitted to its plication without its detachment. In the 1980s, SMAS started to be displaced, pulled, and resected [2, 4].

Dissection, selective resection, and SMAS repositioning in the cranial or lateral region may cause temporary or permanent facial nerve damage. Other intercurrences and complications were reported with longer physical changes, preventing a rapid return to routine. We have used plication of SMAS for 13 years in five sectors

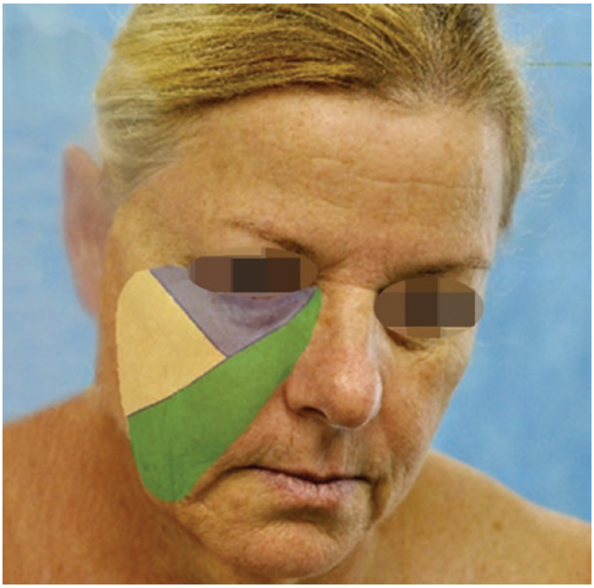

Fig. 45.1 The face's movable regions are more susceptible to signs of aging

following vectors with specific orientations, without their dissection, that is, maintaining their anatomical integrity [9]. The technique reduces more extensive manipulations, avoiding injuries of nerves and other important structures of the face (Fig. 45.2).

45.2.1 Technique

The surgical experience is based on 1476 patients submitted to surgery between 2006 and 2019 and with a postoperative follow-up of at least 1 year, 128 males and 1348 females, ranging in age from 35 to 84 years. All the surgeries followed the same SMAS plication systematization in five directions, three on the face and two on the cervical region.

45.2.1.1 Marking

Prior marking is required with the patient in the orthostatic position. *Vector I* is positioned vertically in the cervical midline for treatment of the platysma muscle bands (Fig. 45.3).

It consists of two lines, each positioned on the cutaneous projection of the two bands of the platysma muscle.

In patients with a single apparent band, the first demarcation falls on it and the second, parallel and about 3–5 cm from each other. In the absence of the two flanges,

Fig. 45.2 The vectors must overcome the retentive ligaments described by Mendelson, to achieve the necessary effectiveness

Fig. 45.3 Demarcation of vector I follows the principles of Feldman

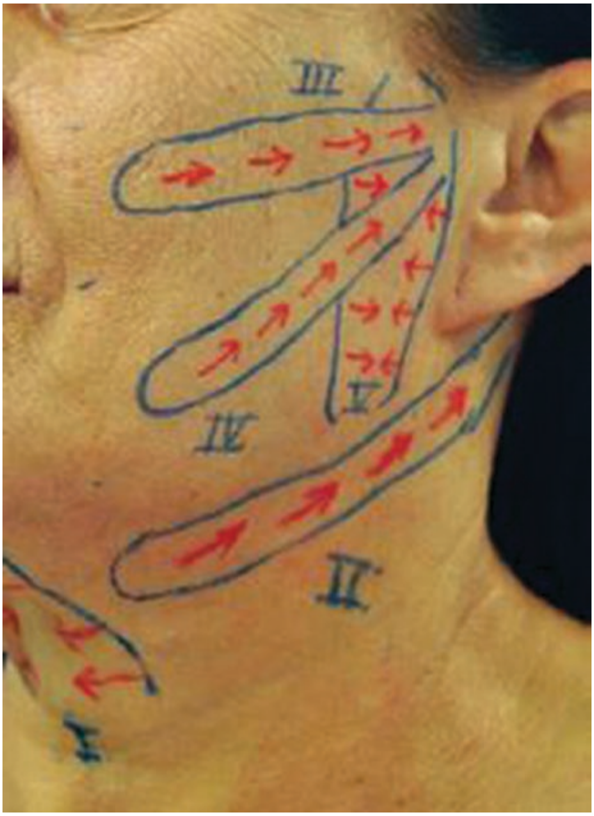

Fig. 45.4 The grips of vector II are fixed to the mastoid and those of vectors III and IV are fixed in the zygomatic arch

but with tissue flaccidity that compromises the mandibulocervical angle, vector I is routinely applied.

Vector II is positioned parallel to and about 1–2 cm below the jaw line, distant about 1.5 cm from the cutaneous projection of the sublingual salivary gland.

The three facial vectors have the same upper base positioned closely to the projection of the zygomatic arch with the root of the helix and the chop, when naturally implanted in women.

Vector III, in the highest position on the face, is directed in the midline of the nasogenian sulcus. Vector IV is more inclined, following a midline between the corner of the mouth and the edge of the jaw. Vector V is vertical and located 1–2 cm from the anterior implant line of the ear, extended in the direction of the jaw angle. With the exception of vectors I and V, the others delineate the shape of a rectangle variable in length and with an average width of 2 cm (Fig. 45.4). The distance between the two vertical lines of vector I varies with the two bands of the platysma muscle.

In case of a single platysma band, the homologous and parallel demarcation to the first one varies from 3 to 5 cm. In the absence of muscle bands, but with flaccidity in the submental cervical region, the two lines are demarcated, and the platysma is sutured following vector I. Vectors I and V vary with the degree of flaccidity, because they are of the containment type, and vector V varies according to the effectiveness of the traction straps of vectors II, III, and IV.

45.2.1.2 Surgical Technique

Patients undergo general anesthesia or sedation in the horizontal dorsal decubitus, with the chest and head elevated by about 30 degrees. Local infiltration with 2% lidocaine and 1:250,000 epinephrine is performed. The limits of cutaneous dissection are initially demarcated at the root of the helix with the zygomatic arch, following medially along the malar bone. The demarcation continues in the lower direction to the outer border of the nasolabial groove, reaching the jaw flange, to join with the opposite side. The lower cervical border follows a transverse line about 2–3 cm below the hyoid bone. Posteriorly, from the earlobe, the demarcation ascends in the line of the implantation of the ear up to 2 cm from the root of the helix, curving 90 degrees horizontally in the direction of the scalp, in an extension that varies from 8 to 10 cm (Fig. 45.5).

After the demarcation of the areas to be treated, lipospirations in the submental, genian, and paranasal regions are performed, as ancillary procedures for the improvement of the facial contour.

Fig. 45.5 Red lines mark the wide dissection required

Fig. 45.6 Both hands under the fatty dermis show the extent of the dissection

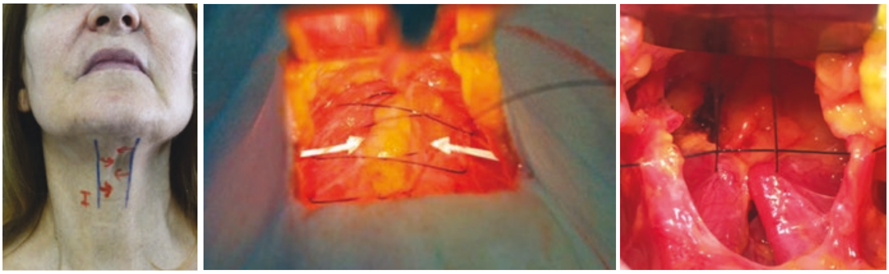

Fig. 45.7 Precise dissection of the platysma muscle, sub-platysmal fat, and digastric muscles when necessary

Cutaneous dissection is performed along the entire extent of the demarcated surface (Fig. 45.6).

A 4 cm submental incision is made near the edge of the mandible. The cutaneous dissection is extended inferiorly to the lower limit previously established in the cervical region. A systematic hemostasis should be performed.

After careful dissection of the submental region, with detailed exposure of platysma muscle's fibers, a dissection begins in the submuscular plane for visualization and resection of exceeding sub-platysmal adipose tissue. In most of the cases, the fat is removed (Fig. 45.7).

After this step, the bands of the digastric muscles are visible, which can be treated according to each need by plication or partial and total resection, in order to improve the submentonian angle.

After that, partial resection of the platysma bands is performed in selected cases, followed by a muscle plication that varies according to each case, always with an inabsorbable thread. It is initiated 1 cm below the cricoid cartilage and continues to the posterior border of the mandible in the midline (vector I). At this point, the submandibular glands can be manipulated.

The plication corresponding to vector II begins with the fixation of the thread near the mastoid region, and the thread is conducted undulating in the platysma muscle, approximately 1.5 cm below the mandibular border, until it surpasses 1.0–2.0 cm the projection of the submandibular glands. The return of the thread, to the mastoid, is carried out in the form of a strap, when the necessary traction is calculated and executed.

This movement improves the lower contour of the mandible and camouflages the projection of the submandibular glands. The lateral traction of the platysma muscle near the mandibular ridge helps to improve the lip-mentonian groove's appearance, aided by plication of vector IV (Fig. 45.8).

Vector III is anchored in the periosteum of the zygomatic arch and walks through the SMAS toward the midpoint between the nasal wing and the commissure of the lips, and its traction point must overcome the fixation of the retentive ligaments, to guarantee efficacy of result and relieve nasolabial sulcus, and nasomental groove depression (Fig. 45.9).

Vector IV is similar to the previous one and is anchored more posteriorly, followed by the SMAS toward the middle distance between the labial commissure and angle of the mandible, also surpassing the resistance of the retentive ligaments; its traction straps will relieve the jaw lip groove (Fig. 45.10).

Vector V, like Vector I, is not a strap but a vertical plication of SMAS that will intensify the actions of vectors III and IV and will intensify the traction of the face's middle third. It improves the lateral projection of the face harmonizing the appearance. This technique diminishes the area of detachment, reducing the extension of the flap, and relieves the traction. All of this makes the irrigation of the tissue safer. The extent of plication follows from the angle of the mandible to the zygomatic arch (Fig. 45.11).

It is possible to prove the efficacy of the traction with the measure of the detached area, which shows an average reduction of 2 cm after the vector's actions (Fig. 45.12).

After resection of the skin excesses, containment points are made between the flap and SMAS. The skin suture is intradermal with absorbable 4-0 and 5-0 thread. Vertical containment points are made around 6–7 columns in the cervical and

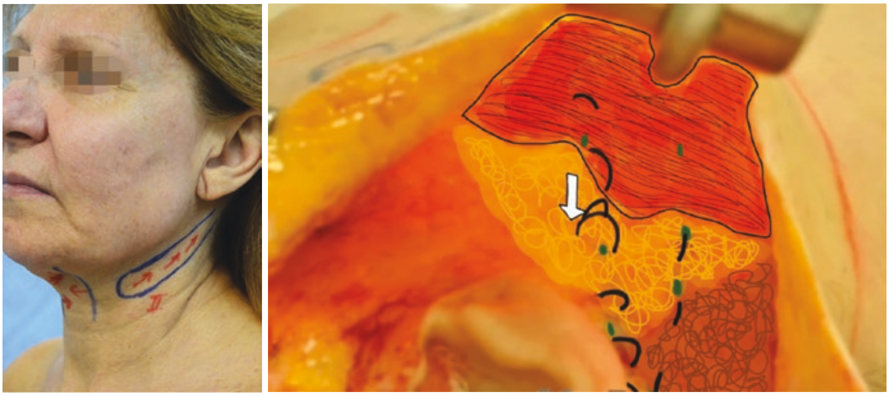

Fig. 45.8 Vector II – the traction loop attaches to the mastoid and should extend beyond the projection of the submandibular gland

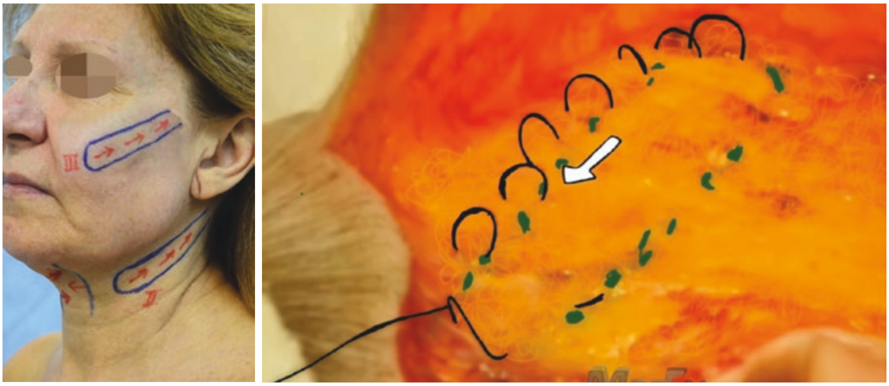

Fig. 45.9 Vector III – the traction loop is fixed in the periosteum of the zygomatic arch and walks to the mid-segment of the nasogenian sulcus

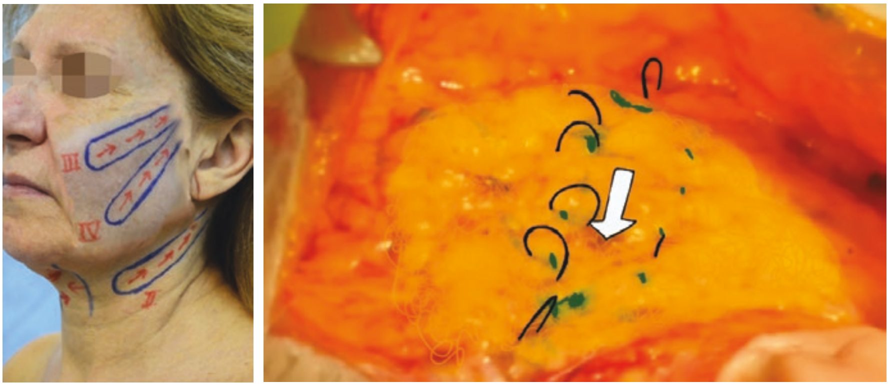

Fig. 45.10 Vector IV – strap attached more posteriorly in the zygomatic arch will pull the lip-mentonian groove

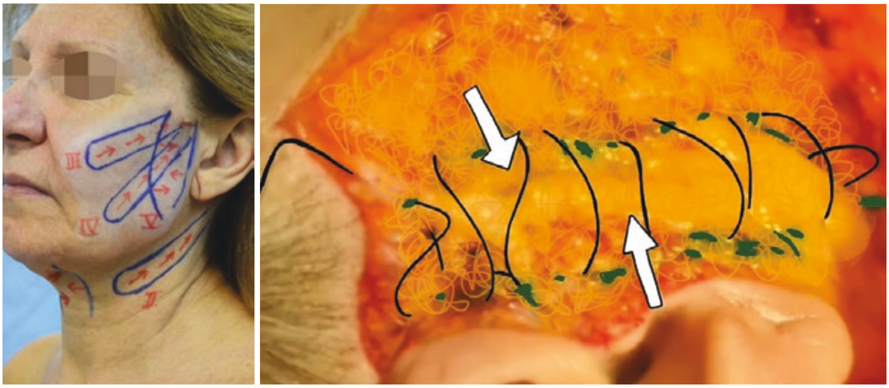

Fig. 45.11 Vector V – vertical plication between the mandible edge and the zygomatic arch

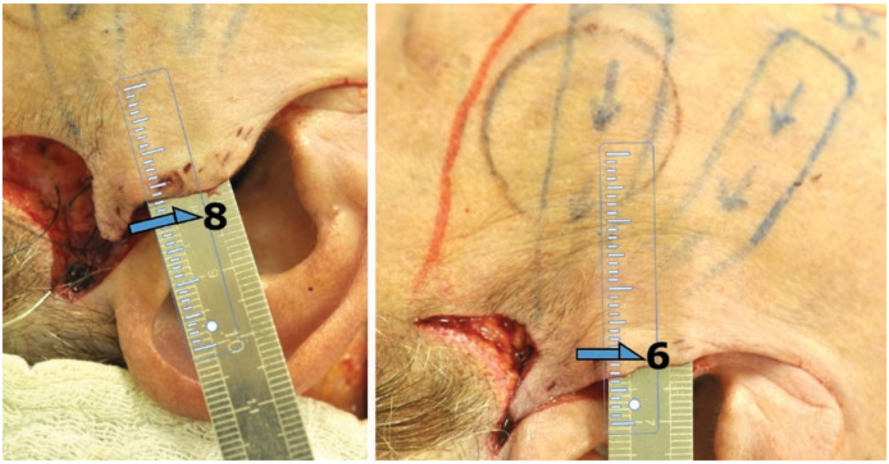

Fig. 45.12 Measurements that proves the effect of the traction of the vectors

submentonian areas from the end of the detached area to the angle of the mandible with 4-0 nylon monofilament threads that are removed after 48 hours.

In most of the cases, fat grafting is used according to the principles described by Colleman, regarding harvesting, preparation, and grafting. The most frequent points of grafting are the nasolabial, nasogenian, and lip-nasomentonian grooves, upper and lower lip, glabella, upper and lower eyelids, and temporal region.

CO_2 laser skin abrasion is employed as an ancillary procedure and may be used pure or in the fractionated mode. It is applied in the orbital regions and around the lips, which improves the quality of the skin and promotes a slight retraction.

The interaction of vector actions, II for the mental lip groove and III, IV, and V for the nasal labial sulcus, with fat grafting at the sites and surgical abrasion with CO_2 laser has provided very satisfactory outcomes in the medium and long-term results (Figs. 45.13, 45.14, 45.15, 45.16, and 45.17).

Patients are hospitalized for 1–3 days for routine postoperative care. No tubular drains or Penrose drain type is used, as a consequence of the adhesion points in the dissected areas, in particular around the periauricular region.

45.3 Results

45.4 Complications

Only one case of hematoma required revision in the operating room. No type of nerve injury or need for retouching has been recorded within 2 years after surgery, which is attributed to the anchorage of the five traction and retention vectors. Figures 45.12, 45.13, and 45.14 illustrate cases of some patients included in this study.

Fig. 45.13 A 56-year-old patient

Fig. 45.14 A 63-year-old patient

Fig. 45.15 A 49-year-old patient

Fig. 45.16 A 53-year-old patient

Fig. 45.17 A 54-year-old patient

45.5 Reviews

The suture of SMAS according to the five vectors with different directions has offered a more effective, constant, and satisfactory effects in the long follow-up, motivating its indication and use in the routine of rhytidoplasties. In all patients, there was no segmental dissection or resection of the SMAS with cranial or retroauricular suture.

Nerve injury is possible even having knowledge of the anatomy. The dissection and release of AMS can temporarily or permanently cause nerve damage. Even when the injury is temporary, the recovery time, sometimes a few months, determines great apprehension for the involved parts. Plication reduces surgical trauma, offers greater safety, and may be effective in the long term and should be considered a relevant factor for its indication. The technique with systematization of two vectors used in the cervical region is easily performed and may be reproduced, delaying a possible recurrence of vertical folds in the cervical region, commonly observed when the only maneuver is the cervical middle suture. In our patients followed in the last 5 years, we have not observed recurrence of the vertical bands.

The plication of SMAS through vectors III, IV, and V, presenting different directions, has determined the reduction of its surface, delaying the possible stretching of the skin. Measurements on the dissected surface of the skin in the transverse and longitudinal directions in the middle segment of the face, before and after the plication of SMAS, show a reduction of 1–2 cm of these axes. The effects of these procedures have been better observed in patients older than 60 years, due to the natural factors of aging advanced by progressive sagging of the skin and SMAS (Figs. 45.12, 45.13, and 45.14).

The incidence of edema, ecchymosis, and hematomas is also reduced when compared to surgical tactics with broader dissections. The application of the adhesion points in the dissected areas has guaranteed the limitation of possible bruising. The use of drains of any nature is not required. Based on these aspects, faster recovery has been observed and greater efficacy in the quality of the long-term results when compared to other methods traditionally described in the literature. The literature records multiple sections of platysma bands along its length also with satisfactory results. The search for improvement of the surgical tactics coupled with the technical simplification, the quality, and maintenance of the results has been constant in the history of medicine.

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Chapter 46
Treatment of the Nasolabial Fold

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46.1 Introduction

The nasolabial fold (NLF) is a natural contour of the face that runs deep laterally the nasal wing and ends lateral to the labial commissure. The nasolabial folds become an important aesthetic problem, when with age, it becomes more prominent due to several factors such as loss of soft tissue volume, cutaneous atrophy, less elasticity of the skin, loss of fat malar, and musculature of the face.

There is not a lot of variety to the treatment of nasolabial fold, so this becomes a challenge for plastic surgery.

46.2 Anatomy

The nasolabial fold, which belongs to the middle third of the face [1], is irrigated by the facial artery. One of its branches, lateral nasal artery, is the main vascular supply of the tip and wing of the nose, which is very close to the nasolabial fold, 2–3 mm superior to the wing sulcus [2]. Therefore, complications of filling in this area are intravascular injection or external vascular compression, which manifests clinically with necrosis of the wing and tip of the nose but unusual complications [3].

In the aging, the fat compartments become softer; there is malar fat atrophy, which leads to a more skeletal appearance of the zygoma. Simultaneously, there is

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an apparent ptosis of the fat pad that causes accumulation of fat and deepening of the nasolabial fold [4].

The fascia fatty layer and skin of the cheek mass are suggested as the primary ptotic responsible for facial aging.

46.3 A Classification of Facial Wrinkles for Nasolabial Fold

The nasolabial folds can be of different shapes, depth, and lengths, so for proper evaluation of patients, Dr. Lemperle developed a classification [4].

Grade	Severity
Grade 1	No visible NLF. Continuous skin line
Grade 2	Shallow but visible NLF with a slight indentation
Grade 3	Moderate deep NLF. Visible at normal appearance
Grade 4	Very long and deep NLF. Prominent facial feature. Less than 2 mm visible fold if stretched
Grade 5	Extreme, deep, and long NLF. Between 2 and 4 mm V-shaped fold if stretched

46.4 Treatment Options

46.4.1 Direct Excision

The direct excision of the nasolabial fold is powerful way to reduce deep nasolabial folds but in select cases. Generally, it is used in elderly and male patients. In most cases, it produces a good scar [5, 6] (Figs. 46.1 and 46.2).

Direct skin excisions were popularized by Castanares as ancillary procedures for facial rejuvenation. The technique consists in direct excision of skin and subcutaneous tissue (Figs. Fig. 46.3 and Fig. 46.4).

The surgeon must be careful with the facial nerve branch, so to avoid injury, he should limit excision to the skin and subcutaneous tissue.

46.4.2 Fillers

Injection of fillers into cutaneous tissue is a common practice.

This minimally invasive procedure has become a routine in dermatological practice and plastic surgery.

The ideal filler should be nontoxic and anti-allergenic, and its action should be long-lasting.

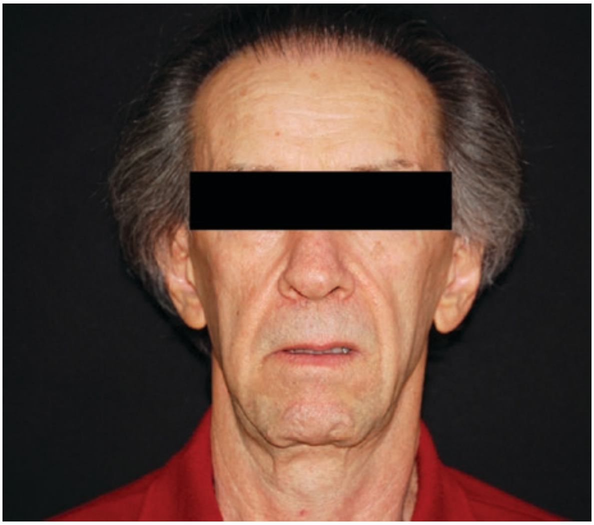

Fig. 46.1 Male patient in the preoperative of direct excision of the nasolabial fold

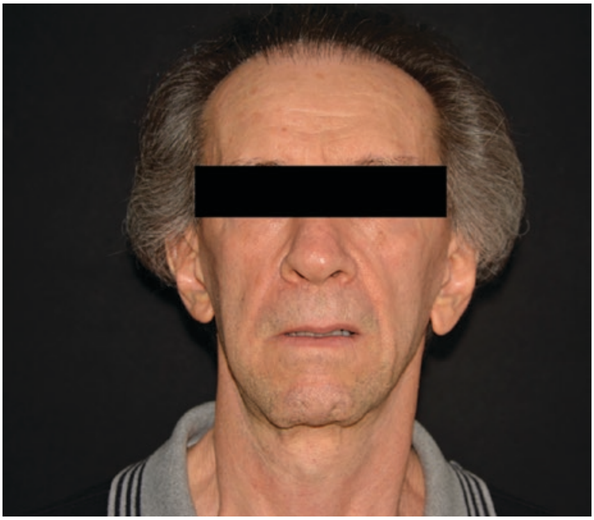

Fig. 46.2 Male patient in postoperative of direct excision of the nasolabial fold

46.4.2.1 Fat Grafting

The fat grafting as a fill to the objective of facial rejuvenation has been gaining space in the therapeutic arsenal of plastic surgery because it is a good method and easy to apply.

Structured fat grafting, or lipostructure, a term coined by Coleman, is one such method and perhaps most popularized by the didactic form with which it was presented and by the wide dissemination in the scientific milieu.

The collection of fat is done with liposuction cannula, 2-3mm diameter, connected to a sy-ringe, with local anesthesia. In general, the donor areas are knee and abdomen. Before fat grafting, fat decantation is performed by placing the syringe in

Fig. 46.3 Intraoperative should be careful not to injure facial nerve branch

Fig. 46.4 Intraoperative with intradermal suture

a vertical position. Then, after the procedure, it is injected below the deep dermis to correct NFL [7].

There is a histological study the shows that 30 to 60 days after grafting, the necrotic adipose cells are absorbed and replaced by connective tissue. The durability of fat in the recipient area in uncertain [8].

The complications of this technique are swelling, bruising, damage of structures like vessels, and rarer and more devastating intravascular emboli. Pay attention to not introduce the injection too deep.

46.4.2.2 Hyaluronic Acids

Hyaluronic acid is a naturalsubstance, complex sugar, found inconnective tissue. Most hy-aluronicacid in the body is located in the skin, which gives the body volume,support, hydration and elasticity.

Hyaluronic acid is one of the most versatile soft tissue fillers and has a range of advantages such as ease of application, low incidence of complications, rapid product dispersal with hyaluronidase, in cases of complication.

The nasolabial groove has variable depth, so using the Lemperle scale may be useful to aid in the outcome expected by thepatient. In general, the depth correction of the groove is made with approximately 0.5–1.5 ml of filler [9].

It is necessary emphasizing the upper third of the nasolabial fold, to the detriment of the inferior two third, since too much application in the lower third can be visible in the situation that the patient smiles.

The most feared complications are rarely tissue necrosis or ischemia which must be rapidly treated with injection of hyaluronidase.

Other common complications are abscess, hematoma, lip numbness, pain, swelling, irreg-ularity, and overcorrection.

46.4.2.3 PMMA

PMMA is a rigid, transparent, and colorless, thermoplastic material used for skin filling of small areas of the body.

In Brazil, the product is only authorized for the following applications by Anvisa, because it is at high risk of complications: Lipodystrophy correction (change in the body that leads to the concentration of fat in some parts of the body) caused by the use of antiretrovirals in patients with acquired immunodeficiency syndrome (SIDA). Facial and body volumetric correction, which is a way to treat changes such as irregularities and depressions in the body, filling in affected areas through bioplasty [10].

Complications may appear in the form of granuloma when the application is superficial. Telangiectasias can also occur in patients with thin skin and could be stay for long time [11].

46.4.2.4 SMAS Graft

The superficial musculoaponeurotic system (SMAS) is a collagen-rich sheet of fascia that covers the muscles of the face. This material can be used to fill deep wrinkles or lines in the face or augment the lips. It is durable and strong yet soft enough to feel natural when implanted into the face.

The SMAS tissue, fascia grafts, has less reabsorption and tissue reaction as compared to fat and dermal grafting. It still has the advantage of not needing additional donor area and is not foreign material for the organism [12].

The correction of the nasolabial fold using autologous SMAS implantation begins with the typical rhytidectomy incision [13].

46.4.2.5 Temporalis Superficial Fascia Graft

Temporalis superficial fascia is derived from the fibro-conjunctive involution of the primitive fronto-auriculo-occipital muscle. It is anatomically continuous with the SMAS at the bottom, at the top with the galea, and at the back with the superficial cervical fascia.

The surgical technique employed consists in the accomplishment of two small incisions one superior and one inferior, in the nasolabial sulcus. Then, a 2-mm-diameter cannula is inserted from the upper incision to the inferior one, in the subcutaneous plane. The graft is attached to the cannula, obtained behind a pre-auricular vertical incision, where strips of the superficial leaflet of the temporal fascia are collected, with a lamina to prevent thermal injury [14].

The complications observed in this technique are pain in the donor area, cicatricial alopecia, infection, and hematoma.

46.4.3 SMAS Traction

A superficial musculoaponeurotic system (SMAS) was described in the parotid and cheek regions of the face, dividing superficial and deep adipose tissue.

Many authors believe in the efficacy of SMAS traction for the nasolabial fold solution, but is necessary extensive dissection and rick to lesion a facial nerve, because it is done at the same time as facelift [15].

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Chapter 47
Nonsurgical Complementary Procedures to Improve Facial Contour

Aristóteles Bersou Júnior

47.1 Introduction

Among the numerous technologies in search of facial rejuvenation, the use of absorbable synthetic fillers such as the hyaluronic acid stands out. Its excellent biocompatibility enables not only to treat and hydrate the skin but even to selectively increase volume in some areas of the face for a few months. Subsequently, new applications might be needed to obtain the desired results.

Only one substance manages to remain definitely and naturally where it is applied: fat.

The use of fat to fill spaces increased after liposuction was integrated to the arsenal of plastic surgery. The development of technologies to achieve a better fat engraftment went through successive essays, and in our hands the natural appearance and the consistency of the results occurred after the mastery of expansive technology.

In 1990, observing a wine cave, we had the idea of expanding the subcutaneous layer, by imagining adipocytes as if they were bottles placed in separate spaces to prevent breaking. The tissue distended by a fluid increases the receptive space for new cells, and the absorbed fluid keeps them distributed in a more spread-out way, with better vascular nutrition and better engraftment.

Anesthetic solution is infiltrated at the approximate temperature of 23 degrees Celsius moments before fat removal and grafting, leading to the cooling of the tissues. The hydraulic pressure promotes the separation of the structures: skin, fat, muscles, vessels and nerves. Fat, because of its lower density, distends and pushes the skin upward and the denser structures downward, emptying the vessels due to the pressure exercised on their walls by the blood content. From these details we have developed the technique of *expansive anesthesia* in fat grafting.

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47.2 Method

47.2.1 Expansive Anesthesia

The chemical composition of the Ringer's lactate makes it an ideal vehicle for anesthesia. As a diluent for anesthetic solution, its injection in the fat is virtually painless. When injected at 23 degrees Celsius, it allows for the use of less adrenaline and a lower amount of anesthetic, without pain and without the risk of anesthetic intoxication in larger volumes.

Composition of the anesthetic solution to be used under sedation or general anesthesia:

- Diluent – Ringer's lactate in a 500 ml volume
- Anesthetic – Lidocaine at 2% without epinephrine in a 10 ml volume
- Vasoconstrictor – Adrenaline 0.5 ml
- Adrenaline concentration: 1:1,000,000
- Temperature of the anesthetic when infiltrated: around 23 degrees Celsius

When opting for the use of local anesthesia alone, the volume of Lidocaine is increased to 20 ml and that of adrenaline, to 1 ml (Fig. 47.1).

Facial liposculpture should be conducted in stages (Fig. 47.2):

1. Demarcation of the areas of interest for liposuction and fat grafting.
2. Expansive anesthesia in the areas to be aspirated using 10 ml syringes and 22G × 11/4″ needles, with slow infiltration producing uniform expansion.
3. The liposuction of the excess fat located in the subcutaneous layer of the double chin and in the anterior and inferior prominences of the cheeks (jowls) is carried out with a cannula 2 mm wide and 150 mm long attached to a 10 ml syringe, inserted through an opening made in the skin with a 18G × 11/2″ needle near the projection of the masseter muscle over the mandibular arch and through an

Fig. 47.1 The hydraulic pressure promotes the separation of the structures: skin, fat, muscles, vessels, and nerves

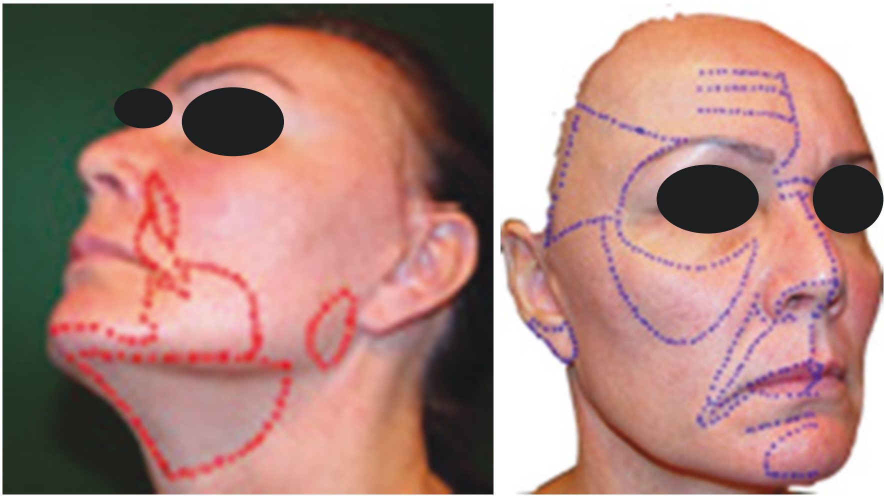

Fig. 47.2 Liposuction in the red areas, fat grafting in the blue areas

orifice made in the nasolabial fold with a cannula of 1.5 mm by 8 mm, duly expanded by the anesthetic. If there is little volume to be aspirated, the 1.5 mm cannula is recommended.

4. Expansive anesthesia in the areas to be grafted: temples, malar, and chin.
5. Graft of previously decanted fat with a cannula 1.3 or 1.5 mm wide and 8 mm long, attached to 1 ml syringes for the temples and 3 ml syringes for the malar. In the chin, the 18G × 11/2″ needle is the recommended one, with a 3 ml syringe.
6. Anesthetic infiltration in the lips and in the tip of the nose producing large expansion.
7. Fat grafting in the contours of the upper lip, in the lower lip, and in the columella nasi.

The methodology for the fat grafting of the different regions of the face follows the stratagem of using as a reference the patients' old photographs, approximately from 20 years before the procedure:

1. Glabella: Expansive anesthesia, fat grafting with a 1 ml syringe and a 21G × 11/4″ needle, in the direction from the forehead to the apex of the nose, close to the dermis. It is important to have a large expansion in order to avoid the risk of intravascular injection. In the presence of deep wrinkles, after anesthetic hyperdistension, we perform an incision under the skin with an 18G × 11/2″ needle, in order to liberate the subcutaneous cellular tissue from all its muscular connections: procerus muscle, corrugator muscle, and frontalis muscle. The fat grafting is carried out in levels, from the periosteum to the deep dermis with a cannula 1.5 mm wide in order to avoid the risk of injection of intravascular fat. Fifteen days earlier, we perform the injection of botulinum toxin, so that the reduction in mobility favors the integration of the grafts.

2. Frontotemporal area: Anesthesia in the base triangle, at the limit of the hair insertion and the lateral canthus. The skin is perforated close to the hair with an 18G × 11/2″ needle, in order to introduce a 1.2 mm cannula attached to a 1 ml syringe. The fat is grafted by retroinjection, in fan-shaped back-and-forth movements, with a larger volume close to the periosteum in the fat pad of the temporal area and less superficially. The grafted volume varies between 3 and 6 ml, depending on the indication. After the grafting it is important to apply palmar pressure to the grafted area to accommodate the fat graft (Fig. 47.3).
3. Malar area: The estimate of the volume of fat to be grafted is made indirectly, with the help of a carpule syringe and cartridges. The volume of each cartridge is 1.8 ml. By slowly injecting the content, the distension caused in the malar enables to approximately visualize the effect that the fat will have when grafted in a similar volume. After this verification, the hydric expansion is performed in a volume of two to three times the calculated amount of fat. The access is made with an 18G × 11/2″ needle in the vertical projection of the outer orbital ridge with the zygomatic arch, so that the fat is grafted in angular movements in relation to the orbit, with a 1.5 mm cannula and a 3 ml syringe, in a fan-like way, going from the periosteum to the subcutaneous layer close to the skin. Special care should be taken not to inject above the projection of the bone ridge of the orbit, to prevent the unaesthetic effect of fat bulge in the lower eyelid. To avoid this problem, the index finger should be placed over the lower eyelid so as to press it against the bone. The average volume grafted is 3–5 ml on each side, and it may be larger in some cases (Fig. 47.4).
4. Nasolabial fold: The anesthesia should be done in a superficial and expansive way, starting in the commissure of the lips toward the wing of the nose, so as to create a safe space for the passage of a 1.5 mm cannula attached to a 3 ml syringe, which is inserted by piercing the skin with an 18G × 11/2″ needle close to the commissure of the lips, preferably within the depression of the fold. The volume

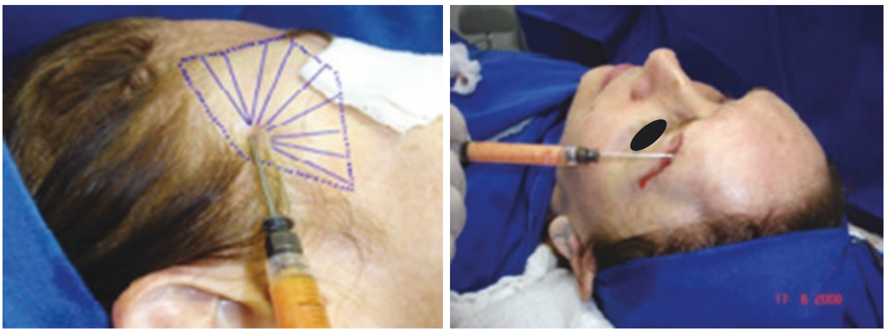

Fig. 47.3 Fat grafting in frontoparietal and glabella area

Fig. 47.4 The index finger should be placed over the lower eyelid so as to press it against the bone

Fig. 47.5 The expansive anesthesia creates a safe space for the passage of a cannula

of up to 2 ml may be grafted under the alar cartilage, and, therefore, we should deepen the cannula in order to break the local tissue resistance. This graft raises the nasal tip. The amount of fat injected should not exceed 4 ml and must be spread by retroinjection throughout the fold (Fig. 47.5).

5. Lips: We should make a distinction between the senile lips, the lips of someone who had a massive weight loss or lips that are too marked, from younger lips with few marks. In the first two cases, in addition to fat grafting in a larger volume, we indicate superficial abrasion and, if necessary, a new grafting after 6 months, which is not recommended for the younger lips. After a large-volume expansive anesthesia, we use a 1 ml syringe and a 21G × 11/4″ green hub needle. The average volume grafted is 6 ml in the young lips and 18 ml in the senile lips or in the lips of someone who suffered massive weight loss (Fig. 47.6).

Fig. 47.6 Senile lips before and after fat grafting

(a) Senile upper lip or after massive weight loss

- Skin – In the subcutaneous cellular tissue between the vermillion and the nasal base, through fan-shaped retroinjection. Starting in the commissure of the lips, the needle is inserted until it touches the line of the philtrum. The area between the ridges should not be injected, so that they remain taller. Volumes of 1 and at most 2 ml are grafted in the subcutaneous layer; larger volumes lead to artificiality. In the philtrum the needle is inserted at the vermillion/skin limit, from the bottom up, holding the skin between the fingers so that the graft remains perfectly directed in the projection formed by the philtrum, in approximately 0.3 ml volume.
- Skin/vermillion limit – It is important to press this limit between the fingers when introducing the 21G × 11/4″ needle close to the line that divides the different tissues, in order to prevent the fat, grafted by retroinjection, from spreading and allowing for a perfect contour that marks the limits of the lips. The needle is inserted in the exact point of the lateral limits of the Cupid's bow to the right and to the left, up to 4 mm before the commissure of the lips, and the volume of 1 ml on each side is inserted. The Cupid's bow should be grafted through the same orifices, from the right to the left and from the left to the right, with a maximum volume of 0.30 ml; larger volumes lead to artificiality (Fig.47.7).
- Lip tubercle – For the grafting, it is essential to press the Cupid's bow between the fingers so that the tissue remains firm. A 21G × 11/4″ needle is inserted from the lateral vertices of the bow toward the tubercle, forming a V inside the muscle, and the fat is grafted in the volume of 0.10 ml on each side. In the center of the Cupid's bow, close to the mucosa/skin limit, the needle is inserted vertically up to the vertex of the lip tubercle, and the volume of 0.10 ml is grafted through a movement of retroinjection. These three movements determine the elevation of the Cupid's bow, which can be more or less projected depending on the grafted volume. Volumes of 0.30 ml are enough for a discrete elevation, without artificiality; larger volumes may sag and stretch the lip in a vertical direction (Fig.47.8).

Fig. 47.7 Skin/vermillion limit

Fig. 47.8 Lip tubercle

- Muscle – In order to thicken the lip, we must introduce the 21G × 11/4″ needle at the approximate depth of 3 mm in the orbicular muscle close to the vermillion and retroinject from the middle of the lip toward the commissure of the lips, with a larger volume in the medium third and reducing it as the needle is withdrawn, up to 2 ml on each side.

(b) Senile lower lip or after massive weight loss: The anesthesia is performed after the one of the upper lip.

- Skin/vermillion limit – The 21G × 11/4″ needle should be inserted at 4 mm from the commissure and slide to the middle of the lip to retroinject 1 ml of fat coming from the right and 1 ml coming from the left. It is important to press this limit between the fingers when introducing the needle and when injecting, to mark the contour. In the middle third of the width in the base of the nose, the grafting is complemented with 0.5 ml. The minimum amount to emphasize the limit between the vermillion and

Fig. 47.9 Skin/vermillion limit

the skin is 2 ml for plumper lips; for lips that are very thin, very marked or senile, the limit is 4 ml (Fig.47.9).

- Orbicular muscle – Only for thin or senile lips, with a 21G × 11/4″ needle, inserted at 4 mm from the commissure of the lips, by retroinjection. The graft is made from the center of the lip toward the extremities, with an average grafted volume of 3 ml: 2 ml in the center and 0.5 ml scattered on the sides;
- Skin/vermillion/mucosa – In order to increase the thickness of the middle third of the lip, the fat injection is made in a triangular way: the base is the skin/vermillion limit, the width is the projection of the base of the nose, and two edges form the vertex in the union of the lower incisors. We mark those references on the lip, over each edge; with the 21G × 11/4″ needle, we inject 0.25 ml of fat in the muscle, at the maximum depth of 3 mm and in the direction of the lower incisors. The fat previously injected in the middle third, added to the V shaped graft, enhance the inversion and the increase in thickness. It is important to avoid larger-volume grafts, since there is the risk of provoking a pronounced eversion, exposing the mucosa (Fig.47.10).

(c) Young Upper Lip: To improve the definition of the lip, the grafting is made only in the skin/vermillion limit, in the philtrum, in the Cupid's bow, and in the lip tubercle, with the maximum volume of 4 ml. The skin should not be grafted.

The volumetric increase in the lip is made by grafting in the muscle, close to the mucosa, with 3–6 ml volumes.

(d) Young Lower Lip: The grafting is made only in the medium third, in the skin/vermillion limit, horizontally, close to the mucosa, with a maximum volume of 1 ml to create a slight eversion (Fig. 47.11).

Fig. 47.10 Skin/vermillion/mucosa

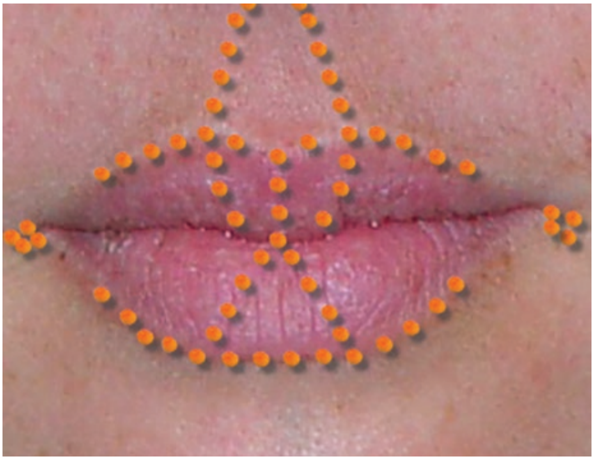

Fig. 47.11 Young upper lip

6. Chin: After expansive infiltration in the area, the fat retroinjection will be made by using a 3 ml syringe and an 18G × 11/2″ needle, from the lateral sides to the center and from the bottom up, in the musculus depressor labii inferioris and subcutaneous, so as to form a triangle whose imaginary vertex lies at the junction of the lower incisors and whose base has the width of the distance between the lower canine teeth. Fat should never be grafted horizontally at the base of the chin, since this will lead to the formation of unaesthetic volume in this line, characterizing the witch's chin. The volume of fat to be injected will depend on each patient's aesthetic need. In the case of light to moderate need, 3–5 ml is grafted. In cases that require a larger volume, the periosteum should be scratched with the tip of the needle so that it bleeds and stimulates the fat to repair the lesion, through calcification. This maneuver provides more firmness and allows for more volume (Fig. 47.12a, b).

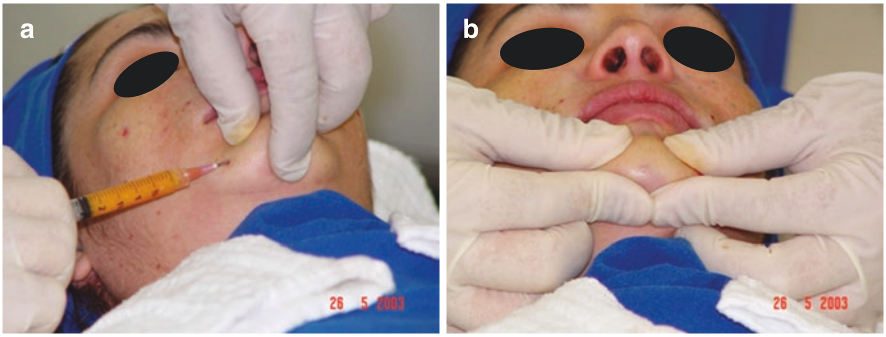

Fig. 47.12 (**a**) Never to graft horizontally. (**b**) Compression modeling

7. Nose: Despite the nose's structural complexity, with multiple elements and different functions, but always wrapped in adipose tissue, fat grafting to the nose permits to improve the harmony and the appearance of the nose, specifically in small depressions of the ridge, postsurgical irregularities, and droopy nasal tip, among other applications. It is important to previously make a rigorous demarcation of the defects to be corrected, in order to proceed to the expansive anesthesia. Fat grafting is carried out with a 1 ml syringe and a 21G × 11/4″ needle, always by retroinjection. It is important to avoid hypercorrection, particularly in the ridge, where it may cause unaesthetic protuberances. In sequelae of post-rhinoplasty fibrosis and bone irregularities, among others, the fat promotes the softening of those scars and disguises depressions. Skin lesions and very thin skin of older people at risk of neoplasia respond well to fat grafting of the ridge, improving the quality of the skin. In the nasal tip, after significant anesthetic distension, the needle goes down between the junction of the alar cartilages close to the skin, from the tip to the anterior nasal spine bone of maxilla, injecting at least 1 ml and at most 2 ml of fat. The second point of elevation is the alar insertions: after anesthetic expansion, a puncture is made, with an 18G × 11/2″ needle, in the skin of the nasolabial fold, at 2–3 cm from the wings of the nose; using a 1.5 mm cannula, the insertion of the wings of the nose is detached, and a volume of 1–2 ml is grafted, which promotes the elevation of the tip by elevation of the triangle of the nasal base (Fig. 47.13a, b).
8. Expression lines: Those wrinkles are individually delimited alongside their axis. Expansive anesthesia, retroinjection with 1 ml syringe, and a 21G × 11/4″ needle in the subcutaneous cellular tissue and in the intradermal layer of the depression. In deeper wrinkles the subincision is made before grafting.
9. Earlobes: In the senile atrophic ear, the thinning of the lobe makes it longer. After the demarcation of the lobe, the expansive anesthesia should attain a significant turgor in order to open the spaces and enable grafting in crisscross movements in several levels of depth. A 1 ml syringe and a 21G × 11/4″ needle are used, and the grafted volumes depend on the format and the need of the lobe, ranging between 2 and 3 ml (Fig. 47.14).

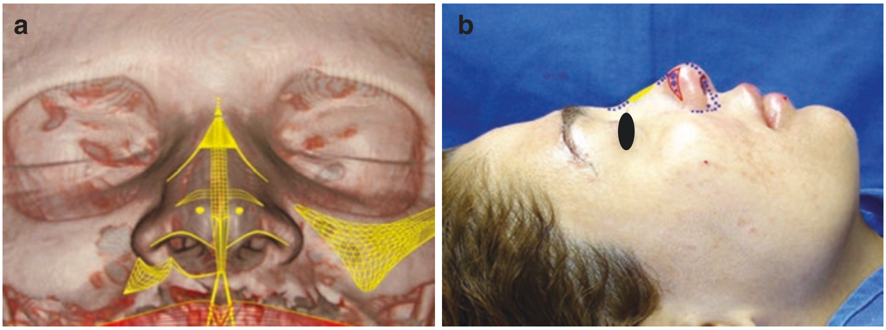

Fig. 47.13 (**a**, **b**) Areas of interest in the nose, upper lip, and malar region

Fig. 47.14 Earlobes

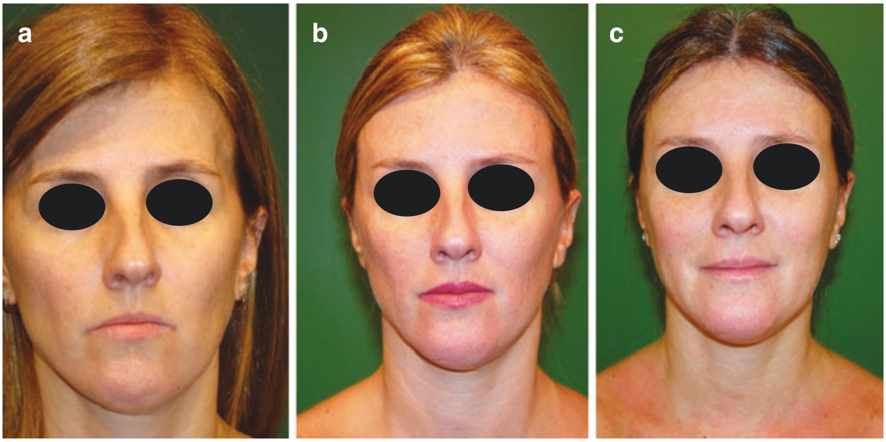

Fig. 47.15 (**a**–**c**) Results: 5 years of evolution

47.3 Complications

The most common complications occur in the lips, usually caused by edema. Anxiety may cause the patient to press or even suck on the lip tubercle, thus increasing the edema and deforming the lip.

The patient should not sleep on the side, because it may provoke lipolysis of the grafted fat. Ideally, he/she should wait 3 weeks to do it.

47.4 Discussion

For beginners in the technique of hydric distension of the tissues, the use of cartridges as a measure of volume makes learning easier. The use of old photographs helps in the concept of restoring the lost beauty. It is impossible to go back to the past, but it helps to have an approximate idea of what should be done.

47.5 Conclusions

Expansive anesthesia changes the surgical concept of fat grafting, creating a space that does not exist and filling it with a larger number of cells, with better quality for engraftment.

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Chapter 48
Facial Surgery in Postbariatric Patients

Roberto Kaluf, Hugo Leonardo Freire Gomes, and Roberto Kaluf Filho

48.1 Introduction

The number of patients classified as overweight (Body Mass Index (BMI > 25 kg/m^2) or obese (BMI > 30 kg/m^2)) [26] is increasing in developing as well as in developed countries. This also increases the number of those who can lose weight through lifestyle changes, especially with bariatric surgeries.

Bariatric surgery has emerged as an effective and rapid means of weight control in obese patients who seek to improve health in keeping with WHO guidelines. They seek not only the absence of disease (hypertension, coronary disease, pulmonary hypertension, diabetes, dyslipidemia, gastroesophageal reflux disease, cutaneous mycosis, etc.) [7, 22] but complete physical, mental, and social well-being.

In spite of the advantages and disadvantages associated with the significant loss of adipose tissue after these surgeries, there is excess skin that will remain after the procedure. This excess can be considered an aesthetic issue by both society and the patient and can cause a psychological impact [2]; this creates a demand for reconstructive surgeries involving dermolipectomies in about one third of the patients who stabilize their weight [20].

Generally, reconstructive plastic surgeries after massive weight loss (AMWL), those with a loss of at least 45 kg or 50% of body weight, have seen only a relatively recent rise [5, 20]. Among these procedures, one less performed is rhytidoplasty since the face is generally a body region less affected by substantial fat loss [9, 13, 20]. However, the demand for it is increasing and naturalness is a characteristic expected by the patients. To achieve such an effect, it is important to decrease the

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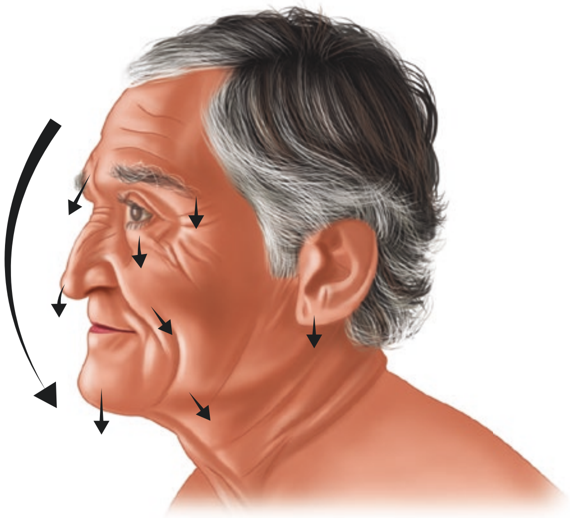

Fig. 48.1 Demonstration of the decline of facial structures after weight loss

visibility of the scars resulting from the procedure and to remodel the tissues according to the force vectors to which the skin of the face is subjected.

In those patients whose faces are more affected, we perceive excess skin and a laxity in the platysma muscle, developing something similar to “jowls,” “dewlap,” or a “turkey neck” [13, 20, 22]. Nasogenian sulcus are noticeable, as are sagging in the mentalis, perioral, periorbital, and palpebral regions, as well as in the tip of the nose and earlobes, all of which contribute to the early aging aspect of the individual (Fig. 48.1).

In order to correct these aspects in the most aesthetic and lasting way, we use various surgical tactics suited to the quality of the tissue of these patients. Due to the fact that the postbariatric patient does not adequately absorb enough nutrients, he ends up damaging the tone and consistency of the skin and superficial musculoaponeurotic system (SMAS) [5, 11, 16, 18].

Considering the region of the face that we intend to rejuvenate or simply remodel, different types of rhytidoplasty are performed: frontal rhytidoplasty, rhytidectomy of the middle third of the face, neck rhytidectomy, and complete rhytidectomy (which covers all three).

48.2 Diagnosis or Preoperative Evaluation (General Considerations)

Plastic surgery plays a crucial role in the outcome of one’s search for health, promoting surgeries that, roughly speaking, could even be called inclusion procedures, since the patient who has had his face quickly transformed by weight loss can have his facial pattern restored in most cases. Since the face is an area that the patient cannot camouflage through clothing, the surgical procedure allows him to see himself as the individual that he was before, to accept himself more, and be better accepted by society.

Therefore, most patients who are candidates for rhytidectomy are those who have undergone a significant loss of weight, resulting in flaccidity of the facial skin and decrease in the volume of the fatty cushions that are responsible for filling out the face and that provide facial harmony, resulting in deep wrinkles, distinct markings, excess skin, and ptosis. Thus, the recommendation of rhytidoplasty after massive weight loss is given when they achieve stability at their target weight. Because the greatest weight loss usually occurs some 12–18 months after bariatric surgery, it is prudent to wait another 4–6 months after that to assess whether the new plateau is being maintained [6].

48.3 Nutritional Changes of the Patient After Bariatric Surgery

Nutritional changes are not uncommon for postbariatric patients. The literature suggests that the use of nutritional supplementation is necessary to prevent or treat any nutritional deficiencies caused by anatomical changes due to surgical techniques [1, 3, 4, 10, 15, 18, 23–25, 27]. Therefore, we suggest nutritional supplementation (vitamin B12, elemental iron, liposoluble vitamins, calcium citrate, protein, etc.) whenever a laboratory test shows some alteration in the pre-surgical evaluation and, whenever possible, by a parenteral route, for the period necessary to achieve the minimum laboratory reference values [3, 4].

48.4 Histopathological Appearance of the Patient After Bariatric Surgery

Knowledge about facial changes due to aging is better established than that involving the structural changes and cutaneous-facial histology resulting from MWL; however, in this group there is a decrease in turgor and loss of subcutaneous fat [12, 17]. The skin thickness tends to decrease in the facial region [17] in spite of there being evidence of an increase or absence of difference in thickness in other skin areas [7]. In addition, there is an increase in the expression of type III collagen, an immature collagen with less ability to heal [7]; the collagen fibers become fewer and wider [7, 14, 19]. Furthermore, we can identify logical alterations compatible with aging, such as loss of cohesion of collagenous fibers and enzymatic degradation of loose tissue [7, 17, 21, 12].

The histopathological analysis of the skin, adipose tissue, and SMAS of postbariatric patients shows increased edema, perifollicular lymphohistiocytic inflammatory activity, and severe hypotrophy in the epidermis (Figs. 48.2, 48.3, 48.4, 48.5, 48.6, 48.7, 48.8, and 48.9); increased inflammatory activity and edema throughout

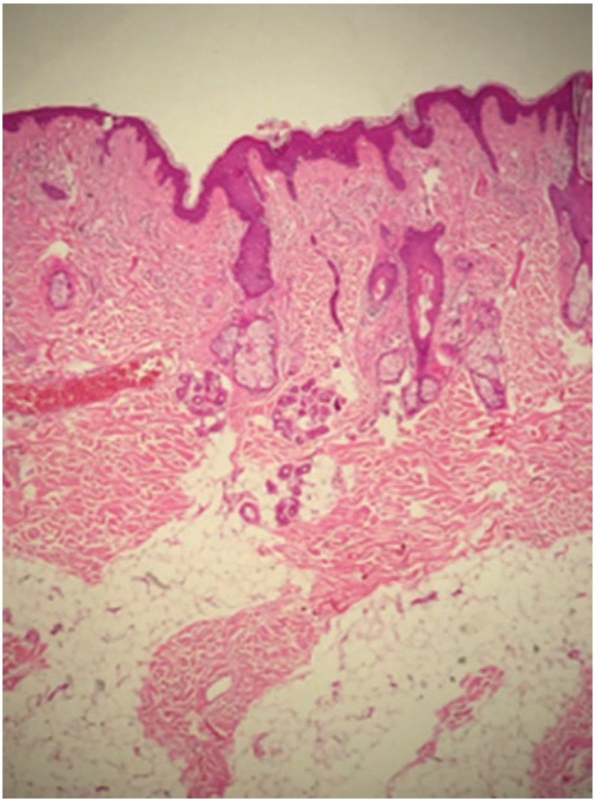

Fig. 48.2 Non-bariatric patient skin (magnification: 100×; stained, hematoxylin and eosin)

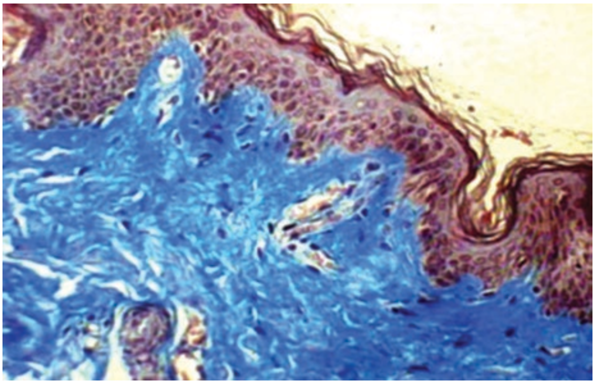

Fig. 48.3 Non-bariatric patient skin (magnification: 200×; stained: Masson’s trichrome)

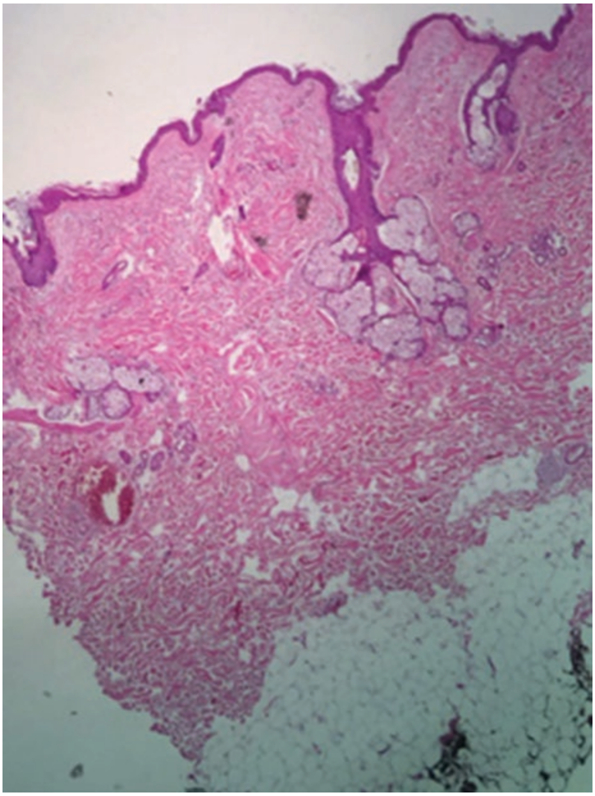

Fig. 48.4 Postbariatric patient skin: perifollicular lymphohistiocytic inflammatory activity, severe hypotrophy of the dermis thickness (magnification: 100×; stained: hematoxylin and eosin)

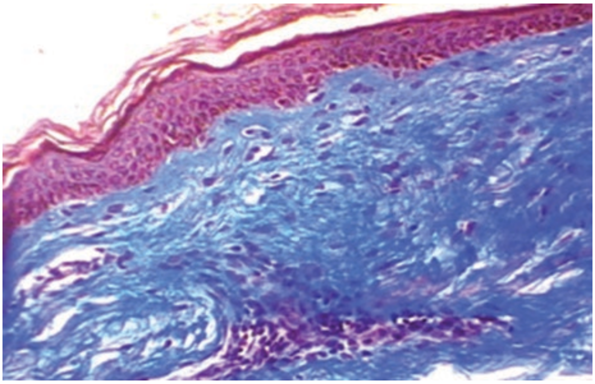

Fig. 48.5 Postbariatric patient skin: perifollicular lymphohistiocytic inflammatory activity, severe hypotrophy of the dermis thickness (magnification: 200×; stained: Masson's trichrome)

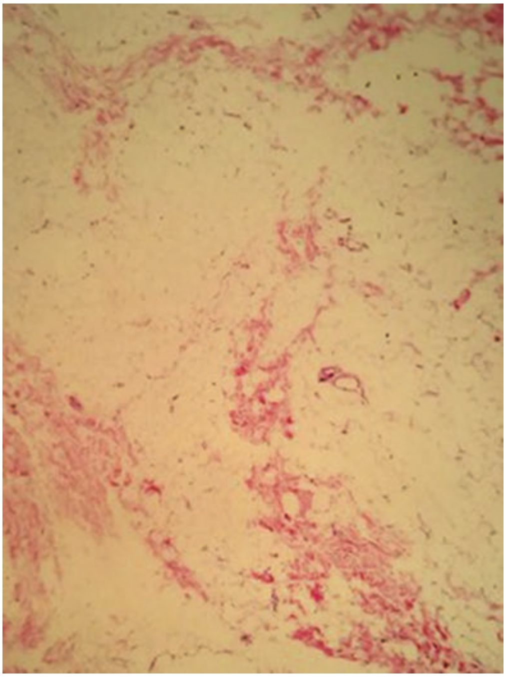

Fig. 48.6 Non-bariatric patient adipose tissue (magnification: 100×; stained: hematoxylin and eosin)

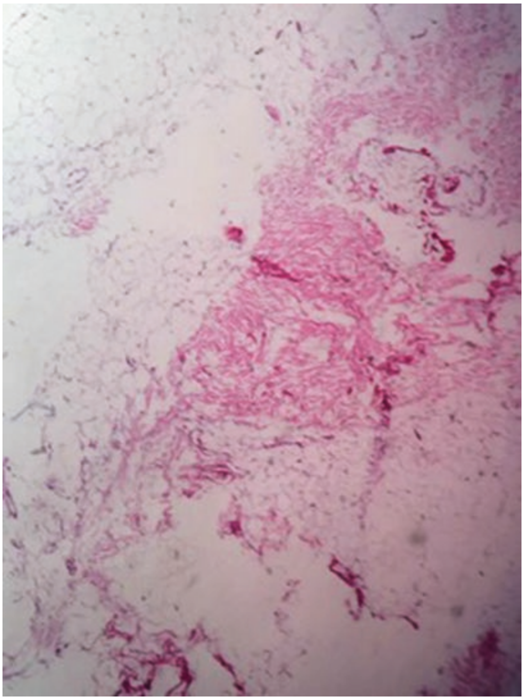

Fig. 48.7 Postbariatric adipose tissue: inflammatory activity and edema in all adipose tissue. (magnification: 100×; stained: hematoxylin and eosin)

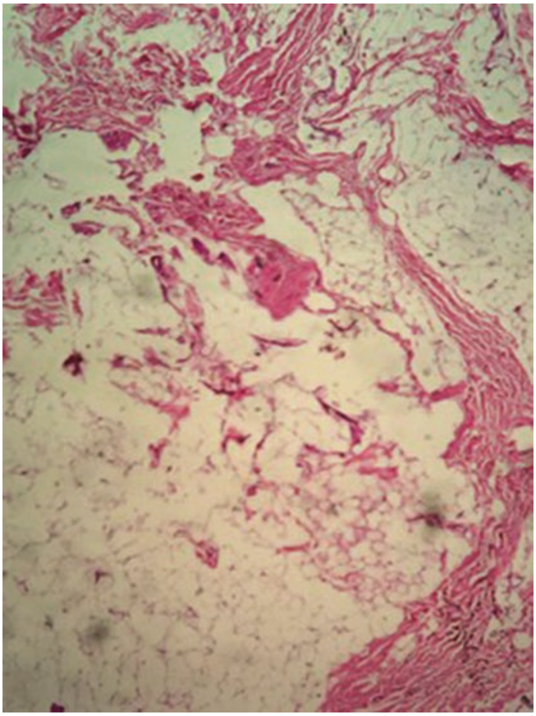

Fig. 48.8 Non-bariatric patient SMAS (magnification: 100×; stained: hematoxylin and eosin)

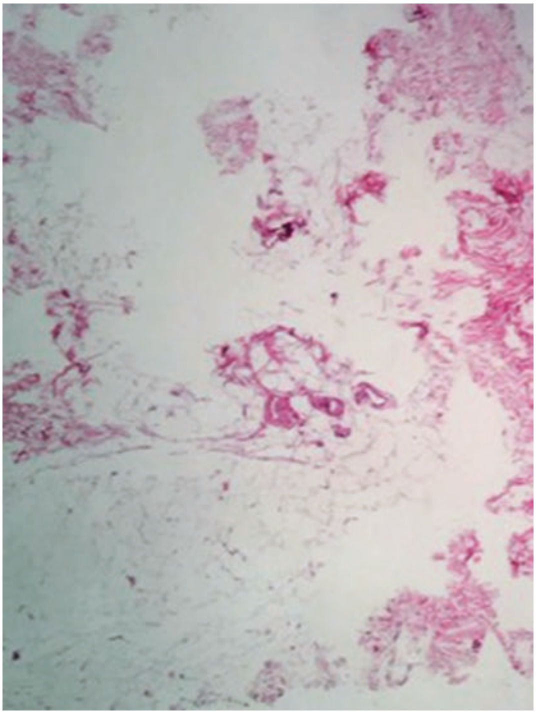

Fig. 48.9 Postbariatric patient SMAS: presence of decreased fibrous collagen tissue in its thickness and fibroconjunctive tissue with decreased vascularity (magnification: 100×; stained: hematoxylin and eosin)

the adipose tissue; a decrease of fibrous collagen tissue in its thickness; and the presence of fibroconjunctive tissue with decreased vascularity in the SMAS, when compared to non-bariatric patient skin.

48.5 Planning

In order to guarantee the effective support of the facial tissues, SMASectomy and plication are necessary to reposition the aponeurotic structures. SMASectomy is obtained through the removal of linear and parallel bands of SMAS, with the intention of subsequently applying force vectors to remodel the tissue and ensure correct support.

These force vectors should pull the tissues cranially and laterally in order to correct the senile, postbariatric decline. The correct application of these vectors deals with the middle and lower thirds of the face, in addition to the anterior cervical region, bringing firmness to the patient's face.

A precaution should be taken due to possible complications related to nerve bundle injuries. Therefore, the wide detachments must respect the superficialization points of the facial nerve branches, which require deep knowledge of the danger zones of the face.

Finally, the application of sutures in order to reshape the framework on which the skin will rest is necessary to achieve a favorable aesthetic result.

48.6 Surgical Technique

Initially, the markings are made with the patient still awake, in order to recognize static and dynamic lines and marks (Fig. 48.10). To do so, the boundary area of the detachment (Fig. 48.11) is delimited, and the danger points on the face are not exceeded, which must also be marked.

The surgery then begins with anesthesia, and most of the time, general anesthesia is infiltrated with anesthetic solution (lidocaine 0.5%) with adrenaline (dilution 1:200,000 U), except for extremely interactive patients who only will allow a local analgesia. At the time of anesthetic induction, antibiotic prophylaxis should be performed. The patient should be in the supine position, with head slightly inclined to facilitate the venous return and the reduction of perioperative bleeding.

Pre-pilose and trichophytic incisions are then made, which tend to become less evident after the wound heals. The delimitation of the areas of detachment should respect the danger zones of the face, that is, regions with greater potential for nerve damage. The regions with the highest risk of injury are the lower retroauricular region, due to the risk of lesion of the major auricular nerve, and the lateral zygomatic region, especially in very emaciated patients, since it is a region of superficialization of the temporal branches of the facial nerve.

Fig. 48.10 Incision zone, precapillary most of the time due to the large amount of tissue traction in this patient's profile

Moreover, the marking of the lateral line of the face, the area to be detached (zygomatic lateral, preauricular, posterior mandibular, and cervical regions), and the local incision (intracapillary or precapillary temporal, preauricular and retroauricular contour, and the precapillary line of the mastoid region) are performed.

By means of a submental incision, the platysma muscle is accessed allowing the surgeon to manage the platysmal bands through their plication with absorbable sutures (e.g., poliglecaprone 4.0), single stitches, and inverted knots (Fig. 48.12).

The detachment of the lateral regions of the face follows a subcutaneous plane, thick enough to maintain viability of the flap and avoid trophic lesions of the skin, but always above the SMAS, mainly to avoid facial nerve injury (Fig. 48.13).

Afterward, in the lateral detached region of the face, the redundant portion of the SMAS is marked, in which plication or, possibly, SMASectomy may be performed (Figs. 48.13, 48.14, 48.15, and 48.16). The plication establishes a posterior and superior traction vector, in such a way as to diminish the residual dead space of the detachment and reestablish volume of the malar region with the SMAS.

The cutaneous flap is repositioned with the resection of its excess (Fig. 48.17) and suture of the subdermal plane with poliglecaprone 5.0 and the skin with prolene or nylon 6.0, continuous stitching (Fig. 48.18). In men, the technique differs in that we make an incision in the region of the sideburns.

Fig. 48.11 Areas of wide facial skin displacement

Fig. 48.12 Cervical dissection and plication of the platysma muscle

Fig. 48.13 Detachment plan and delimitation of redundant SMAS to be resected

Figs. 48.14 and 48.15 SMASectomy

Fig. 48.16 Plication of SMAS

Fig. 48.17 Traction vectors (upper and posterior) and repositioning of the flaps

Hemostasis must be rigorous. In all cases, we use a vacuum drain, which is removed when the rate is equal to or less than 20 ml/24 hours and looks serous.

The removal of the sutures occurs 7 days postoperatively, with a weekly return up to the 28th day, and results evaluated after 4–6 months (Figs. 48.19, 48.20, 48.21, 48.22, 48.23, 48.24, 48.25, 48.26, 48.27, 48.28, 48.29, 48.30, 48.31, 48.32, 48.33, 48.34, 48.35, and 48.36).

Fig. 48.18 Immediate post-surgical

Figs. 48.19 and 48.20 Pre and post-surgical presentation (6 months); frontal

Figs. 48.21 and 48.22 Pre and post-surgical presentation (6 months); right side

Figs. 48.23 and 48.24 Pre and post-surgical presentation (6 months); left side

Figs. 48.25 and 48.26 Pre- and post-surgical presentation (6 months); frontal

Figs. 48.27 and 48.28 Pre and post-surgical presentation (6 months); right side

Figs. 48.29 and 48.30 Pre and post-surgical presentation (6 months); left side

Figs. 48.31 and 48.32 Pre- and post-surgical presentation (6 months); frontal

Figs. 48.33 and 48.34 Pre and post-surgical presentation (6 months); right side

Figs. 48.35 and 48.36 Pre and post-surgical presentation (6 months); left side

48.7 Complications

Complications increase recovery time, decrease satisfaction, increase procedure costs, and cause discomfort to the patient.

In addition to the usual complications that accompany the procedure of rhytidoplasty (hematomas, skin necrosis, paresis, paralysis of the mimic muscles due to facial nerve damage, infections, alopecia in the incision site, hypertrophic or keloid scars, generally in the retroauricular areas, etc.), concerns the specific complications of the patient after massive weight loss. With regard to this, one can list the influence of the difficulty in nutrient absorption, exacerbated local inflammation and disruption of the collagen fibers in the healing process, in addition to the possibility of not maintaining skin tone in the months following the procedure.

Some authors, however, do not perceive the influence of MWL on the increase of postoperative complications when compared to control groups [8].

48.8 Conclusions

Rhytidoplasty is an effective facial rejuvenation technique. It is not a technique free of complications but has developed over the years looking for ways to circumvent them and achieve the best aesthetic result possible. It has been an excellent technique for redefining the facial contour by removing excess tissue and harmoniously remodeling the subcutaneous tissue, SMAS, and skin.

It can be seen that the operative technique in the postbariatric rhytidectomy follows general principles but with specific details for this group of patients, such as more aggressive plication and treatment of the platysma muscle and the occasional need for SMASectomy. Thus, these patients present satisfactory postoperative surgical results in relation to their initial sagging, with clear rejuvenation and aesthetic remodeling of the face and neck.

It is also noticed that this type of patient presents skin of worse histological quality in relation to those without the nutritional difficulties coming from the surgery for weight reduction. In other words, the skin of the postbariatric patient presents a worse arrangement pattern of the collagen fibers, which, in addition to exacerbating the local inflammatory reaction, may hinder the normal healing process, jeopardize the durability of the procedure, and increase the risk of local complications. Regarding the durability of the procedure, further studies are needed to establish conclusions.

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Chapter 49
Hemostatic Net

André Auersvald and Luiz Augusto Auersvald

49.1 Definition of Hematoma in Rhytidoplasties

A hematoma is a collection of 30 mL or more of blood that requires surgical drainage [7]. Its incidence varies by study, ranging from 8% to 14.2% in larger series [2, 7, 8, 12, 23]. Overall, hematomas substantially increase postoperative morbidity, delaying the final result and often leading to a difficult doctor-patient relationship [2].

49.2 Etiology of Hematomas

Grover et al. [12] analyzed 1078 patients who underwent face-lifts to identify the most important risk factors in hematoma formation. Combined cervical procedures (4.3-fold increase), hypertension (3.6-fold increase), male sex (2.8-fold increase), use of acetylsalicylic acid and nonhormonal anti-inflammatory drugs (2.3-fold increase), and smoking (2.1-fold increase) all correlated significantly with the occurrence of hematoma. Of note, in their study, Grover et al. [12] considered only risk factors for postoperative hematoma that were previously cited by other authors. Our experience in treating hematomas over the years has revealed additional contributory factors.

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49.2.1 Nausea and Vomiting

In our experience, the main cause of postoperative hematomas is nausea and vomiting. Similarly, Apfel et al. [1] found that nausea and vomiting were the most frequent complications in postoperative recovery after general surgery, affecting between 20% and 30% of patients.

Vomiting is a spasmodic activity involving abdominal, thoracic, and diaphragmatic muscle contractions, resulting in the elimination of gastric contents. Vomiting raises the venous – and often the arterial – blood pressure levels. When added to concomitant psychomotor agitation, these increases in blood pressure values can lead to hematoma formation.

Among the risk factors for postoperative nausea and vomiting are individual predisposition (i.e., a history of emesis in other surgeries), surgical time, hypotension during surgery, use of anticholinergics in high doses to reverse muscle inhibition, reaction to medications (especially anti-inflammatory drugs and opioids), inhalation anesthesia, gastroesophageal reflux, and vestibular (labyrinthine) and migraine disorders [1].

49.2.2 Labyrinthitis

Acute peripheral vestibulopathy (acute labyrinthitis) and benign positional vertigo (BPV) are diseases of the vestibular system with high prevalences in those older than 40 years. BPV occurs in 25% of persons over age 70 years with a history of dizziness [27]. With vertigo, these syndromes are commonly associated with nausea and vomiting. These patients are also more likely to have episodes of vomiting postoperatively, which implies a greater risk of hematoma.

Considering the average age of patients seeking facial rejuvenation surgery, it is important to question them about a history of labyrinthitis. Patients with this condition should be aware of the possibility of a crisis occurring after surgery. Treatment alternatives and implications for the postoperative period should also be discussed.

49.2.3 Migraine

Patients with a history of migraine may develop a crisis in the immediate postoperative period, often involving nausea and vomiting. To avoid a potential hematoma, patients should be questioned in advance about this condition and their current treatment approaches. Discussing additional measures to reduce postoperative discomfort facilitates the process of decision taking when a migraine crisis occurs.

49.2.4 Psychomotor Agitation

Patients undergoing facial rejuvenation surgery often become agitated in the first postoperative hours. It is not uncommon for patients to have an interval of psychomotor activity and tension between waking from anesthesia and full consciousness. During this time, vigorous movement of the head and neck can cause bleeding. This unrest may also start as the patient may experience difficulty in breathing soon after removal of the orotracheal or nasotracheal tube during recovery. Pain in the operated area can also lead to agitation and potentially elevate arterial blood pressure level. Any of these states in turn may cause bleeding.

49.2.5 Urinary Retention

Transurethral bladder catheterization is fundamental to adequate control of transoperative and postoperative diuresis. It is usually performed after the patient enters the operating room and receives the first dose of sedative. The volume of saline infused during surgery naturally implies major production of urine. A full bladder is a very common cause of transoperative increase in arterial blood pressure level. Waking the patient with this condition leads to distress over the urge to urinate, psychomotor agitation, and possibly hematoma.

In men, it is important to note a history of benign prostatic hyperplasia and/or previous procedures in the prostate before surgery, as this may mean a difficult bladder catheterization. For patients with these conditions, we usually request the assistance of an urologist for the passage of the catheter.

49.2.6 Constipation

Patients undergoing a face-lift often experience constipation in the postoperative period. Reductions in fluid and fiber intake in addition to continued use of opioid analgesics may be among the causes. Evacuation efforts may lead to increased venous pressure and consequently to hematoma in the operated region.

Instructing patients about an appropriate diet, warning them not to make extra efforts during a bowel movement, and informing them about possible use of intestinal regulators and laxatives can help prevent bleeding.

49.3 Standardization in Pre-, Inter-, and Postoperative Management

The young surgeon who wishes to perform facial rejuvenation surgery usually has to work in different surgical environments with unfamiliar anesthetic teams. This often complicates standardization in the control of variables and symptoms that can increase the risk of hematoma, notably rising blood pressure level and vomiting. On the other hand, more experienced surgeons can establish constants in their routine, reducing the risk factors for hematoma, although not eliminating them completely.

49.4 The Hemostatic Net

49.4.1 Background

The history of the hemostatic net began in 2005 and 2006, years during which the number of face-lifts we performed increased substantially. In more than 90% of these patients, surgical rejuvenation of the neck (i.e., neck lift) – associated with lifting of the middle third of the face – was also performed [5]. This rate is consistent with the literature, which indicates that rejuvenation of the neck is the primary objective of patients seeking facial rejuvenation [6, 10, 13, 19, 26].

In our view, the best method for treatment of the cervical region is via submental access, which allows adequate assessment and treatment of the platysmal and subplatysmal structures (digastric muscles, subplatysmal fat, and submandibular salivary glands). Cervical lifting, performed via the submental incision, greatly expands the area of cutaneous undermining, and, according to Grover et al. [12], it increases the risk of bleeding by threefold to fourfold. The rate they reported (13.4%) is similar to the rate we observed (14.2%) during the mid-2000s [2]. Thus, although we were driven to open the submental area in the quest for better results in the neck, we encountered a series of difficulties that included a substantial increase in the incidence of hematomas.

In a study of 1236 patients undergoing face-lift surgery, Rees et al. [24] reported 23 hematomas, all occurring during the first 48 hours postoperatively. Once a hematoma has been diagnosed after a face and/or neck lift, the surgeon should consider its drainage. This is especially imperative with rapidly expanding hematomas in cervical lifts, as compression of the trachea in the neck region can lead to extreme conditions, as we saw on two occasions.

Nevertheless, difficulties may arise when treating hematomas, especially in emergency situations. The time it takes for the patient, the surgeon, and the surgical team to get to the hospital, the availability of an anesthesiologist-supported operating room, and the organization of appropriate materials and instruments are critical to a successful intervention. The longer the waiting time, the greater the risks of ischemia and necrosis of the flaps. Effective interaction between the surgical, anesthetic, and hospital teams is also important to speed up treatment. Younger surgeons tend not to have an established routine for such events and often lack an established bond with the hospital structure and the anesthesia team. In this scenario, greater delays are more likely, possibly leading to more severe complications.

During preparation for drainage, it is not uncommon for hematomas to expand considerably in volume. As patients' stress and pain levels increase, their blood pressure level can also rise. In addition, because hematoma is an emergency condition, patients are often not in the fasting state necessary for sedation or general anesthesia; in this case, they should be operated on only under local anesthesia. Unfortunately, patients who undergo surgery with local anesthesia (i.e., without sedation) often recall the discomfort of the procedure, which may become the reason for complaints during postoperative follow-up visits.

Traditionally, evacuation of a hematoma requires opening of the incisions and withdrawal and aspiration of the blood, followed by irrigation with saline to wash the impregnated areas until the responsible vessel(s) is found. A larger vessel is often not visualized, and bleeding can be diffuse and difficult to control, requiring excessive cauterization. Surgery is finalized by repositioning of the flaps and the placement of drains.

Unfortunately, these maneuvers do not guarantee that a new hematoma will not occur. It was precisely in situations of early recurrence of bleeding, immediately or a few hours after hematoma evacuation, that we initiated use of the hemostatic net.

In early cases, the *A-net* was used to treat an already installed hematoma. Patients were treated in their hospital room, not in the operating room. Local clots were drained through the incisions by rolling gauze over the skin flap and forcing the blood out by compression. External sutures of mononylon 4-0 were applied to obliterate the space, preventing the blood from recollecting. No damage to the flaps or alteration in skin pigmentation at the suture application sites was observed over time.

This success inspired us to use external sutures at the bedside for larger primary hematomas, without the need to take patients to the operating room. With enough experience in the use of the net to treat installed hematomas, we decided to use the same tactic to prevent the occurrence of bleeding.

The use of quilting sutures has already been described in the literature. Rho et al. demonstrated their use in preventing the occurrence of hematomas after liposuction and curettage for the treatment of axillary hyperhidrosis [25]. Dr. Ronaldo Pontes also described the use of such sutures, albeit quilted, for the purpose of stabilizing cervical flaps [21].

49.5 The Inspiration of the "Baroudi Sutures"

Seroma is one of the most frequent complications in abdominoplasty. Dr. Ricardo Baroudi developed internal adhesion sutures that close the undermined area, preventing the collection of serous fluids and/or blood postoperatively [9]. This simple and easy-to-learn technique, using readily available materials, quickly became popular.

Early on in the development of the hemostatic net, we consulted with Dr. Baroudi, to whom we owe gratitude for academic guidance and encouragement in the publication of our first articles on the subject. In our view, the hemostatic net is analogous to Baroudi's quilting sutures, but with external application, an impression he shared.

49.6 Applying the Hemostatic Net

During facial rejuvenation, the hemostatic net is performed after dissection, and treatment of the deep structures and traction of the skin flap are completed. In our routine, the right side of the face is addressed before the left side. We incise the left side only after completing the *A-net* on the right side.

The hemostatic net consists of parallel columns of continuous sutures that provide mechanical closure of the detached areas by approximating the skin flap to the underlying superficial muscular aponeurotic system (SMAS)-platysma.

Our surgical suture of preference is nylon 5-0 with a semicircular and triangular 26-mm needle (Ethicon's Mononylon or Covidien Monosof). The shape and size facilitate maneuvering of the needle through the deep tissues. In the retroauricular region, where the skin may be thicker, the preferred suture is 4-0 nylon with a 2.5-cm needle. The semicircular needle is important in applying the *A-net* because this format facilitates encompassing of the SMAS or platysma under the skin by the suture. A key technical issue in creating the net is to ensure that the skin and SMAS are transfixed by the needle in the same pass.

As noted previously, we operate on the right side of the face first. The head is rotated to the left side with the neck extended so that the cervico-mandibular angle is slightly greater than 90°. This position helps to evenly distribute the skin. The detached area limits are demarcated, and the entire dissected surface must be covered by the *A-net*.

With the surgeon on the right side of the patient, the first column of sutures is initiated in the most medial and inferior portion of the detachment and directed to the most posterior dissected area in the retroauricular region. The passage of the needle follows a uniform pattern, entering perpendicularly and then diving, inclined at a 45 ° angle toward the SMAS-platysma, which in turn is encompassed in the movement. The needle returns to the skin surface at the same 45 ° angle, at a distance of about 0.8–1.5 mm from the anterior passage (Figs. 49.1 and 49.2). In the return, it is important to make a slight upper traction of the needle to ensure that the SMAS-platysma is indeed included.

The assistant should stand on the opposite side of the surgeon and help in two ways. The first is by securing the thread with one hand so that a light to moderate tension is maintained after each passage of the needle. The *A-net* cannot be so loose that it has no obliterative effect or so tight that it impairs circulation. The second

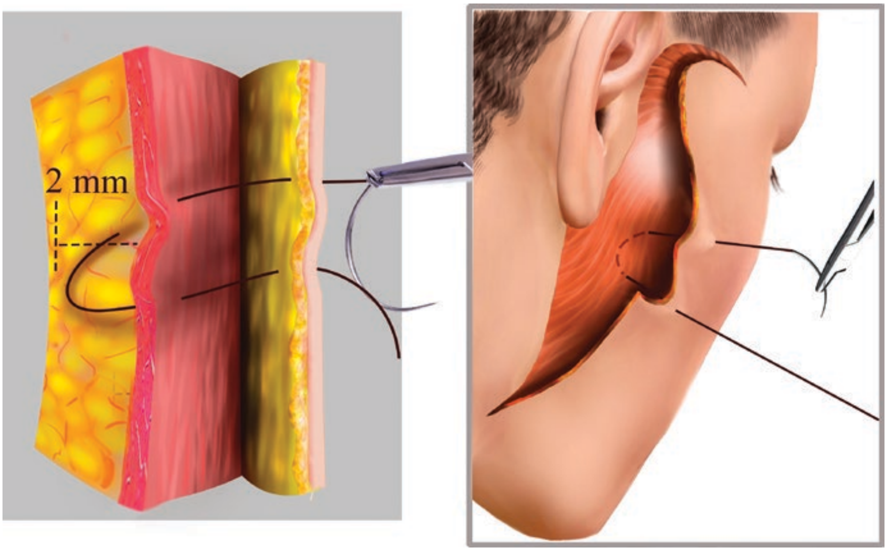


Fig. 49.1 A patient's right side is illustrated. The hemostatic net consists of continuous sutures that encompass the skin and the superficial portion of the SMAS-platysma

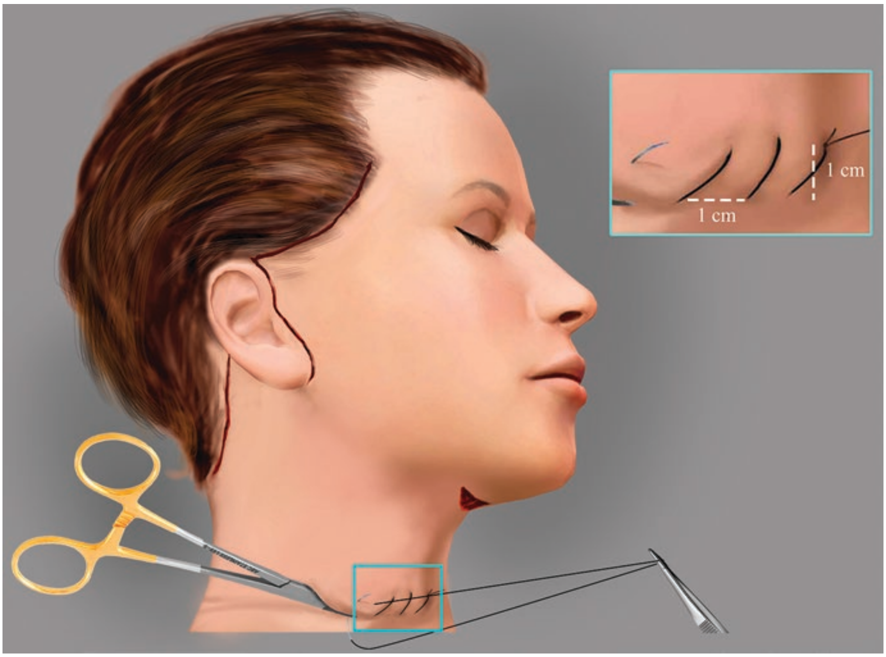


Fig. 49.2 The first column should start in the most inferior and medial aspect of the neck and run posteriorly. Each passage of the needle should be placed approximately 0.8–1.5 cm from the previous one. Each loop should be about 1 cm over the skin

form of assistance is helping to distribute the skin in an upward direction as the surgeon applies the net. This maneuver is especially important in the neck region because it helps to recruit the flaccid skin from the lower neck, accommodating it more superiorly. In addition, it is important that the skin be well distributed over the operated surface, without redundancies.

At the end of each column of the hemostatic net, the surgeon can check the correct application of sutures by simply inserting a forceps through the incision under the flap and sliding it along the column of sutures. If the skin in any region is not properly adhered to the underlying plane, a separate suture can resolve the issue. This complies with the fundamental principle of the *A-net*, which is the mandatory mechanical closure of all detached areas. The next line of sutures is applied parallel to the first one, leaving a space of 2–3 mm between them.

Once the neck is finished, the net is initiated in the most anterior area of the face in a line extending from the chin to the temporal region, passing through the malar and zygomatic regions. Parallel columns are successively applied until they meet those of the neck (Figs. 49.3, 49.4, and 49.5). In a combined face and neck lift, between 20 and 40 sutures are required for a hemostatic net.

Of note, hemostasis, which was a lengthy step before the introduction of the hemostatic net, is performed in a very brief and objective manner. Major bleeding vessels over the SMAS-platysma are cauterized. Smaller bleeders are usually controlled with the *A-net* itself: while the blood is aspirated with a Yankauer suction tip device, running sutures encompass the skin flap and the vessels, forcing them to stop bleeding.

After the *A-net* is completed, the surgical incisions are closed using 5-0 nylon. In the retroauricular scalp, the skin is closed with surgical staples. Drains are not needed and are not used in this protocol.

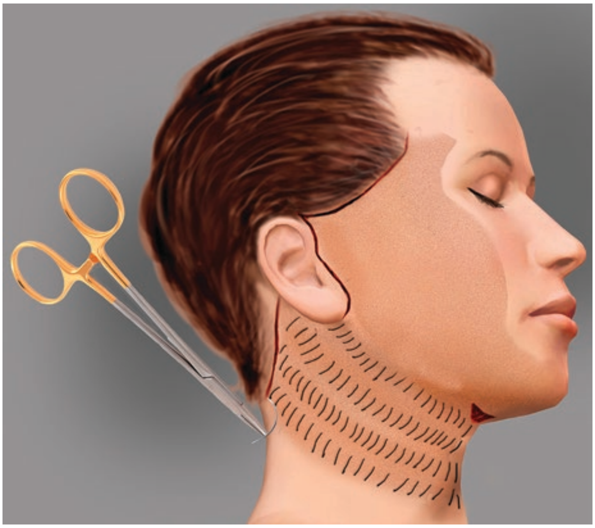


Fig. 49.3 The columns should be placed parallel to each other. The columns should progress in a superior and anterior direction. This is especially important in the neck because it allows the recruitment of the flaccid skin and better redraping of this region

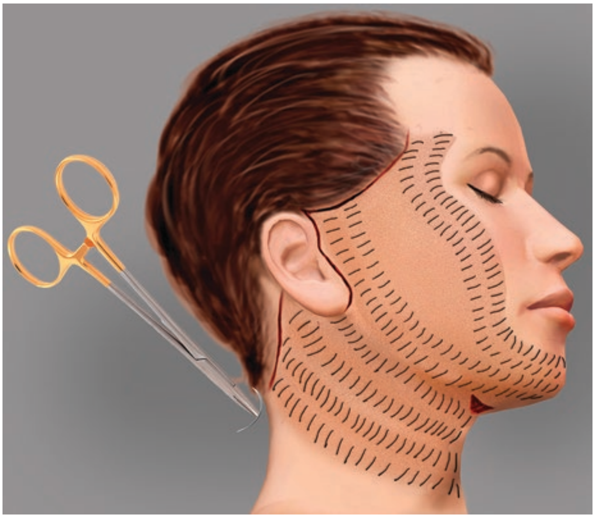


Fig. 49.4 After the neck is completed and one or two columns in the preauricular region are placed, the net is initiated in the most anterior area of the face. The columns here follow a line extending from the temporal region to the chin, passing through the malar and zygomatic regions. Successive columns are applied until they meet those of the neck

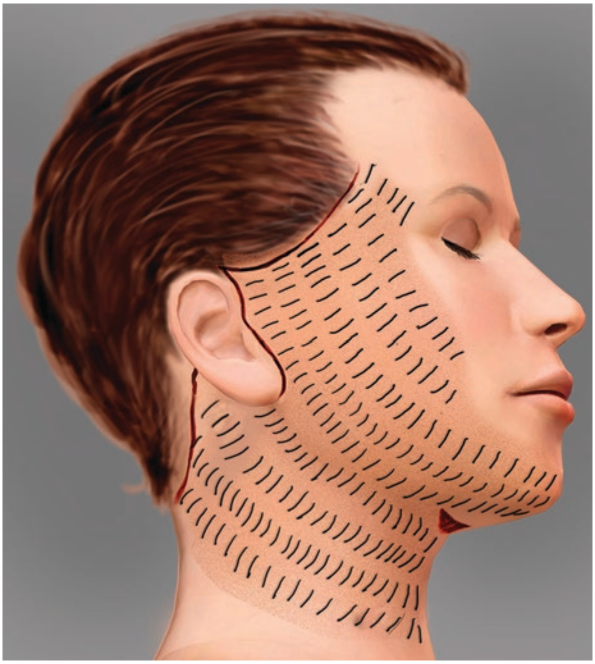


Fig. 49.5 Finally, the last spaces are covered by the net, concluding the procedure

Figs. 49.6 and 49.7 Preoperative frontal and lateral views of a 56-year-old woman who underwent a combined face-lift and neck lift

Figs. 49.8 and 49.9 Postoperative day 1. The flaps are well vascularized, and there are no signs of hematoma

Preoperative and postoperative photographs of a patient who underwent face and neck lifts using the hemostatic net are shown in Figs. 49.6, 49.7, 49.8, 49.9, 49.10, 49.11, 49.12, 49.13, 49.14, 49.15, 49.16, and 49.17.

49.7 The Hemostatic Net, the Jugular Vein, and the Facial Nerve

The external jugular vein results from the confluence of the posterior division of the retromandibular and the posterior auricular veins. It originates near the parotid and descends caudally, obliquely crossing the sternocleidomastoid muscle until it


Figs. 49.10 and 49.11 Postoperative day 7. After the removal of the net on postoperative day 2, the orifices formed by the passage of the needle tend to heal appropriately, with the crust starting to fall off in about a week


Figs. 49.12 and 49.13 Postoperative 2 months. Virtually no signs of the net are visible

reaches the subclavian vein around the middle third of the clavicle. The external jugular vein may be totally or partially covered by the platysma. During the dissection of the inferolateral region of the neck, the scarcity of subcutaneous tissue and thin coverage of the vein by the platysma may lead to inadvertently cutting it.

The hemostatic net should cover all detached areas including those corresponding to the region of the external jugular vein. In our experience, the passage of the needle through the vein does not generate bleeding because the suture is made/placed in a continuous running fashion, and a possible extravasation of blood is contained by the tension of the thread. In addition, we have not experienced bleeding from the removal of the *A-net* over the external jugular vein, possibly because

Figs. 49.14 and 49.15 Postoperative 6 months

Figs. 49.16 and 49.17 Postoperative 2 years

of the time it remains in place (48 hours) and the stabilization of clots. Doppler ultrasonography of the external jugular vein in patients undergoing the net technique shows maintenance of postoperative flow after its removal (unpublished data).

Some surgeons fear possible injury of the facial nerve with passage of the needle during application of the *A-net*. In our experience, however, no significant change in the incidence of paresis of this nerve was observed in patients undergoing this technique. This is likely explained, at least in part, by the fact that the needle passes predominantly in the fascial rather than the deeply subfascial plane. Unlike other surgical maneuvers, such as SMAS resections and plications, the hemostatic net stays in a more superficial plane, posing less risk to the facial nerve. It should also be noted that the 5-0 nylon needle is delicate enough to avoid critical or permanent trauma. Furthermore, the continuous sutures do not tighten the tissues enough to cause permanent trauma.

49.8 Dressings

During our initial consultation with patients, we always show them photographs of the hemostatic net, so there is clear understanding of and consent for its use. However, escorts and family members, especially those who have not participated in the preoperative evaluation, often have difficulty accepting the appearance of the *A-net* once it is in place. To help make everyone more comfortable, an occlusive dressing with cotton wool gauze and light crepe bandages is applied after the surgery (Fig. 49.18). This dressing is changed at 24 and 48 hours and is kept on for at least 3 days.

49.9 Removal of the Hemostatic Net

We recommend removal of the hemostatic net at 48 hours after surgery. This is sufficient time to have established coagulation and ensured adequate healing of the sutures.

Patients usually stay in the hospital for 48 hours. At the end of this period and before discharge, they take a shower, at which time the first hair washing is performed with nursing support. Afterward, with the patient in the supine position and

Figs. 49.18 An occlusive dressing is placed to protect the operated area and also to reduce the potential visual impact on others

his or her head at 30 °, the stitches are removed by sectioning and pulling each loop of the thread. Before this, however, all knots are removed, ensuring that none is inadvertently pulled into the skin. Traction of the knot, pulling it into the skin flap, can lead to the tearing of deep tissues and, consequently, to localized hematomas.

Some authors take advantage of the safety features of the hemostatic net and discharge patients earlier in the day. The net is then removed on an outpatient basis within 48 hours.

49.10 Reversibility

The *A-net* is an easily reversible surgical tactic, should the surgeon have any questions regarding its application or consequences. Concerns about the optimal distribution of the skin and adequate blood circulation in the flaps allow the surgeon to remove the net before the recommended 48 hours.

49.11 Effectiveness and Safety of the Hemostatic Net

Other protocols for the prevention of hematomas use drains, tissue adhesives, tumescent infiltrations, and dissection with the help of ultrasonic instruments [11, 14–17, 22]. None of these methods has proven fully effective in preventing hematomas. In contrast, the hemostatic net can predictably and safely mitigate their occurrence during the initial postoperative period. The stability of the flap over the undermined area affords the patient greater mobility immediately, reducing the well-documented risks of hematoma caused by movement of the neck (i.e., movement that causes the skin flap to glide over the underlying muscles and consequently generates bleeding).

Since 2010, we have applied the *A-net* in all our patients who have undergone facial rejuvenation surgery. As of the writing of this chapter, more than 1100 patients have used this approach, including those with combined face and neck lifts, rhytidoplasty of the middle third of the face, and isolated neck lifts. None of these patients experienced a hematoma in the first 48 hours (i.e., while the hemostatic net was in place).

These optimal results encouraged us to expand the indication to neck lifts. It has also allowed us to safely use the net concept in the treatment of the subplatysmal region [4], an area that is currently addressed in nearly all of our patients undergoing neck lifts.

The incidence of late hematomas, defined for the purposes of this chapter as those occurring after the initial 48 hours (i.e., after removal of the *A-net*), has also been low: only 5 were observed in a series of 1073 patients. These hematomas were diagnosed between the second and fourth postoperative days in patients who had a middle-third rhytidoplasty combined with a neck lift. Three of these patients were men, and the probable cause was hypertension associated with psychomotor agitation. These hematomas were limited by incipient healing that restricted their expansion, reducing morbidity.

49.12 Healing of the Hemostatic Net

One possible concern for the surgeon who considers to use the *A-net* technique and also for the patient, who is given a preoperative demonstration, is how the net itself heals.

In our experience, beginning with use of the net to treat uncontrollable hematomas, adequate healing has been the norm. In fact, the 5-0 nylon suture (and even the 4-0 suture used initially) is tightened just enough to bring the skin in contact with the underlying fascia, avoiding an imprint on the skin. The orifices corresponding to the entrance of the net are smaller than 1 mm and form a scar that usually becomes inconspicuous. This probably occurs because the thread is removed in 48 hours, allowing punctiform lesions to heal [18]. Crusts formed in the orifices fall off in about 10 days. This results in an initially reddish puncture wound which, over time, becomes normochromic.

In 17.1% of the patients, there was transient hyperpigmentation, which typically resolved in 3 months with the aid of 2% hydroquinone lightening cream. Hypopigmentation may rarely occur. All of our patients in whom hypopigmentation was observed had a predisposition to this condition, as evidenced by scars from previous surgeries, or they had age-related hypopigmentation. Evaluating these conditions and discussing the postoperative effect not only of the net but also of other scars resulting from the surgery itself help to minimize problems with surgical results.

The ethnic makeup of our geographic region means that most patients present with Fitzpatrick skin types 1 to 4. We have also operated on a limited number of patients with skin types 5 and 6. No scarring problems related to the *A-net* were observed in these patients.

Although we do not have serial histologic studies of the region where the net has been applied, in our view, there is a gain in the overall quality of healing, with reduced edema and increased skin firmness. Regarding the latter, skin improvement is analogous to that seen with a fractional CO_2 laser device.

Finally, there has been no increased incidence of ischemia and necrosis in patients who underwent the net technique compared with patients who did not use this technique [2, 3].

49.13 Variations in the Use of the Hemostatic Net in Plastic Surgery

49.13.1 Brow Lift (Gliding Brow Lift)

Using the basic concept of the *A-net*, Dr. Fausto Viterbo collaborated with one of the authors (A.A.) to develop an eyebrow-lifting technique. With this method, the skin of the frontal and periorbital region, including the skin of the eyebrow region, is essentially released and then fixed superiorly through the sutures of the hemostatic net. This technique reestablishes its position while avoiding hematoma in the operated region [28].

49.13.2 Temporary Hemostatic Tension

Pereira et al. [20] developed traction points in face-lifts for reduction of scar tension and prevention of hematomas in a manner analogous to the hemostatic net (Fig. 49.19).

49.13.3 Other Experiences

With time and growing interest in the *A-net* technique, several surgeons have personally communicated its use in other areas: Dr. Norman Waterhouse (London, United Kingdom), for the prevention of bruising in gynecomastia; Dr. Pedro Pitta (Pernambuco, Brazil), for the obliteration of the axillary space after the inclusion of

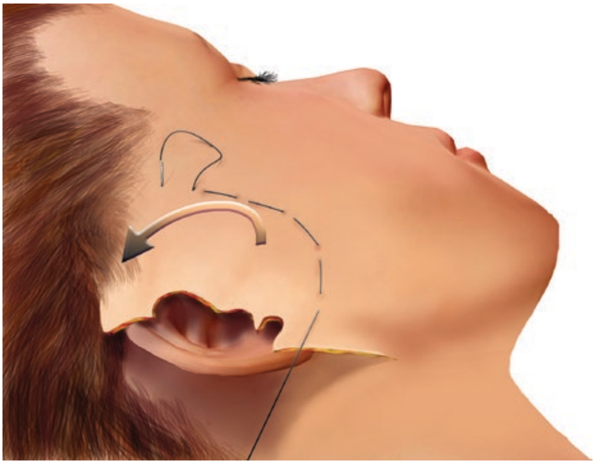
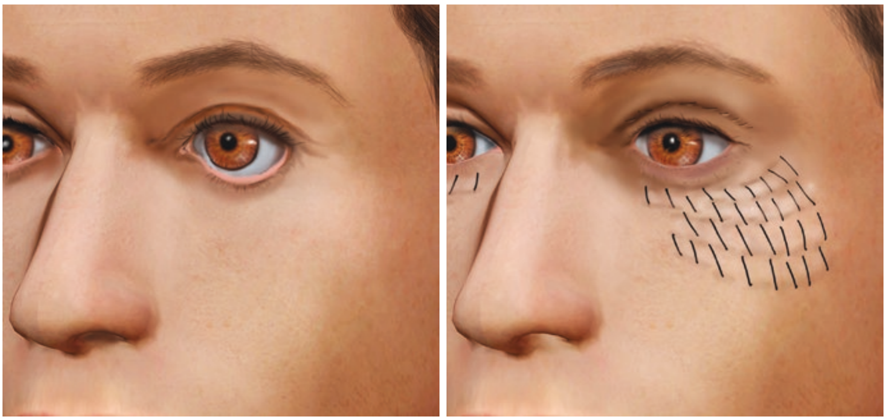


Fig. 49.19 The technique of progressive sutures in face-lift as developed by Dr. Francisco Pereira and colleagues (Santa Catarina, Brazil)

breast implants (Fig. 49.20); Dr. João Medeiros Tavares Filho (Rio de Janeiro, Brazil), for postmastectomy closure of the dissected area; Dr. Milton Daniel (Curitiba, Brazil), for gynecomastias; Dr. Carlos Casagrande (Florianopolis, Brazil), for closure of the dead space after face-lift with an imperceptible continuous internal suture; Dr. Ronaldo Righesso (Rio Grande do Sul, Brazil), for treating late seroma of the lumbar region after orthopedic surgery of the vertebral column; Dr. Francisco Bravo (Spain), for recruitment of eyelid skin cranially in the treatment of ectropion (Figs. 49.21 and 49.22); Dr. S. Anthony Wolfe (United States) and Dr. Chiara Botti (Italy), for the fixation of free skin grafts; and finally, Dr. Fausto Viterbo (Botucatu, Brazil), for the treatment of dead space after resection of large lipomas. In addition, we have expanded its use in cases of lateral breast liposuction and abdominoplasty in very thin patients, for whom application of the Baroudi quilting sutures would involve skin retraction, especially in the epigastric region.

Fig. 49.20 Obliteration of the axillary space after the inclusion of breast implants, a technique developed by Dr. Pedro Pitta (Pernambuco, Brazil)



Figs. 49.21 and 49.22 The use of the hemostatic net in the treatment of ectropion, as indicated by Dr. Francisco Bravo (Spain). The skin is recruited superiorly with the help of the transfixing sutures

49.14 Conclusion

After almost 15 years of experience with the hemostatic net, we have found it to be an efficient, reliable, and consistent method for the prevention of hematomas in facial rejuvenation surgery, an area that has traditionally been worrisome to surgeons. This simple and easy-to-learn technique using readily available materials not only enhances patient safety and lowers morbidity in the postoperative period, but it also ensures the predictability of results in a range of procedures, including reconstructive surgery.

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Part VI
Associated Procedures During Rhytidoplasty

Chapter 50
Frontal Region Rejuvenation

Gerardo Schwember and Jorge Luis Gortarez Martinez

50.1 Introduction

In this chapter the authors share their nearly 40 years of experience in the specialty. We consider eyebrow positioning as a key element and center of the rejuvenating planning of this area. We show our experience with the standard coronal lift, more frequently described in the 1970s [1, 2], and still in use today, albeit with a more restricted indication and frequency. Direct brow lift was described by Castañares [3] and the frontal endoscopic surgery stages of the beginning of the 1990s [4, 5].

Today there are less aggressive approaches, such as loop sutures in browpexy, the use of botulinum toxin, and direct skin rejuvenation with laser. These allow for a faster recovery and have less risk of complications.

50.2 Methodology

Clinical assessment: Hairline and hair density are recorded. The vertical distance between the horizontal axis of the hairline and the horizontal axis of the eyebrows is measured. A distance larger than 6 centimeters is a contraindication for a standard intra-hairline coronal lifting, since it can produce a forehead that is too large. A

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patient with a very wide forehead can benefit from a standard pre-hairline trans-coronal lifting, which will shorten that distance and as a result will produce a narrower and harmonious forehead in its aesthetic view. A vertical distance less than 4 centimeters is a surgical option for a standard intra-hairline trans-coronal lifting, to widen the frontal region.

Eyebrow positioning: This is our most important reference when planning the surgery. In comparison to what occurs with aging of other anatomic elements that drop down, with the eyebrows, or part of them, the contrary can occur. The average normal distances found in the vertical axis of 20–30-year-old women, from the medial, central, and lateral parts of the eyebrow to the medial canthus, pupil, and lateral canthus are on average 15.7, 19.8, and 21.3 millimeters. On the other hand, in the group of 50–60-year-old women, these measurements are 19.1, 22.4, and 22.4 millimeters, respectively [6]. This means that when planning a procedure that will elevate the eyebrow positioning, it must be confirmed that the medial half of it is not already in a normal or elevated position. What usually occurs with aging is that the lateral brow segment is the one that descends.

Regional muscles: These must be assessed at rest and in activity, evaluating symmetry of frontal muscle motility, the wrinkles they produce, and the symmetry of those wrinkles. The only elevator element in this segment of the face is the frontal muscle. Depressor muscles of the eyebrows are *orbicularis oculi*, *corrugator supercilii*, *depressor supercilii*, and *procerus* muscles. These should also be evaluated for motility and symmetry in comparison with their contralateral homonymous as well as for the type of cutaneous wrinkles they possess. Very prominent frontal wrinkles can be a compensating mechanism of an undiagnosed palpebral ptosis. If this is the case, the ptosis should be treated.

Upper eyelid assessment: How attractive and youthful the superior third of the face looks is related to the shape and position of the eyebrows, as well as to their relationship with the upper eyelids. The aesthetic appearance of the eyelids is related to ethnic characteristics that define the position of the superior palpebral sulcus. A youthful appearance of the eyelid has a visible segment of pretarsal skin and a marked palpebral sulcus. If the upper eyelid is hollow or has hooding of excess skin, it will have a more aged appearance. Folds and wrinkles of the lateral portion of the orbit usually accompany the descent of the lateral portion of the eyebrow together with an aging upper eyelid with the presence of crows' feet. Non-correction of the signs of aging in the upper eyelid at the time of doing a frontal rejuvenating procedure will produce an insufficient aesthetic result with a probably unsatisfied patient.

Once the described assessment is complete, it is necessary to take standard position photographs of the patient, with the patients' face at resting position and then have them mimicking to have a record of possible asymmetries, especially of the musculature, shape, and position of eyebrows and upper eyelid. With this graphic documentation, a conversation is held with the patient in terms of alterations that are already present, what they are looking to correct, and expectations they have in terms of the results. If there is an important discrepancy of any or many of the elements that will be corrected between the surgeon and the patient, it is recommended to postpone or suspend the surgery or procedures that were to take place.

Anatomic considerations: The temporal branch (frontal) of the facial nerve is the most important anatomic element to consider for some of the surgical procedures described below, especially the standard coronal lifting and the endoscopic frontal lifting. It is the thinnest of the extraparotideal facial nerve branches and does not cross any other of the branches of this cranial nerve, in comparison to what occurs with the buccal and zygomatic branches of this same nerve. The temporal branch (frontal) runs superficial to the temporal muscle aponeurosis [7]. The dissection of the superior third of the frontal region should be in subperiosteal plane. Laterally past the temporal line and crest, it should be over the temporal muscle aponeurosis and when it descends in the direction of the zygomatic arch, it should lie deep under the superficial layer of the deep temporal fascia. When the temporal branch (frontal) passes over the zygomatic arch, it is described with 2–5 branches [8]. Cephalic to the arch at the height of the lateral canthus, it is described 2–3 cm lateral to the orbital margin [9]. An anatomic reference point can be visualized during the surgery. It is the sentinel vein, an anterior branch of the temporal vein. The temporal branch (frontal) runs always cephalic to this vein, on average at 6.8 millimeters [10]. The other relevant anatomic structures in these surgeries are usually clearly visible, and the anatomic description can be found readily available in topic-related books.

50.2.1 Surgical Alternatives and Additional Procedures

Standard Coronal Lifting: This was the classic rejuvenating procedure of the frontal region in the 1980s. It allows a wide access to the surgical field, but it has the drawback of a very extensive scar, areas of anesthesia or hypoesthesia in the scalp, and alopecia in the scar line. The emphasis on traction will depend on the patients' need for correction. Usually the traction of the frontal flap is less in the midline and more in the lateral segments, with a divergent vector in the laterodorsal direction. Once the resection and meticulous hemostasis of the margins with bipolar electrosurgery, so that hair follicles are not damaged, are finished, a deep plane tensionreleasing suture must be done. In this way we decrease the possibility of a hypertrophic cutaneous scar. Today the general indication for this surgery is restricted to:

1. Patients with 6 centimeters or less of forehead and eyebrow ptosis. Under these conditions, a standard coronal lifting can be planned with a classic intra-hairline incision, 3–4 centimeters behind the hairline. The surgeon can, if so desired, widen the vertical axis of the forehead and also a browpexy (Figs. 50.1 and 50.2 preop; Figs. 50.3 and 50.4 postop).
2. Patients with a wide forehead (6 cm or more in the vertical axis) and eyebrow ptosis, it may be done with a pre-hairline approach: this shortens the forehead and improves eyebrow position (Fig. 50.5 preop and Fig. 50.6 postop).

Endoscopic Frontal Lifting: It began to be used in the middle of the 1990s [4, 5]. The advantage over the standard coronal lifting is that only 3–5 very short incisions are made, of 1–2 cm each. Usually only three incisions are needed. It provides a wide access to the surgical field, and optic magnification allows a very clear view of

Figs. 50.1–50.4 Intra-hairline frontal lifting. Figures 50.1 and 50.2 Preop. Left: A standard coronal lifting was planned, borderline with the indication due to the height of his frontal region. Figures 50.3 and 50.4 Postop. Right: The frontal region was pulled with lateral vectors so as not to elevate the hairline in the midline and only elevate the lateral half of the eyebrows. Also, an upper and lower blepharoplasty were done and a cervicofacial lifting (full sub-SMAS; in the neck deep to the platysma muscle)

Figs. 50.5 and 50.6 Pre-hairline frontal lifting. Figure 50.5 Preop. Left: Male patient already with an endoscopic frontal lifting and upper and lower lid blepharoplasty somewhere else. Unsatisfied with the global result of the forehead amplitude, drooping eyebrows, and poor result of the eyelid surgery. Figure 50.6 Postop. Right: After doing a pre-hairline standard coronal lifting, browpexy, and upper and lower blepharoplasty

all the structures, such as supraorbital and supratrochlear nerves and vessels and the frontal, corrugator, and procerus muscles. Usually the subperiostic dissection is made. Initially the dissection can be started without the endoscope, but once we are close to the superior orbital margin, the optic must be used, so that under endoscopic view, we can identify the supraorbital and supratrochlear nerves and vessels. From this point, we can dissect all the tissue adhered to the superior orbital margin, medial and lateral to the supraorbital vessels and nerves. If it is not necessary to elevate the medial third of the eyebrows, the tissues adhered to the medial segment of the orbital margin should not be released. The lateral approach is from lateral incision in the temporal region. The dissection plane is above the temporal muscle aponeurosis. Using a dissector the adherences to the temporal crest are released. The sentinel vein will be visualized, which is the anterior branch (ventral) of the temporal vein and should be the anatomic reference to have in mind, of the proximity of the temporal branch (frontal) of the facial nerve. Once the lateral dissection is finished, both zones are joined, the lateral with the frontal. The traction exerted on the scalp allows the excision of a triangle for it to position the tail of the eyebrow in a more cephalic location.

It is unlikely that the endoscopic frontal lifting produces or leaves anesthetized or hypoesthetic areas in the scalp and very rarely leaves focal segments with alopecia. These authors are not in favor of partial or total resection of the corrugator and/or procerus muscles, unless they are dealing with a patient with very strong muscles and/or very prominent wrinkles. This is due to the risk of producing asymmetric mobility of the treated muscles or subcutaneous depressions or irregularities. We do not like either weakening or resections of the frontal muscle, since it is the only elevator muscle of the area and eyebrows. In the long term it can cause a very marked brow ptosis and/or asymmetry. Today the execution of endoscopic frontal lifting is done less frequently. On occasion on one side, the result is inferior to what is expected from the surgical approach of an experienced surgeon with this type of equipment. On the other side, more simple procedures have been developed that obtain similar results in a simpler manner (Fig. 50.7 preop and Fig. 50.8 postop).

Direct Browpexy: Castañares described this procedure [3]. The preferred indication is males with very thick skin and subcutaneous layers, with a severe eyebrow ptosis. We assess the magnitude of the browpexy and what eyebrow segment needs to be elevated. The lateral half of the eyebrow is the one that usually needs elevation. The eyebrow segment is tractioned and/or a pinch test of the segment is done. It is necessary to have presurgical photographs and the corresponding written consent, where it is clearly stated that the procedure will leave a permanent scar, even though unapparent, in the cephalic margin of the eyebrow of at least 3–4 centimeters. If it is the only surgery that person will require, local anesthesia may be used. An island of skin and subcutaneous layer is excised in block, without including the frontal muscle. Care must be taken to protect the supraorbital vessels and nerve. Hemostasis is done with bipolar electrosurgery. Sutures in two different planes, releasing the tension in the superficial layer. First the ends of the suture must be compensated. The usual situation is that the cephalic lip of the excised island is longer than the eyebrow side (Fig. 50.9 preop and Fig. 50.10 postop).

Browpexy Through Blepharoplasty: An upper blepharoplasty is made and if the eyebrow is drooping, a browpexy is included. Only one scar is left. Cutaneous premarkings are made on the excess of the skin that will be excised from the upper eyelid; since the browpexy is done with this approach, it may be possible that the skin from the upper eyelid that will be needed to remove is less than what is previously assessed. The incision is made through the caudal marking of the skin ellipse

Figs. 50.7 and 50.8 Endoscopic lifting. Figure 50.7 Preop. Left: Patient requested a global rejuvenation, forehead, eyelids, face, and neck. Figure 50.8 Postop. Right: Shows a rejuvenation of the frontal region and an elevation of the lateral half of the eyebrow. An endoscopic frontal lifting, upper and lower blepharoplasty, and a cervicofacial lifting (full sub-SMAS; in the neck deep to the platysma muscle)

Fig. 50.9 and 50.10 Direct browpexy. Figure 50.9 Preop. Left: Patient requested a palpebral rejuvenation, without being conscious of his eyebrows ptosis. Figure 50.10 Postop. Right: It was agreed with the patient to do an external browpexy, with emphasis on elevation of the lateral segment of the eyebrows and an upper and lower blepharoplasty

to be excised from the upper eyelid. Dissection is done deep to the orbicularis muscle and superficial to the orbital septum. It is not frequent that we do procedures over the corrugator, eyebrow depressor, or procerus muscles, since they may produce asymmetries or subcutaneous defects in the late postoperative period. On the other hand, it may result in an undesirable elevation of the middle half of the eyebrow, leaving the elevating action of the frontal muscle with no counterbalance. When the dissection reaches the lateral supraorbital margin, we continue over the frontal bone, over the periosteal level. Usually it is necessary to dissect 1–2 centimeters in cephalic direction over the frontal bone, but if it is necessary, three or more centimeters can be dissected. The eyebrow is well exposed and is fixed with 5-0 nonabsorbable sutures. Fixation is made through trial and error until the adequate positioning is reached and observing that the suture does not produce any irregularities on the skin surface. Once the bilateral pexy is finished, the amount of skin of blepharoplasty is assessed and thus the procedure is continued (Fig. 50.11 preop and Fig. 50.12 postop).

Browpexy with Sutures or Loops: We are not in favor of the barbed sutures on any location. We have been using smooth sutures for years, only for browpexy, with predictable and stable results. It is a simple, fast, safe, and reproducible technique. If the patient is not satisfied, it is easy to undo without leaving any sequels. It is very easy to calibrate the height of the pexy. If only half of the eyebrow needs to be elevated, usually two sutures are used. It might be necessary to use up to four sutures on each side, if the entire eyebrow needs to be lifted. The usual execution is to test with the hand the best traction vectors, then, using a guiding instrument, make two intra-hairline 3 millimeter incisions and two in the lateral third of each eyebrow. Local anesthesia with vasoconstrictor is injected in the site of the incisions and on the path where the instrument will pass. The steps are in the following order: eyebrow–forehead suture passes and then the Nylon 40 colorless suture passes with no needle through the buttonhole and then comes back to the eyebrow. Then on another

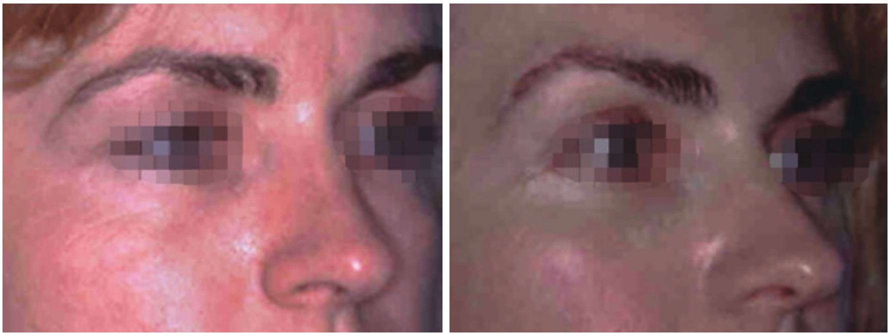

Fig. 50.11 and 50.12 Browpexy through blepharoplasty. Figure 50.11 Preop. Left: Young woman that requests a palpebral rejuvenation. It is agreed with her to also correct the lateral position of the eyebrows. Figure 50.12 postop. Right: Shows the result of the lateral browpexy performed through the upper blepharoplasty

route, I go from the forehead to the eyebrow, and the suture goes back toward the forehead. With a simple hook and a Stevens' scissors, all adherences from the suture to tissues surrounding the incision, if there were any, are freed to avoid irregularities over the brow skin and/or the scalp. All hairs that could have been introduced in the scalp incision are withdrawn. Next the browpexy is calibrated, pulling each thread with its contralateral homonymous. The intra-hairline incision is knotted. Access is closed with a 5 or 6-0 Nylon suture.

If this is going to be done together with a superior blepharoplasty, once the pexy has been done, a reassessment of the amount of skin of the eyelid to be removed must be made (Figs. 50.13 and 50.14 preop; Figs. 50.15 and 50.16 postop brow suspension with sutures and blepharoplasty; Figs. 50.17 and 50.18; Figs. 50.19 and 50.20 long-term stability of the brow suspension with sutures).

Access Through the Temples or Lateral to the Eyebrow, Intra-hairline, or Perihairline: We do not use it because we find that there are more risks than benefits. Other procedures: We usually use botulinum toxin, since it highlights the surgical results and because we do not like partial or total excision of the muscles of that region. We also use the erbium laser in its modalities microlaser peel or profractional resurfacing in a deferred manner, if the skin conditions in terms of spots or aging demand it so.

Complications: As described, more aggressive surgeries have more complications. If judicialization of aesthetic surgery is considered, this is a factor to take into account. Furthermore, patients have less tolerance to complications and want less aggressive procedures and faster recovery times.

Postsurgery: Initial follow-up will depend of the magnitude of the surgeries that took place. Patients with a standard or endoscopic coronal lifting may feel drowsiness and tightness in their head. There is more palpebral edema, since that skin is thinner. During the first few days, it is convenient to use cold packs on the eyelids frequently. The patient must use two pillows when in bed during the first 2 weeks. Usually a daily eye drop is indicated with lubricating agent by night. If chemosis

Fig. 50.13–50.16 Browpexy with standard suture. Figures 50.13 and 50.14 Preop. Left: A 42-year-old patient with severe dermatochalasis and accentuated brow ptosis. If only a classic blepharoplasty was done, the result of the surgery would have been insufficient. Figures 50.15 and 50.16 Postop. Right: Shows the patient after an upper and lower blepharoplasty. The simultaneous lateral browpexy highlights the result of the blepharoplasty

Figs. 50.17 and 50.18 Preop. Right: The usual criticism to browpexy with sutures is its volatility. 40-year old patient that requested an inferior blepharoplasty and to improve his eyebrow positioning, with a family background of drooping eyebrows

Figs. 50.19 and 50.20 Postop. Right: Shows the result of the lower blepharoplasty. There is no excess skin in the upper eyelids, only a browpexy. The lateral positioning of the eyebrows remains the same 14 years later

arises, we recommend eye drops with hypertonic saline solution at 0.5%, several times a day. We consider a tarsorrhaphy as an aggressive and unnecessary procedure.

They can wash their hair after 24–48 hours with a lukewarm shower. The hair drier should be used with a certain distance and warm temperature. Edema starts to stabilize and/or decrease approximately on the 3rd day. The eyelid sutures are withdrawn on the 4th to 5th day, the ones in the eyebrows on the 6th to 8th days, and the scalp on the 8th to 10th day.

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Chapter 51
Endoscopic Video Rhytidoplasty

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51.1 Endoscopic Video Rhytidoplasty

51.1.1 Endoscopic Video Rhytidoplasty

The facelift was originally performed as a simple technique to improve facial aging using skin excision followed by closure with tension. The procedure evolved to encompass a wide range of techniques that reposition facial tissues in attempt to rejuvenate the face and delay the aging process.

Facial endoscopic video surgery is the surgical procedure of choice in the treatment of eyebrow ptosis and alterations of the periorbital region [1].

Minimally invasive access, which combines reduced scarring and rapid patient recovery, contrasts with the traditional coronal incision for the treatment of this region [1, 2].

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51.1.1.1 History

The introduction of video endoscopy in plastic surgery is due to the interest and curiosity of Vasconez et al. who, in 1992, described a video-assisted frontal lift [1]. The authors described the use of small scalp incisions allowing treatment of the frontal glabellar region by resection of the musculature, in order to minimize the vertical wrinkles. Since then, many authors have shown great interest in noninvasive techniques for the aesthetic treatment of the face [2].

In 1994, Nicanor Isse published his technique of subperiosteal access for the treatment of the frontal region [2]. He also described the treatment of the temporal region with endoscopic dissection above the deep temporal fascia. His work is considered by many authors as the major contribution to the success of video endoscopy for the treatment of the face. Through his technique, he performed treatment of the frontal glabellar and temporo-orbito-lateral region.

Subsequently, Ramirez published his experience with the use of video endoscopy in facial cosmetic surgery [3]. He described the frontal region and also the treatment of the middle and lower thirds of the face.

51.2 Traction Vectors

The harmonious facial appearance is determined by a balance relationship between the facial tissues. As a result of the aging process, there is loss of balance between the bone structure, muscle, fat, and facial skin. Progressive changes in volume, shape, position, and consistency also occur. Therefore, aging compromises all the structures of the face in different ways, depending on the degree of skin laxity [4].

The technique of video endoscopy revealed, over time, that the tensile force on the flaps is proportional to the plane of detachment of the areas to be treated. In some cases, the skin traction is minimal and varies according to the age, skin type, and history of previous surgeries, among other factors. It is important to analyze the face as a whole unit, and, therefore, it is usually divided in three horizontal thirds: upper, middle, and lower thirds (Fig. 51.1) [5].

Once the diagnosis is made and the area to be treated is identified, the treatment is personalized for each patient. There are different planes of dissection for each region of the face, and through these dissections, it will be possible to perform six traction vectors. Vectors 1, 2, and 3 can be performed through video endoscopy. Vectors 4, 5, and 6 are commonly performed in a conventional manner, after undermining of the face in the subcutaneous plane. In the experience of the senior author, identifying each region of the face to be treated and the separation of the treatment for the different regions of the face into traction vectors facilitates the surgical plan indicated for each patient.

Vector 1 (V1) is used for the treatment of the frontal region, for patients presenting ptosis of the head and body of the eyebrow and frontal glabellar wrinkles. In such cases, the endoscope is placed in a subperiosteal plane at the level of the frontal

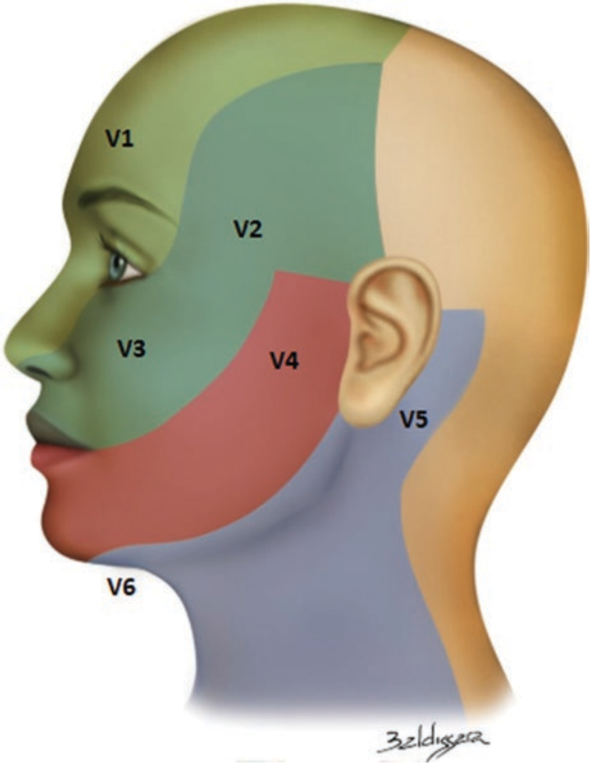


Fig. 51.1 Regions and Vectors: 1-V1: Vector 1: The vector 1 is divided into three parts according to the treatment region: 1A, hear of the eyebrow; 1B, body of the eyebrow; 1C, tail of the eyebrow; Vector 3, third middle of the face. Vector 4; V6/V5 – Vector 5–6. The Vectors V1, V2, and the region 3B corresponding to V3 are treated by video endoscopy

region. In the region of the glabella, the endoscope is placed in a supraperiosteal plane to treat the procerus muscles, corrugators, and depressors of the eyebrow. The direction of traction of this vector is vertical.

Vector 2 (V2) is the vector of the temporal region. The treatment of this vector is indicated in patients who present ptosis of the temporo-orbito-lateral region and ptosis of the eyebrow tail. In these cases, video endoscopy is placed in an interfascial plane between the deep temporal fascia and the superficial temporal fascia (temporoparietal fascia) to release the tissues. The direction of traction is upper oblique.

Vector 3 (V3) is the vector of the anteromedial third region of the face. Patients presenting with ptosis of the anteromedial third of the face and pronounced with the superior and middle third nasolabial folds can benefit from treatment of this region. In these cases, the undermining is performed in a supraperiosteal plane with or without the aid of the endoscope, and the direction of traction is upper oblique, using triple-convergence polypropylene thread™ - 3C on each side, fixed in the deep temporal fascia [7].

Vector 4 (V4) is the vector of the anterolateral middle third region of the face. Its treatment is indicated in patients presenting with ptosis of the inferior third nasolabial folds. The undermining plane is subcutaneous. With this vector, the SMAS (superficial musculoaponeurotic system) is “plicated like a ladder” in a vertical direction, and the skin flap is drawn in the same vertical direction.

Vector 5 (V5) is the cervical traction vector, for neck treatment. The platysma muscle is tractioned and sutured in a retroauricular position.

Vector 6 (V6) is for the treatment of the submental area, with plication of the bands of the platysma muscle.

The endoscopically assisted limited-incision facelift technique is indicated for using this technique, including young patients with a relatively small amount of skin excess and older patients with thick skin and minimal skin redundancy. The senior author described in 2010 a set of incisions in the forehead, preauricular area, ear lobe, and postauricular area. Frontal and temporal endoscopic lifting is performed, followed by middle third and cervical undermining and transposition of a 2 × 5.5 cm rectangular preauricular SMAS flap [8].

51.2.1 Frontal Video Endoscopy Technique

Numerous techniques have been developed in the last years in order to treat the effects of facial aging on the upper third of the face.

51.2.1.1 Materials and Preparation

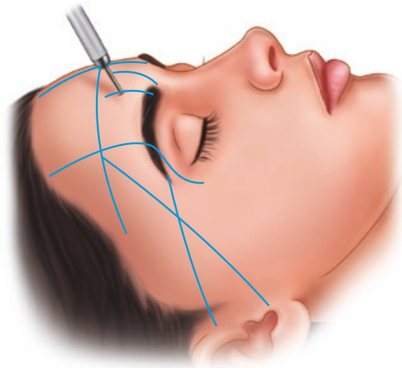
Necessary tools are a camera, a monitor, a 4 mm diameter lens (with a 30 degree angle), an optic fiber cable, and a protective jacket. A complete endoscopic unit and a dissector separator are required.

Additionally, retractors for periosteum over scalpel handle, a Reverdin needle for attachment, an aspirator with a long L-shaped end, and one with a rounded end are needed.

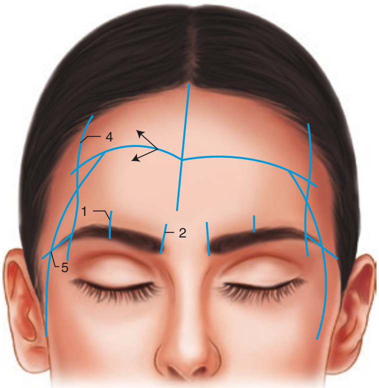
The technique is performed under local anesthesia with sedation or general anesthesia, depending on the patient, the preference of the surgeon, and the anesthetist. After preparation of the hair with bactericidal soap, the lines are performed depending on the planning of the incisions, without the need for trichotomy of the scalp. The eyes are protected, and the ear canals are covered with a cap. The surgical drapes are placed and fixed so that the head can be mobilized. Intravenous antibiotic prophylaxis is administered and maintained during the first 24 hours postoperatively. A vasoconstrictive solution consisting of 0.5% lidocaine with adrenaline at 1: 160.000 proportion is infiltrated in the following areas: the supraorbital borders, the frontotemporal areas, and the lateral orbits (Figs. 51.2 and 51.3).

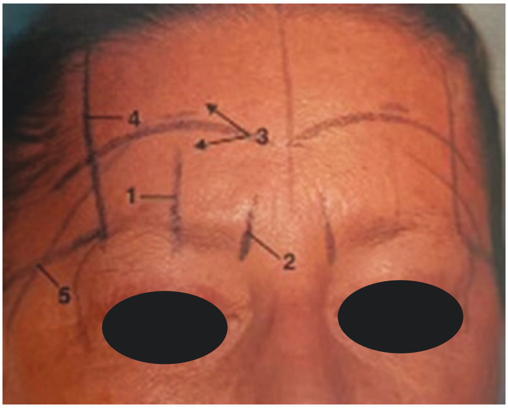
The following anatomical points are marked with methylene blue ink:

- Supraorbital nerve
- Supratrochlear nerve
- Temporal crest, in the upper temporal line
- Temporofrontal branch of the facial nerve at its usual location (Figs. 51.4 and 51.5)



Figs. 51.2 and 51.3 Infiltration. (Citarella [6])





Figs. 51.4 and 51.5 Surgical anatomical points of reference: 1, supraorbital nerve 2; supratrochlear nerve 3; planes of dissection on the forehead area(endoscopic and non-endoscopic); 4, superior temporal line; 5, probable localization of the temporo-frontal branch of the facial nerve. (Citarella [6])

51.2.2 Incisions (V1, V2,V3)

The following incisions are made: a vertical median incision is made 3 cm from the hair implantation line, two vertical paramedian frontal incisions are performed at 5 cm from the median line, and two temporal incisions located at approximately 1 cm lateral to the upper temporal line and 2 cm from the hair implantation, having as reference an imaginary line running through the base of the nasal alar, and lateral corner of the eyelids (Fig. 51.6).

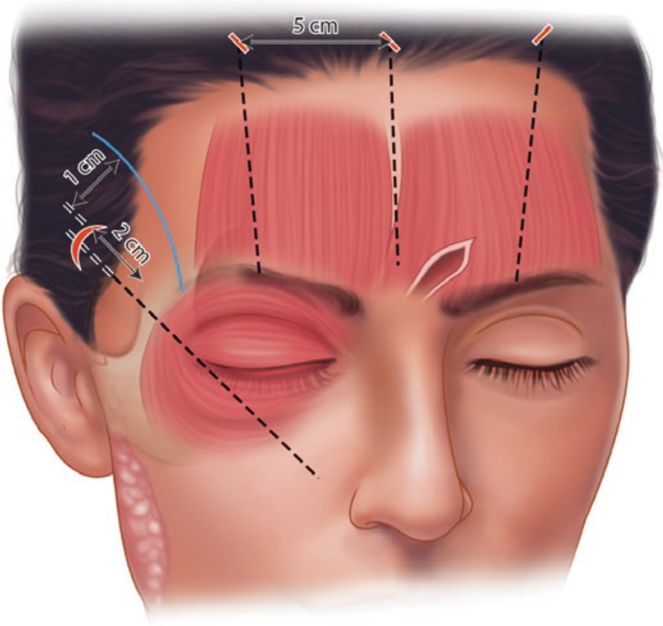


Fig. 51.6 Incisions. (Citarella [6])

In patients where the only treatment desired is of the temporo-orbital-lateral region, two incisions are necessary, a temporal incision and a frontal paramedian incision. If the plan is exclusively to treat the frontal glabellar region, a median incision and a frontal paramedian incision are necessary.

51.2.2.1 Video Endoscopic Dissection

The frontal incisions are extended to the periosteum to allow undermining in the subperiosteal plane. In the temporal region, the incisions are made until the visualization of the deep temporal fascia, allowing undermining in the interfascial plane, between the superficial and deep temporal fascias (Fig. 51.7).

The surgery begins blindly without the endoscope, forming an optical cavity in the subperiosteal plane of the forehead and temporal region interfascia dissection. The undermining is completed using the video endoscopic camera, up to the supraorbital border, visualizing the neurovascular structures of the region.

The non-endoscopic dissection of the temporal region is performed, and the incisions are joined through the undermined area (Figs. 51.8, 51.9, and 51.10).

Once the optical space has been formed, the endoscope is inserted through the paramedian frontal incision, and the clamps are inserted through the temporal incisions. Undermining is done subperiosteal up to the border. The sentinel vein, located 5 mm laterally, determines the lowest point of the frontal and temporal spaces.

In the frontal glabellar region, about 2 cm from the nasal bone, the plane of dissection changes to supraperiosteal, until visualization of the muscles.

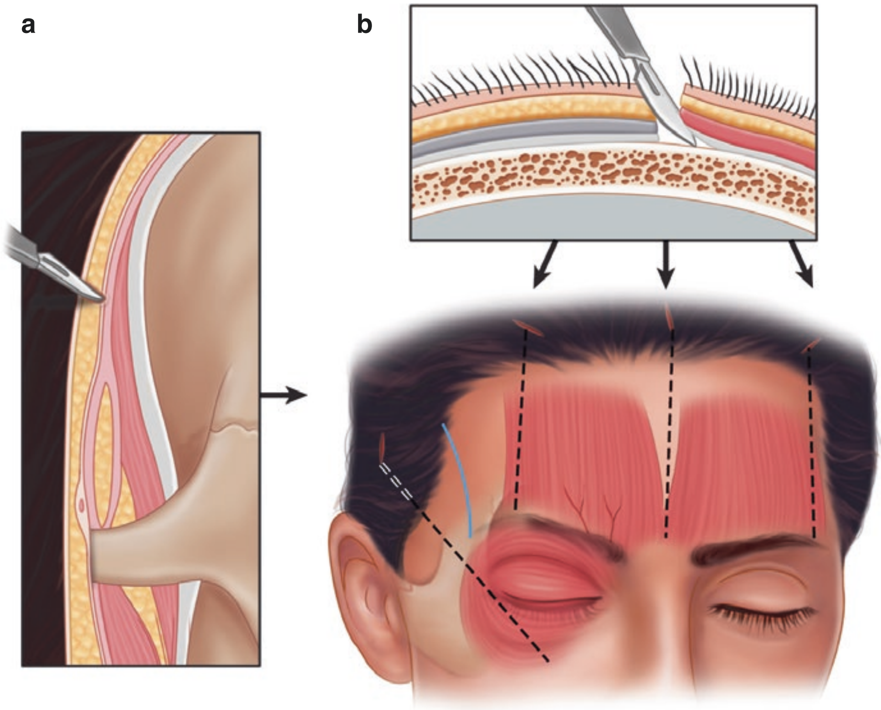


Fig. 51.7 (**a**) The temporal incision is extended to the temporalis superficial fascia. (**b**) The frontal incision to the periosteum. (Citarella [6])

51.2.3 Neurotomies and Myotomies of the Orbicular Muscle of the Eyes

Addressing the orbicularis oculi muscle with myotomies and wide release determines the treatment of the brow tail, as well as horizontal myotomies of the procerus at the level of the nose bone which assist in the elevation of the head of the brow and horizontal frontal glabellar wrinkles. Myotomy of the depressor of the brow can also be performed, to increase mobilization and elevation of the head of the brow. The corrugator muscles are also treated with partial corrugator excision at their periosteal origin (Figs. 51.11, 51.12, and 51.13).

A quadrilateral is delimited by four lines that pass 1 cm from the supraorbital nerve, 2 mm from the upper edge of the eyebrow, 2 mm from the lower edge of the eyebrow, and a line that tangentiates the lateral corner of the eye and the tail of the eyebrow. Within the limits of this quadrilateral, multiple myotomies of the orbicularis muscle will be performed, in order to obtain an external rotation of the tail of the eyebrow, and stretching of the skin of the upper eyelid, minimizing the rows lateral periorbital region, neurotomies the branches of the temporofrontal branch of the facial nerve, which passes a few millimeters above the eyebrow and go to the corrugator muscle, will weaken this muscle and consequently decrease its

Fig. 51.8 Plane of dissection: 1–2, subperiosteal; 3, subgaleal; 4, moving from the subperiosteal to the supraperiosteal plane. (Citarella [6])

Fig. 51.9 Temporal undermining

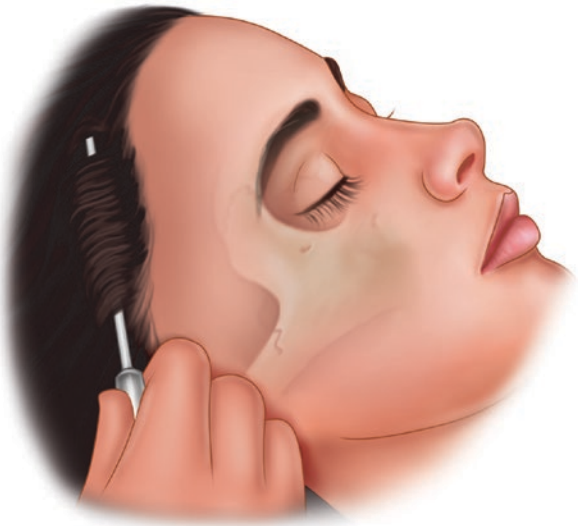


Fig. 51.10 Connection of the temporal to the frontal cavity. Releasing the superior temporal crest

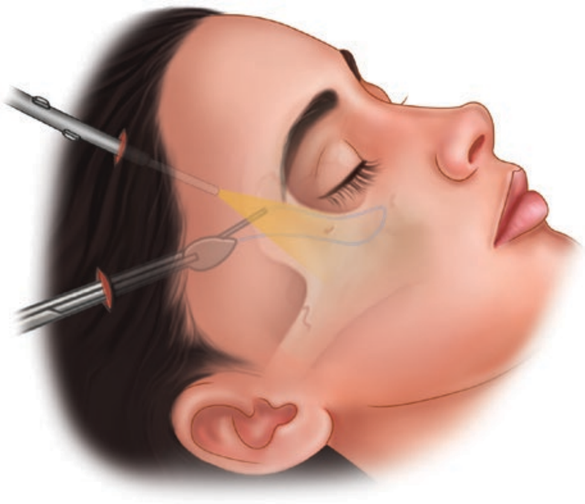


Fig. 51.11 Starting undermining with the endoscopic camera and dissector positioned

depressing action on the eyebrow. The myotomies are performed with Metzenbaum scissors, facilitated by a counterpressure maneuver with the fingers of the opposite hand.

The frontal muscle should not be treated with myotomies, except in case of hyperactivity of this muscle, because its functionality is necessary in the treatment for the depressors of the eyebrow.

In the frontal glabellar region, approximately 2 cm above the nose bone, the undermining passes from a subperiosteal plane to a supraperiosteal plane to the nasal dorsum, in order to visualize the muscular structures that will be treated. The muscles of this region are the corrugator muscle, the procerus muscle, and the depressor muscle of the eyebrow.

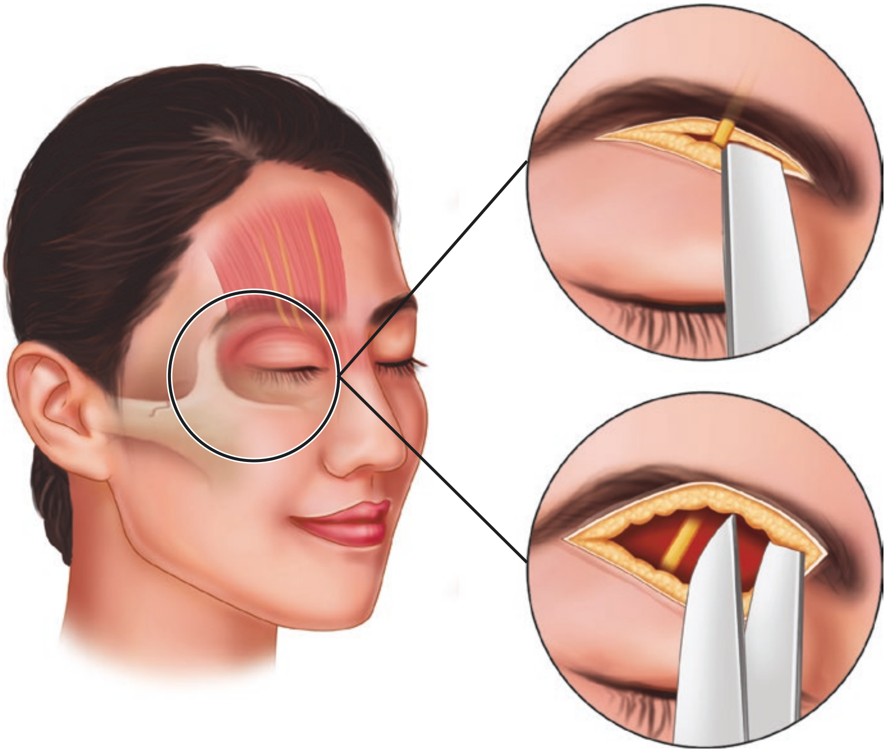


Fig. 51.12 Horizontal periosteotomy on a supraorbitary level. (Citarella [6])

This change in the dissection plane is performed by transection of the periosteum with the tip of the Metzenbaum scissors toward the surface plane. When it is also intended to soften the horizontal ridges of this area, horizontal myotomies of the procerus muscle are performed.

Subsequently, electrocautery with “L” tip is used to traction and partially deinsert; the corrugator muscle is tractioned, and the deinsertion of this muscle causes an increase in the distance between the two eyebrows. If necessary, myotomy of the depressor muscle of the eyebrow is performed, in order to elevate the head of the eyebrow. Finally, horizontal and vertical periosteotomies are also performed in this region to facilitate tissue elevation.

51.2.4 *Fixation*

The fixation is used to keep the tissues in their new position. In the temporal region, the fixation occurs at the highest point of the deep temporal fascia in the anteroposterior direction. In the frontal region, the fixation is made through the median

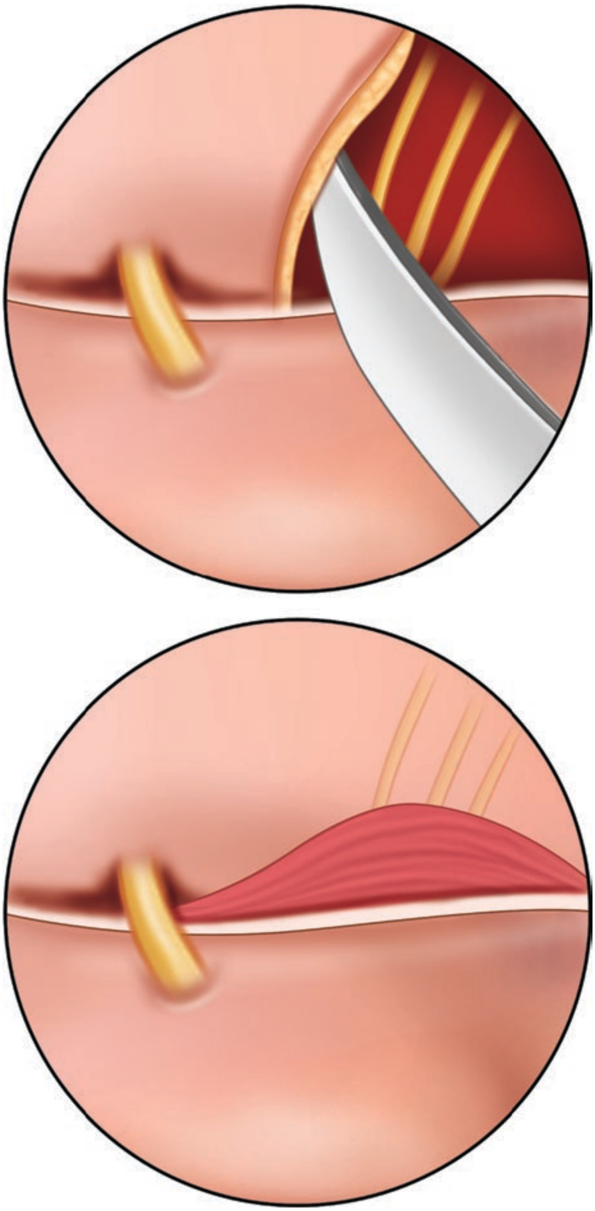


Fig. 51.13 Vertical periostomies and release of the periosteum on a supraorbitary level. (Citarella [6])

vertical incision, advancing the flap in an anteroposterior direction. These points of support are performed with the aid of a Reverdin® needle, posteroanteriorly, in a subperiosteal plane, and returning in a subcutaneous plane. The incisions are sutured with nylon 4.0 (Figs. 51.14, 51.15, and 51.16).

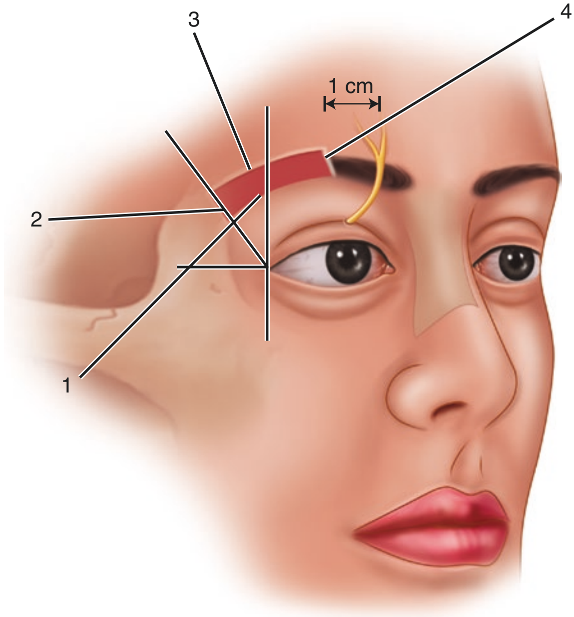
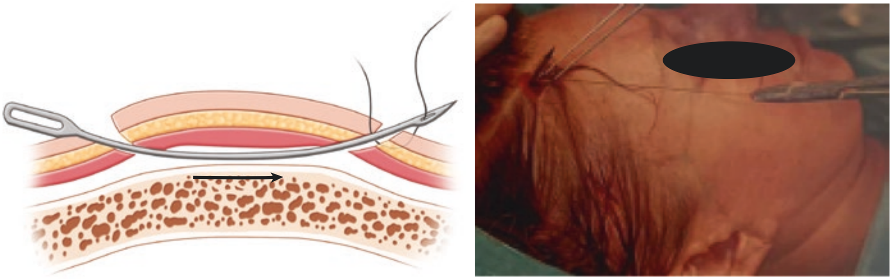


Fig. 51.14 Quadrilateral space where myotomies and neurotomies are performed. 1 – A curved line trailing the inferior border of the eyebrow. 2 – An oblique line extending from the eyelid lateral canthus to the eyebrow lateral extremity. 3 – A line distance 5 mm from and parallel to the superior border of the eyebrow. 4 – A vertical line placed 1 cm lateral to the supraorbital nerve. (Citarella [6])



Figs. 51.15 and 51.16 A stay suture with Reverdin needle is placed anteroposteriorly on a subperiosteal place. (Citarella [6])

51.2.5 *Dressing*

After the video endoscopy is done, surgical tape is applied on the forehead in horizontal and vertical directions. It is kept on for 5–7 days with the purpose of fixing the tissues in their new position and also helping to reduce edema of the region. A suction drain can be maintained for 36–72 hours, depending on its drainage (Fig. 51.17).

Fig. 51.17 Frontal global endoscopy dressing. (Citarella [6])

51.3 Complications

The most frequent complications are localized hematoma, iatrogenic burn, a foreign body reaction, and small asymmetries. The incidence of localized hematoma was 1%, as was the case with iatrogenic burns; 2% of the patients presented foreign body reaction, and there was no case of asymmetry. The presence of transient paraesthesia is described in the literature, with rare cases of definite paralysis due to indirect visualization of the structures.

Pruritus is also a common symptom (25–29% of cases). Alopecia cases are more common in the frontal region than in the temporal region, varying from 2% to 16% of the cases.

51.4 Treatment of the Middle of the Face (V3 and V4)

The middle third of the face can be subdivided into two halves in a vertical direction: the anteromedial middle third and anterolateral middle third.

The anteromedial middle third is treated through a temporal incision, at first changing from an interfascial plane through an orbitolateral supraperosteal plane using triple-convergence polypropylene thread™ - 3C for fixation. The anterolateral middle third is treated with the classic incision of the facelift (Figs. 51.18 and 51.19).

Fig. 51.18 Mid-thirds descolamento by temporal region

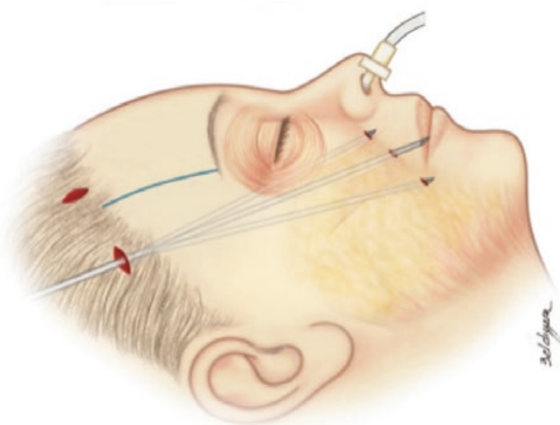


Fig. 51.19 Mid-third fixation in orbitolateral supraperosteal plane using triple. (Citarella [6])

51.4.1 Anteromedial Middle Third

The use of polypropylene threads for suspension and elevation of the middle third of the face has been described since 2005, by Lee et al. In 2008, the senior author of this chapter and co-authors described their use in facial symmetrization in cases of patients with facial paralysis secondary to different pathologies [7]. This technique facilitates the access to the different surgical planes and allows traction in different vectors obtaining an almost vertical traction, which results in a different dissection plane from the conventional facelift, with better results than a conventional facelift and more effective treatment of the nasogenian nasolabial sulcus and the malar area.

The purpose of video endoscopy in the anteromedial middle third of the face is to elevate the midface, to reduce the vertical distance between the lower eyelids and cheek junction, to improve the nasojugal groove, and to improve the upper two-thirds of the nasolabial folds and in the area of undermining to reduce the dissection area in the preauricular region facilitating traction in the anterolateral region.

51.4.2 Surgical Technique

The video endoscopy in the anteromedial middle third of the face initiates with a temporal incision and undermining of the temporal interfascial plane in the temporal region with a dissector. The undermining is continued in the lateral orbital region, creating a tunnel transition from the interfascial plane to the supraperiosteal plane. Subsequently, a metal guide is introduced in a supraperiosteal plane, and polypropylene threads with bidirectional hooks are passed through allowing traction of the anteromedial third of the face in an oblique vector. The threads are then fixed to the deep temporal fascia.

51.4.3 Anterolateral Middle Third

The anterolateral middle third is treated in a conventional way with undermining of the skin in a supra SMAS plane and plication of the SMAS.

In 1967, Pitanguy described his own rhytidoplasty technique, called “round lifting,” based on the morphology of facial aging. Unlike traction vectors described by Pitanguy, the senior author advocates the anterolateral treatment technique of the auricular region in order to produce graduated vertical plication.

51.5 Conclusion

The endoscopic approach has shown satisfactory and lasting results with fast recovery and return to daily activities.

The endoscopic technique has been well received by the patients, as it can result in smaller scars and lower risks of permanent alopecia. The most appropriate treatment of the orbito-temporo-frontal region requires special assessment and precise assessment of basic causes.

51.5.1 *Clinical Cases*

51.5.1.1 Case 1

Case 1: A 62-year-old patient with eyebrow ptosis and cervicofacial flaccidity. Frontal endoscopic treatment and cervicofacial rhytidoplasty were performed, with traction that Vector 1C, Vector 2, Vector V3, Vector V4, and Vector 6.

51.5.1.2 Case 2

Case 2: A 57-year-old patient with eyebrow ptosis and facial flaccidity. Global frontal endoscopic treatment and facial rhytidoplasty were performed, with traction that Vector 1C, 1B, 1C, Vector 2, and Vector V3.

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Chapter 52
Upper and Lower Blepharoplasty

Marcelo Chemin Cury and Roberto Sebastiá

52.1 Introduction

Blepharoplasty is one of the most frequent aesthetic surgeries in the world and presents a false perception of simplicity. The limit between a good aesthetic and functional result of the eyelids and a bad esthetic result with functional deficit is just a millimeter.

In the first examination of the blepharoplasty candidate, the eyelids, such as the eyelashes, the malar region, and the middle third of the face, should be considered. Skin, fat pockets, eyelid ligament structures, upper eyelid crease, tear trough deformity, and the presence of existing asymmetries should be thoroughly analyzed. And not always, we can restore perfect symmetries if it is very pronounced.

Another aspect of relevant importance is the understanding of the changes of the eyelids and periorbital region, due to the aging process.

52.2 Alterations of the Eyelids and Periorbital Region Resulting from the Aging Process

Before performing a surgical procedure on the eyelids and periorbital region, a clear understanding of the anatomical changes occurring in these regions due to aging is necessary. Although these changes may vary among individuals, there are several changes that are common to the aging process, such as family traits, loss of skin elasticity, sun damage, periorbital tissue loss, and deflation of periorbital fat [1].

The retentive ligaments of the periorbitary region are rigid osteocutaneous ligaments, such as the orbitomalar ligament and the zygomaticocutaneous ligament.

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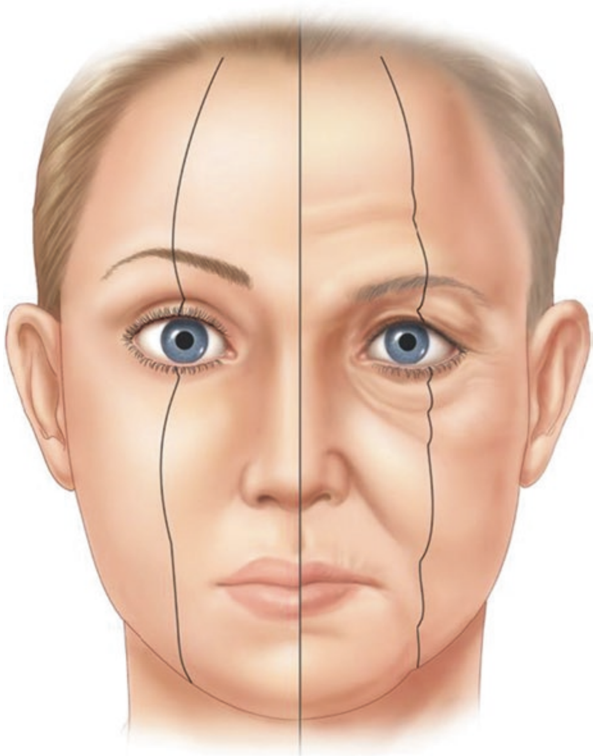

Fig. 52.1 The surface anatomy of a smooth, youthful face *(left side)* compared with the same face showing the convexities and concavities caused by the aging process *(right side)*

When periorbital soft tissues fall, they are contained by these ligaments, thus producing a concavity in the region, which the patient refers to as a "dark circle around the eyes", in addition to a swelling above the ligament (Fig. 52.1).

Relaxation of the ligaments of the frontal and superciliary regions associated with repeated movements of facial animation and blinking of the corrugator, procero, and orbicular muscles leads to a decrease of the lateral superciliary and a depression of the temporal region. This is more pronounced in patients with weak support structures in this region and more central insertions of the frontal muscle. With these changes, we will notice a decrease in the distance between the eyebrow and the ciliary line, creating a hooded look on the upper eyelid, with the eyelid skin erasing the upper eyelid crease as well as the pretarsal space (Fig. 52.2).

In the upper eyelid, the loss of elasticity of the skin associated with the lowering of the eyebrow produces a redundancy of skin and dermatocalase in the upper eyelid. The laxity of the orbital septum and the inability of the adjacent connective tissues to hold the confined fat compartments lead to a protrusion of this fat, also giving the eyelids a swollen appearance. Other alterations that may occur in the upper eyelids are related to the size and shape of the eyeball and the partial dehiscence of the levator muscle of the upper eyelid, thus leading to

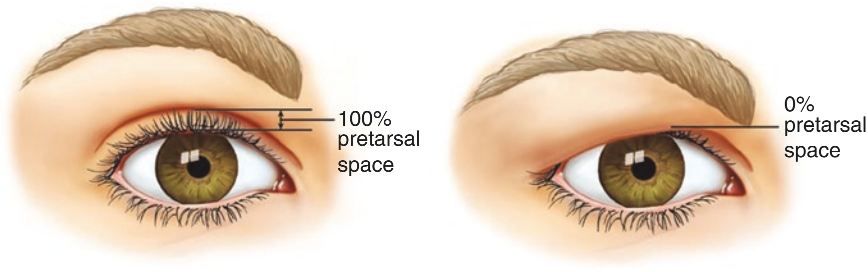

Fig. 52.2 Left, youthful brow position showing pretarsal space. Right, an aged eyebrow without pretarsal space. In certain situations, the frontalis actually elevates the nasal brow with age

alterations, asymmetries of the eyelid sulcus height, and even ptosis. The palpebral lobe of the lacrimal gland may also be prolapsed in addition to an increase in ROOF (retro-orbicularis oculi fat), thus leading to a "heavy" aspect of the lateral side of the upper eyelid. All these changes must be observed and corrected in the surgery.

In the lower eyelids, loss of skin elasticity, loss of integrity of the orbital septum, laxity of tarsal ligaments, lateral and medial tendons, as well as loss of orbicular muscle tonus lead to important aesthetic and functional changes, such as increase of the vertical distance between the malar region and the eyelid margin; protrusion of fat compartments that become apparent on the skin; change in eyelid shape; alteration of the lower eyelid position, leading in some cases to the "scleral show"; and symptoms related to the function of the lachrymal pump, such as epiphora, since the integrity of the tarsal orbicularis muscle and tarsal ligaments are important for the perfect functioning of the tear pump.

Alterations in the middle third of the face, such as malar bags and festoons, due to decrease of the periorbital soft tissues and laxity of the orbitomalar ligament that "hang" over the inextensible zygomaticocutaneous ligament, must also be identified and corrected, as well as tear trough deformity, characterized by a sharp concavity in the tear groove associated with fat protrusion above this (Fig. 52.3) [2].

52.3 Preoperative Evaluation

In addition to the considerations already made above, some aspects are important to be evaluated in blepharoplasty candidates: the presence of dry eye or lacrimation or epiphora complaints; the ligament tarsal laxity measured through the snap back text (Fig. 52.4); the integrity of the anterior lamella (Figs. 52.5 and 52.6); the presence of Bell's reflex; ocular extrinsic motility; the presence of existing lagophthalmos; and the shape and size of the eyeball, whether a prominent eyeball or even some degree of enophthalmus [3].

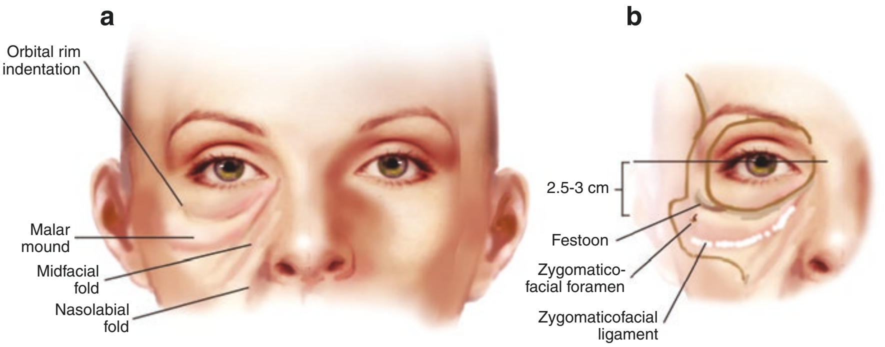

Fig. 52.3 Osteocutaneous ligaments of periorbital region and malar festoon development

Fig. 52.4 Snap back test

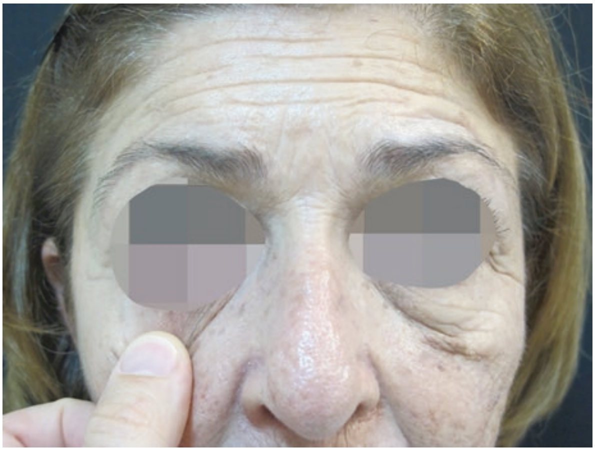

Fig. 52.5 The anterior lamellar test without deficiency. The lower eyelid margin reaches gently the pupil

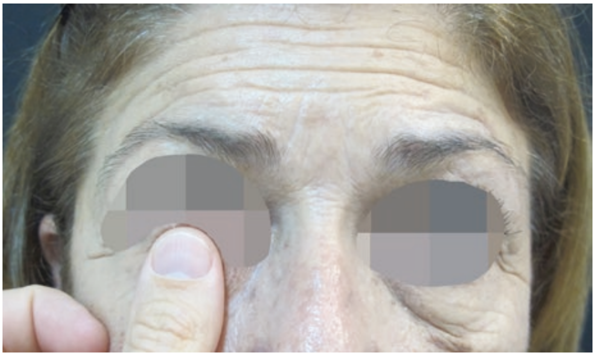

Fig. 52.6 The anterior lamellar test with deficiency. The lower eyelid margin can't reach the pupil

52.4 Upper Blepharoplasty

52.4.1 Marking the Skin Resection

By the principle of Flower, we must preserve a minimum distance of 20 mm between the upper eyelid border and the skin covering the upper edge of the orbit, which may or may not coincide with the eyebrow. Excessive resection should be avoided because repositioning of skin through grafts on the upper eyelid can produce aesthetic and even inadequate functional results, while small complements of cutaneous resection can easily be done under local anesthesia, in the office after 3 months.

The marking of the lower incision is usually made at a distance of 7–9 mm from the upper palpebral margin; medially the incision should not approach the medial canthus exaggeratedly nor adopt a vertical orientation to avoid the appearance of a cicatricial epicantus and laterally, whenever possible, not to exceed the lateral edge of the orbit, since the skin from that point is thicker, and the scar will become more apparent. In this way, the resulting scar was between 8 and 10 mm from the palpebral margin, which made it less visible (Fig. 52.7).

52.4.2 Anesthesia

Most of the time, the surgery is done under local anesthesia associated with venous sedation performed by an anesthesiologist. Local anesthesia is made with a 2% Lidocaine solution with 1:100,000 epinephrine. It uses insulin needle and 3 ml or 5 ml syringe with thread for infiltration, which should be in the subcutaneous plane thus helping the separation of the palpebral skin of the orbicularis muscle.

Fig. 52.7 Upper eyelid skin resection mark

52.4.2.1 Resection of the Skin

The incision of the skin is made with 15 blade scalpel, and its detachment of the underlying muscle can be made with lamina, electrocautery, or scissors, removing only the cutaneous and not the muscular tissue.

52.4.2.2 Orbicular Muscle Resection

Resection of a 2–3 mm spindle of preseptal orbicular muscle can be done, and this provides a better definition of the palpebral groove. This resection should be done symmetrically on both sides, thus avoiding palpebral sulcus asymmetries (Fig. 52.8). In cases of patients with high palpebral sulcus, this procedure should be avoided as it leads to a rise of the sulcus.

This procedure also facilitates the exposure of post-septal fat since the orbital septum is exposed.

52.4.3 Elevation of the Palpebral Groove

The superior eyelid sulcus is formed by fibrous adhesions that originate in the levator muscle of the upper eyelid, cross the orbital septum and the orbicularis muscle, and enter the eyelid skin dermis at varying heights with sex and ethnicity of each individual.

In cases of very low eyelid sulcus, only resection of spindle of orbicularis muscle is insufficient to raise the sulcus. In such cases, 6.0 silk stitches are made covering

Fig. 52.8 Preseptal orbicular muscle resection

the skin of the upper incision, the elevator muscle, and the skin of the lower incision, thus allowing a better rise of the eyelid sulcus. Usually 4 points are made and they should be kept for at least 10 days.

52.4.3.1 Fat Bag Resection

In the upper eyelids are two fat compartments: the nasal, more vascularized and whiter, and the central one, more yellowish and horizontally arranged, which sometimes causes its lateral portion to touch the lacrimal gland (Figs. 52.9 and 52.10).

For the removal of these bags, the orbital septum should be opened to remove the excess herniated fat. In the resection of the nasal fat, the upper oblique muscle should be attenuated, as tendon expanses of this muscle separate this fat from the central one. The nasal fat should always be reviewed since, together with the lower lateral fat, it is the site of higher incidence of postoperative residual fat requiring surgical revision. In the resection of the central fat, we open the entire orbital septum for complete exposition of the same. Its excess is removed, obviously avoiding the lacrimal gland, when adjacent to the lateral portion of the fat. It should also be avoided the exaggerated resection of this bag, especially in its more medial portion, in order to not cause a "A frame" deformity (Fig. 52.11).

In that moment, if there is an excess of ROOF (retro-orbicularis oculi fat), it can be resected for an improvement of the "swollen" appearance on the lateral side of the upper eyelid.

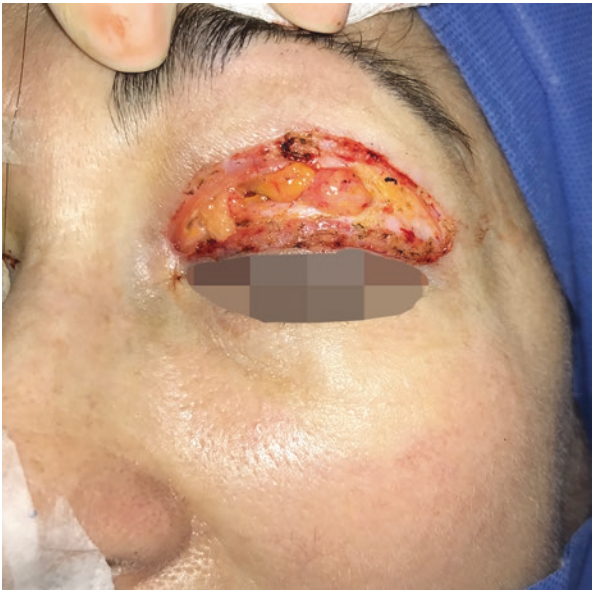

Fig. 52.9 Upper eyelid fat bags

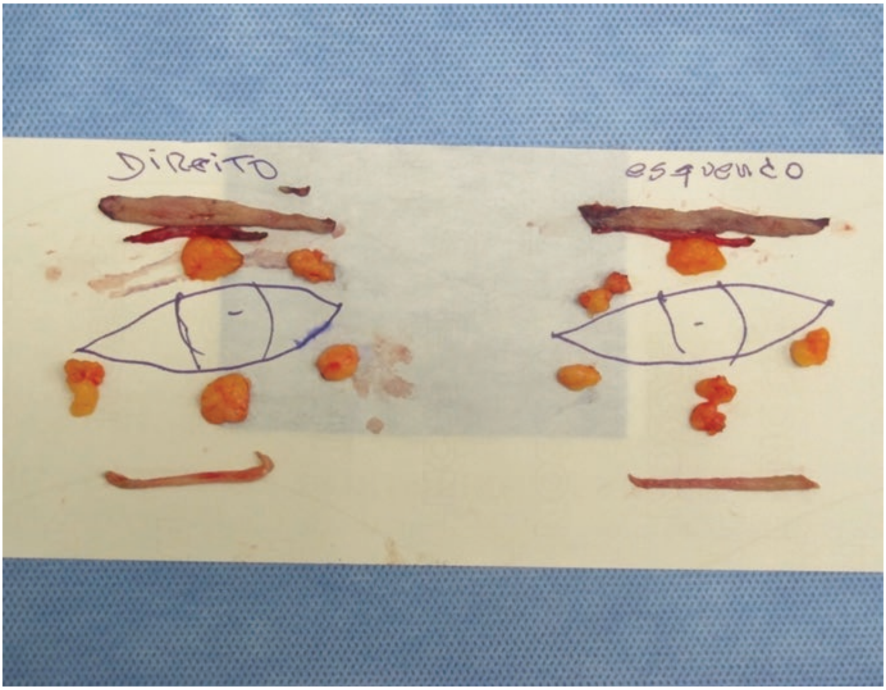

Fig. 52.10 The bags of fat, skin, and orbicular muscle resected and placed side by side to compare the symmetry

Fig. 52.11 "A frame" caused by excessive resection of the medial portion of the central fat bag of the upper eyelids; scleral show also caused by over resection of the fat bags in the lower eyelids

52.4.3.2 Suture

Sutures are not necessary in the deep planes, with the suture of the skin being sufficient. This can be made with nylon or silk 6.0, with separate or running stitches. The removal takes between 5 and 7 days.

52.5 Lower Blepharoplasty

The planning of the inferior blepharoplasty should be customized individually for each patient. Some parameters are very important to be observed in the preoperative evaluation: the integrity of the tarsoligamentous structure; the malar eminence consequently if the patient has a neutral, positive, or negative vector; and the degree of ocular prominence, if the patient has prominent (Hertel Measurement of more than 18 mm), normal (Hertel Measurement of 15–18 mm), or deep (Hertel Measurement of less than 15 mm) eyes.

Basically there are two accesses for the treatment of the lower eyelid fat bags, which are in number of three, the lateral, the central, and the internal or medial. The main accesses are transcutaneous and transconjunctival.

In transcutaneous access, the incision is positioned as close as possible to the ciliary line, without damaging the bulbs. A cutaneous detachment can be done or skin muscle detachment, respecting the pretarsal portion of the orbicularis muscle, as advocated by Codner, McCord, and others for the exposure of fat pockets.

In the routine of the authors, the access used for the removal of excess fat bags is the transconjunctival, since we believe we have less repercussion in the innervation of the orbicularis muscle, which is done by zygomatic and buccal branches of facial nerve that come perpendicular to the muscle.

52.5.1 Conjunctival Trans-Blepharoplasty

An incision can be made along the entire palpebral conjunctiva or three small incisions in the projection of the pockets, thus maintaining bridges of retractor muscles, avoiding postoperative entropion (Fig. 52.12). The use of protective lens is always indicated.

Then we open the capsulopalpebral fascia and the fat bags are easily exposed. The lateral fat bag is also encased by a fascia adjacent to the Lockwood ligament, making it more difficult to be resected. Therefore, the author recommends always review this bag as it tends to remain residual. In the removal of the central and internal bags, care must be taken with the oblique inferior muscle that separates these two structures. Excess removal of fat should be avoided in order not to result in a deep eye appearance (Fig. 52.13).

Sutures are unnecessary in the conjunctiva. In the postoperative period, we used anti-inflammatory eye drops and antibiotics and ocular lubricating eye drops.

52.5.2 Eyelid Skin Resection

The resection of excess palpebral lower skin should always be carefully measured. When using transcutaneous access for removal of the pockets, the cutaneous detachment should be restricted only to give access to the pockets, thus avoiding large

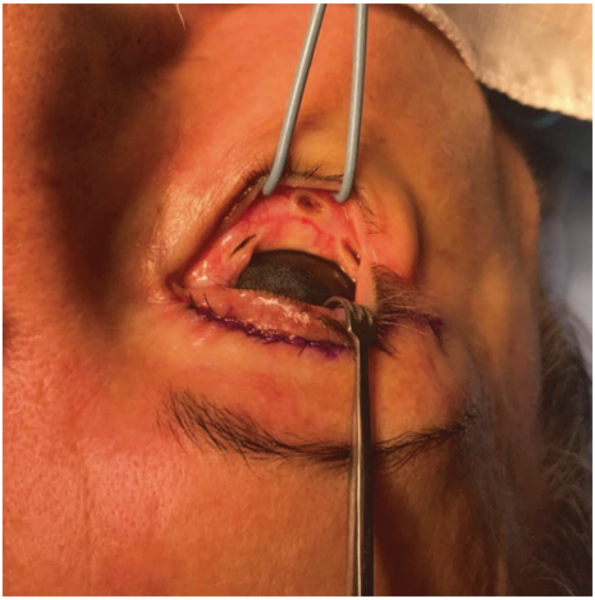

Fig. 52.12 Transconjunctival incisions to remove the fat bags on lower eyelid

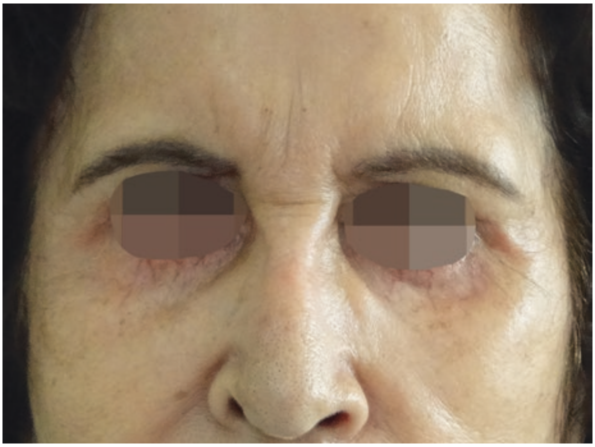

Fig. 52.13 "Deep eyes" due to fat bags over resection on lower eyelids

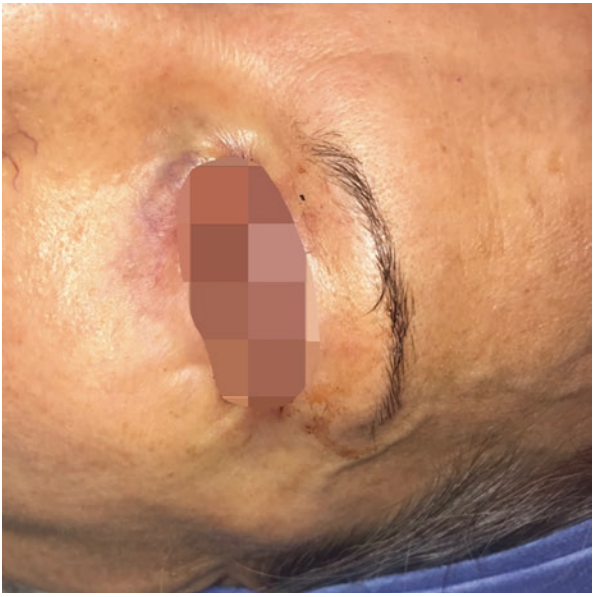

Fig. 52.14 "Pinch" blepharoplasty on lower eyelid

cicatricial retractions in the postoperative period, which may be responsible for the changes in the positioning of the eyelid.

As we use the transconjunctival access, for the removal of excess skin, we prefer the technique described in 2007 by Lorne Rosenfield, called pinch blepharoplasty [4].

Through two forceps, we pinch the skin just below the ciliary margin, thus determining the amount of skin to be resected. With Joseph or Iris scissors, we remove the pinched skin (Fig. 52.14). Subsequently, hemostasis and running suturing of the skin with nylon 6.0 are performed.

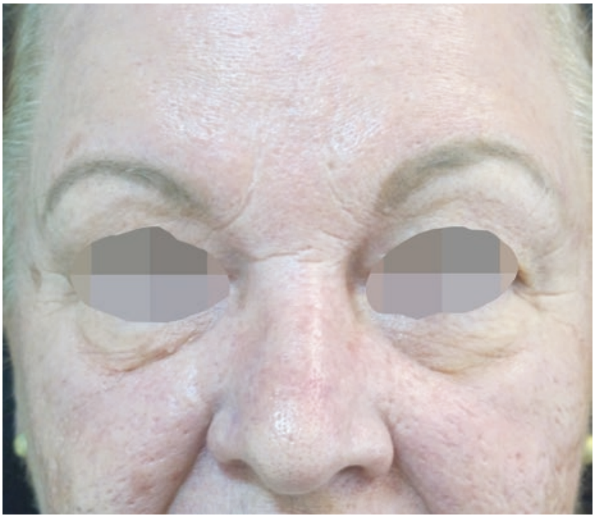

Fig. 52.15 Pre op.: eyelids blepharochalasis and fat bags excess

Fig. 52.16 Post op.: after upper and lower blepharoplasty with Mladick's canthopexy. Transconjunctival approach and "pinch" blepharoplasty on lower eyelids have been used

The advantages of this technique are, as there is no skin detachment, there will be no future scar retractions, any eyelid malposition can be seen and corrected intra-operatively, through canthopexy or canthoplasty; its surgical time is shorter (Figs. 52.15, 52.16, 52.17, and 52.18).

Fig. 52.17 Male patient with upper blepharochalasis, fat bag excess on lower eyelid and tarsal ligaments laxity

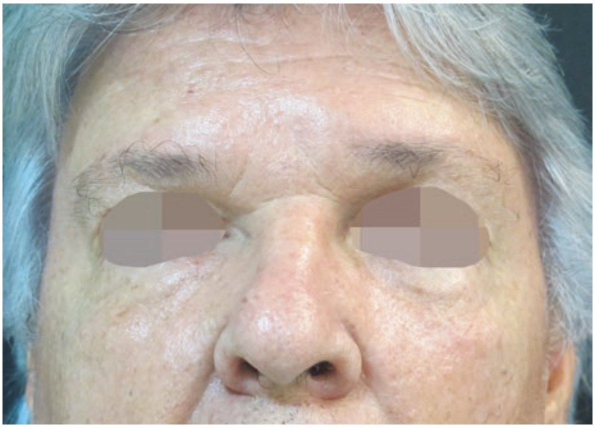

Fig. 52.18 Post op.: after upper and lower blepharoplasty with Mladick's canthopexy. Transconjunctival approach and "pinch" blepharoplasty on lower eyelids have been used

52.5.3 Canthopexy

Whenever tarsoligamentous laxity is present, sustaining procedures such as canthopexy or canthoplasty should be considered, especially if skin is removed. Mladick described a canthopexy which consists of a small traction of the pretarsal portion of the orbicularis muscle, attaching it to the lateral periosteum of the orbit with nylon 5.0 [5]. Its main indication is light flaccidity with good palpebral positioning and the need for skin removal.

In cases where there is moderate tarsoligamentous flaccidity with apparent sclera, the canthopexy described by Lessa and Sebastia is indicated. Through the upper palpebral incision, the upper lateral periosteum of the orbit is accessed, and a 5.0 nylon suture is passed there. Then the suture descends to the lower eyelid after the lateral retinaculum and again returns to the upper eyelid prior to the retinaculum, hugging and stretching it. The sutures return in the periosteum thus raising the position of the lower eyelid [6].

52.6 Nasojugal Groove (Tear Trough)

Is a groove that can be seen as a normal variation in younger people, but it often deepens with age. The indentation is formed by contributions from the bone, muscle, and overlying soft tissues. The concavity begins at the anterior nasal lacrimal crest. It is formed by the arcus marginalis, the orbitomalar ligament, the origin of the orbicularis oculi muscle superolateral to the origins of the levator labii superioris, and the levator alaeque nasi muscles.

The anatomical causes of this furrow are still controversial. Wong et al. described a osteocutaneous ligament, which they called tear trough ligament that would be responsible for the depression of the nasojugal groove. This ligament begins at the maxilla and inserts into the skin along the nasojugal sulcus, securing the suborbital skin medial to the maxilla.

The very thin palpebral skin remains with the thicker cheek skin exactly from that groove, which contributes to a greater depression of this with the aging of the patient.

Some ways have been proposed for the correction and attenuation of this depression in the nasojugal groove: fillers with hyaluronic acid or aspirated fat (lipofilling); free fat graft and transposition of fat bags.

The infiltration of hyaluronic acid should be done below the orbicularis muscle and preferably with micro cannulas rather than needles. The results are usually satisfactory, but the duration is transient, usually 10 months, depending on the product used.

Lipofilling of aspirated fat is a very useful procedure and has the advantage of being permanent, in relation to hyaluronic acid. Care should be taken not to overcorrect, as in the periorbital area, the graft integration is much larger than in other areas (Figs. 52.19 and 52.20) [7].

The free fat graft, as described in 2017 by Miranda and Codner, is also an effective method for the correction of depression in the tear trough. In this technique, the transcutaneous approach and the skin muscle flap are done. A deinsertion of the

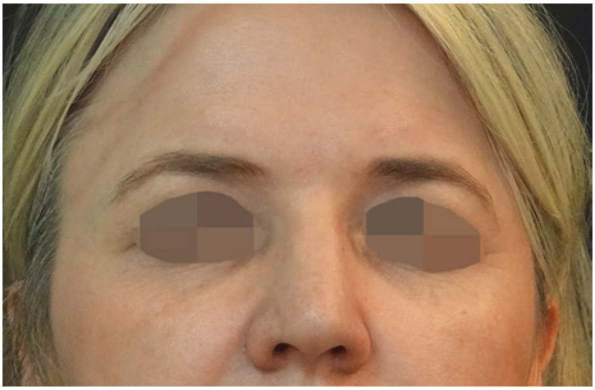

Fig. 52.19 Tear trough deformity, upper eyelid blepharochalasis, and eyebrow “ptosis”

Fig. 52.20 Post op.: upper blepharoplasty and eyebrow suspension with endoscopic technique; lipofilling on tear trough

medial orbicularis muscle and the orbitomalar ligament is made, creating space for the free fat grafting, which must be cut into small pieces of 2–3 mm.

The transposition of fat bags was initially described by Loeb. During the transconjunctival blepharoplasty, the wide release of the medial bag is made, and we enlarge the dissection in the inferior direction, reaching the arcus marginalis. It also releases the tear trough ligament creating space for the transposition of the medial bag, which can be fixed with mattress sutures in the skin or directly in the periosteum.

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Chapter 53
Canthopexy and Canthoplasty

Lessa Sergio and Pontello Joao

The inexorable loss of elasticity of the tarsal plate and lateral canthal tendon has a profound effect on tone, position, and movement of the lower lid. The integrity of the lateral canthal tendon profoundly affects lower lid position, eyelid closure, and eye fissure shape.

Results of aesthetic lower eyelid surgery have improved through a better understanding of the anatomy, indications for surgery, and more effective, individualized solutions for varied problems. Most treatment options have the potential risk inducing lower eyelid malposition if support is not applied through either canthopexy or canthoplasty.

Since the descriptions of the lateral canthal sling for lower eyelid ectropion repair by Tenzel and colleagues [1], the dermal orbicular pennant introduced by Edgerton and Wolfort [2], and the beautiful tarsal strip described by Anderson and Gordy [3], almost 40 years ago, a multitude of similar or related procedures have been described for the correction and prophylaxis of eyelid malposition in cosmetic and reconstructive eyelid plastic surgery [4, 5–13].

A simple physical examination test of lower eyelid laxity that should be performed includes the lid snap-back test. For this test, the patient's lid is pulled away from the eyeball to determine whether lid elasticity is strong enough to immediately reposition the lid against the globe once the lid is released. A slow lid snap-back test and a significant amount of lid distraction and tarsoligamentous redundancy should give pause and cause the surgeon to evaluate the patient as a candidate for possible lateral support procedure (Figs. 53.1 and 53.2).

Laxity is also tested with lid distraction. The lower lid is gently pulled forward and away from the globe. A distraction of more than 6 mm of excess lower lid

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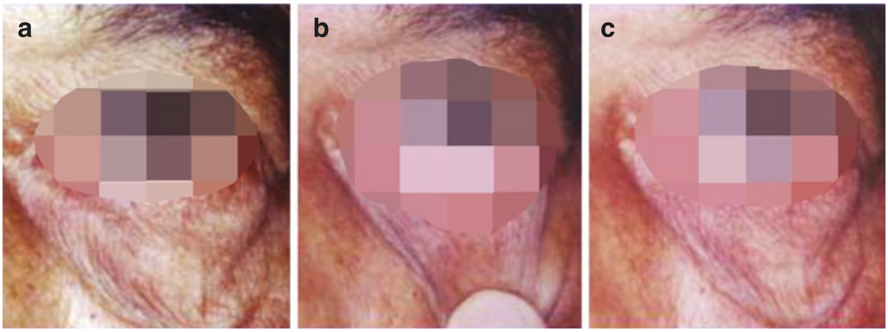

Fig. 53.1 Slow lid snap-back test. Moderate laxity. (**a**) Static. (**b**) Vertical traction. (**c**) Rest after traction

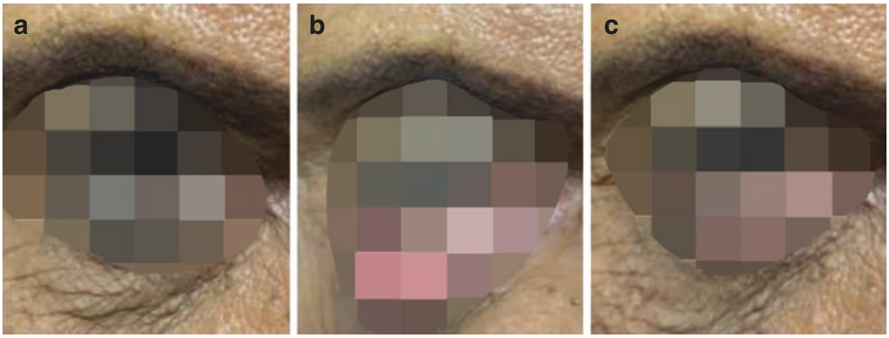

Fig. 53.2 Slow lid snap-back test. Severe laxity. (**a**) Static. (**b**) Vertical traction. (**c**) Rest after traction

indicates significant tarsoligamentous laxity. Although the preoperative tests are used to evaluate canthal laxity before surgery, we prefer to decide intraoperatively whether canthopexy or canthoplasty should be used.

The term canthopexy is used to describe placement of the suture that supports the lateral canthus without dividing the canthus in lower lids with less tarsoligamentous laxity. Canthoplasty is used to describe division of the lateral canthus with a canthotomy, cantholisis, to perform lateral canthal anchoring of lower lids with more significant tarsoligamentous laxity.

Lateral canthal anchoring is integral to both transcutaneous and transconjunctival lower blepharoplasty. Lateral canthal anchoring is performed in almost all patients who undergo a lower lid blepharoplasty, because it provides lower lid support and facilitates functional eyelid fissure.

The canthus should always be anchored inside the orbital rim, not at the edge, allowing the lid to conform to the globe.

There are several methods for performing canthopexy and canthoplasty during lower blepharoplasty.

53.1 Canthopexy Techniques

Muscle suspension (Mladick) lower blepharoplasty was adapted by Mladick in 1979 for correction of mild flaccidity of lower eyelid. The pretarsal orbicularis muscle is important as it contributes to lower lid position and tone. In mild to moderate degrees of laxity, we fixed the lateral position of the pretarsal orbicularis to the internal aspect of the orbital rim periosteum slightly higher to the lateral canthal ligament. We usually use 6-0 nylon for this suture (Figs. 53.3, 53.4, and 53.5).

Retinaculoplasty is used by Lessa since 1995 for treatment of moderate lower eyelid laxity. It is a special canthopexy that avoids release of the lateral canthal tendon. This canthopexy is used in classic transcutaneous blepharoplasty or in transconjunctival blepharoplasty.

On ellipse-shaped piece of skin is removed from the upper eyelid along with a strip of pretarsal orbicularis muscle for the upper blepharoplasty. To remove fatly tissue from the lower eyelid, we enter through the conjunctiva or through the skin. We begin the canthopexy by making a cutaneous incising of about 2 mm, immediately below the lateral canthus in cases of transconjunctival approach. Using 5-0 polypropylene (Ethicon, Johnson & Johnson, Summerville, NJ) for suturing, we pass a 1.9 mm needle through the periosteum of the superior orbital rim at the junction point of a vertical line that touches the lateral canthus and the superior orbital rim. The needle proceeds downward in a retroorbicularis plane, emerging through the small skin incision in the lower eyelid, below the lateral canthus. Through the same small incision, the needle returns upward, grasping the inferior branch of the canthal tendon or the retinaculum, reaching the upper eyelid wound near the initial

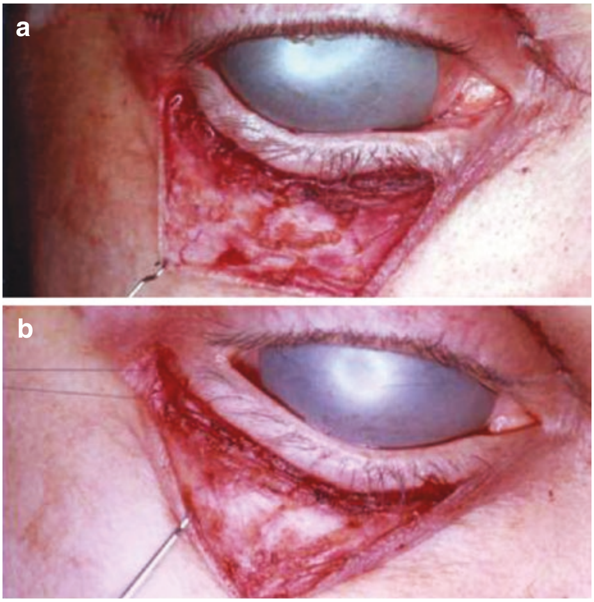

Fig. 53.3 Muscle suspension (Mladick). (**a**) Subciliar incision and pretarsal orbicularis muscle dissection. (**b**) Fixation of the lateral position of the pretarsal orbicularis to the internal aspect of the orbital rim periosteum slightly higher to the lateral canthal ligament

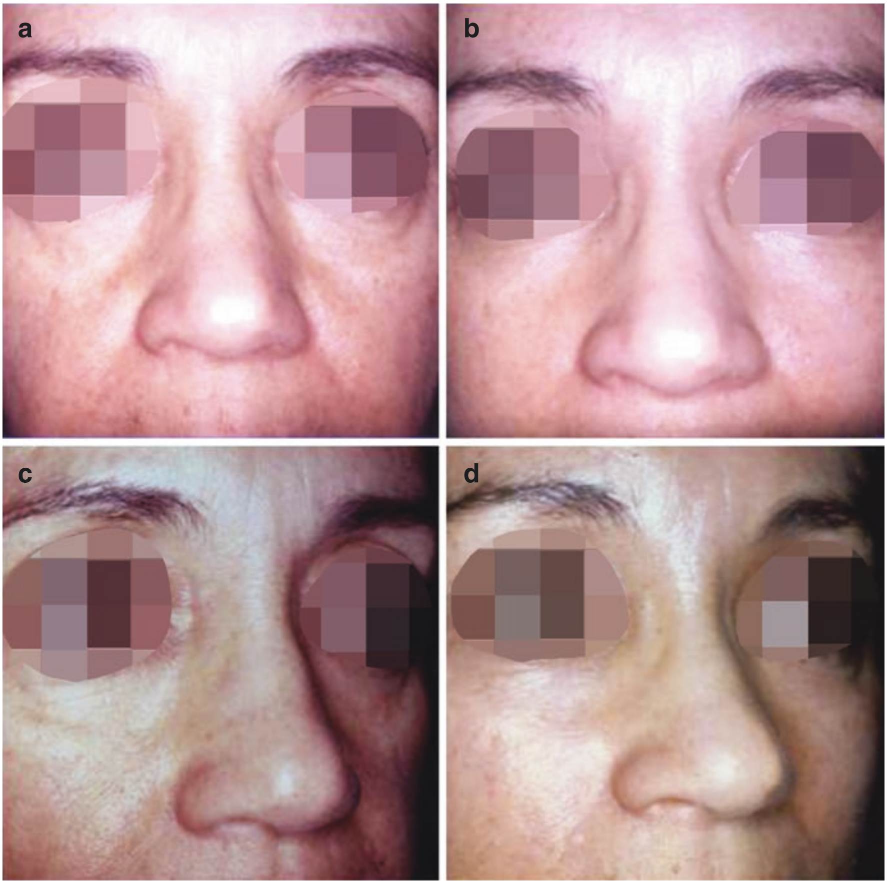

Fig. 53.4 A 54-year-old female patient with moderate laxity of lower eyelids and fatbag. (**a**, **c**) Preoperative – muscle suspension. (**b**, **d**) Same patient, 1 year after surgery

periosteal fixation point where the tie is made. At this phase, we can clearly observe the tension at the lower eyelid and the elevation of the lateral canthus. The hypercorrection lifts the lower eyelid between 1 and 2 mm above the inferior limbus, correcting the false impression of excess tissue or of orbicular hypertrophy. After canthopexy, the wound on the upper eyelid is sutured, and the procedure is completed.

During the first 2 weeks, we observed a greater tension of the lower eyelid and a slight upward slanting of the lateral canthus. During this period, palpebral movement was slightly limited. In the third postoperative week, eyelid shape and canthal positioning had become completely normal. This technique does not dissect a submuscular tunnel and avoid the release of lateral canthal tendon. This procedure greatly reduced surgical tissue and drastically lowers morbidity (Figs. 53.6 and 53.7).

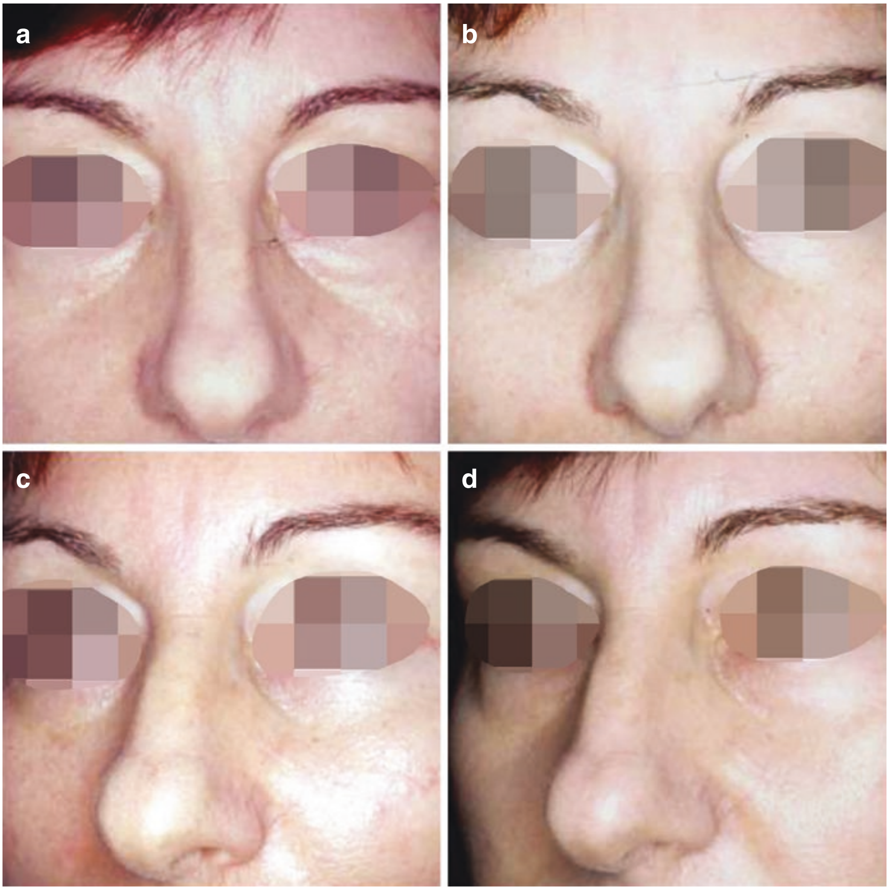

Fig. 53.5 A 52-year-old female patient with moderate laxity of lower eyelids. (**a**, **c**) Preoperative – muscle suspension. (**b**, **d**) Same patient, 1 year after surgery

53.2 Canthoplasty Techniques

For more severe laxity, one of several other techniques may be used.

53.2.1 Tarsal Suspension (McCord)

This lower eyelid tightening procedure is often used in cases of severe flaccidity of lower eyelid without eyelid elongation.

The procedure begins with a standard lateral canthotomy. A small narrow triangles are then resected, which usually exposes the lateral and the upper and lower tarsal plates. Using blunt-tipped scissors, the upper edge of the lateral canthotomy is spread

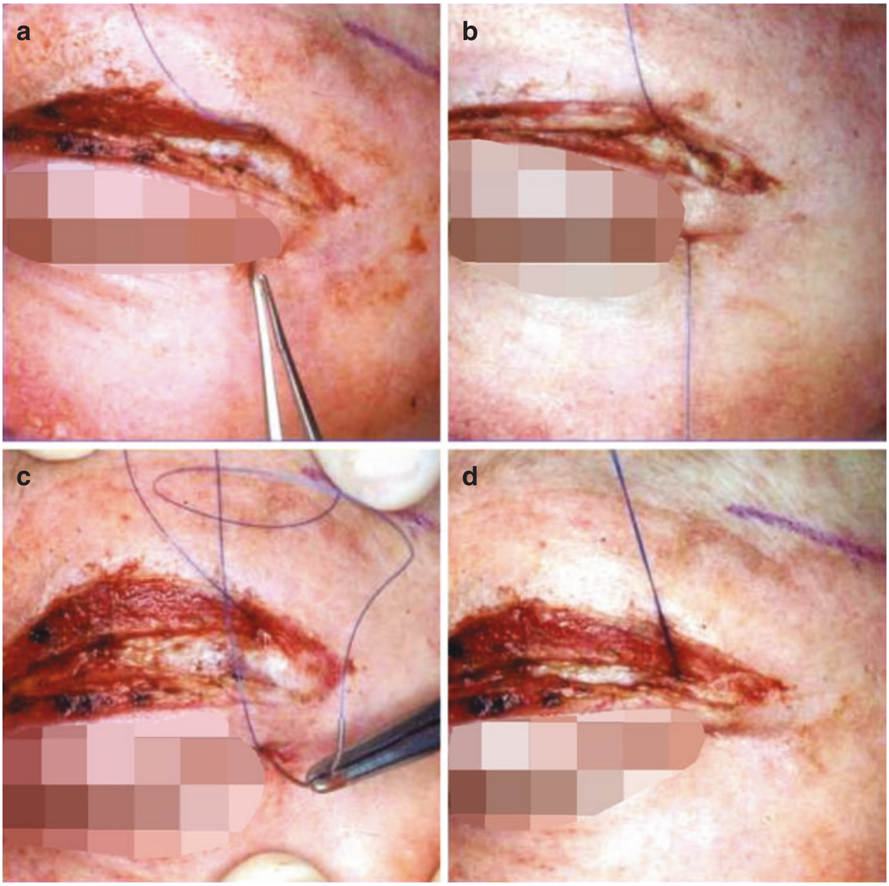

Fig. 53.6 Retinaculoplasty by Lessa. (**a**, **b**) Passing a 1.9 mm needle through the periosteum of the superior orbital rim at the junction point of a vertical line that touches the lateral canthus and the superior orbital rim. (**c**) Through the same small incision, the needle returns upward, grasping the inferior branch of the canthal tendon or the retinaculum. (**d**) Realization of the node next to the fixation

open to visualize directly the periosteum of the lateral orbital rim. This can be identified by visualization or by palpation. A 5-0 nylon suture is passed through the skin at the middle of lateral aspect of the upper eyelid, emerging at the middle of lateral tarsus. At this point, inverting the knot by placing the suture through the periosteum at the whitnell's tubercle and advanced through the lower tarsal plate, emerging on the suffering at the skin, and the lateral canthotomy is closed. Additional stiches using 6-0 silk sutures are used to close the small lateral wound. This 3-point fixation technique of canthoplasty offers a minimal shortening of the lower eyelid (Fig. 53.8).

Essentially this simplified technique is much easier to execute than the lateral tarsal strip technique. Another advantage of this technique is the preservation of the normal horizontal dimension of the palpebral aperture. It can be used to correct an

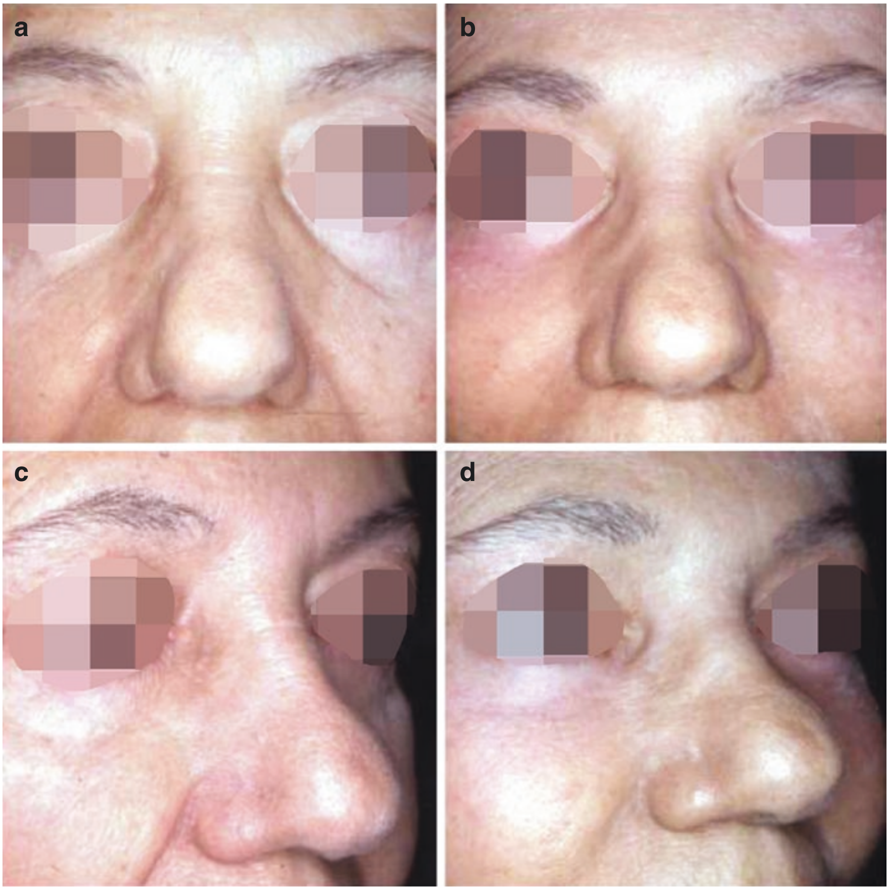

Fig. 53.7 A 68-year-old female patient with upper eyelid ptosis, moderate laxity of lower eyelids and bilateral scleral show. (**a**, **c**) Preoperative – Lessa technique. (**b**, **d**) Same patient, 1 year after surgery

anatomic defect such as eyelid retraction or eyelid ectropion, severe lid laxity, or canthal malposition (Figs. 53.9 and 53.10).

53.2.2 Tarsal Strip (Anderson & Gordy)

A significant lower lid laxity generally requires a canthotomy followed by a canthoplasty to achieve appropriate lid tension. This eyelid shortening procedure is a solution to primary functional eyelid disorders that related to, in part, horizontal eyelid laxity. Tarsal-strip canthoplasty is a highly viable method for elevation and fixation of the lateral canthus and will correct most retraction and ectropion where lower lid is elongated; it may be appropriate to reduce the medial-to-lateral dimension.

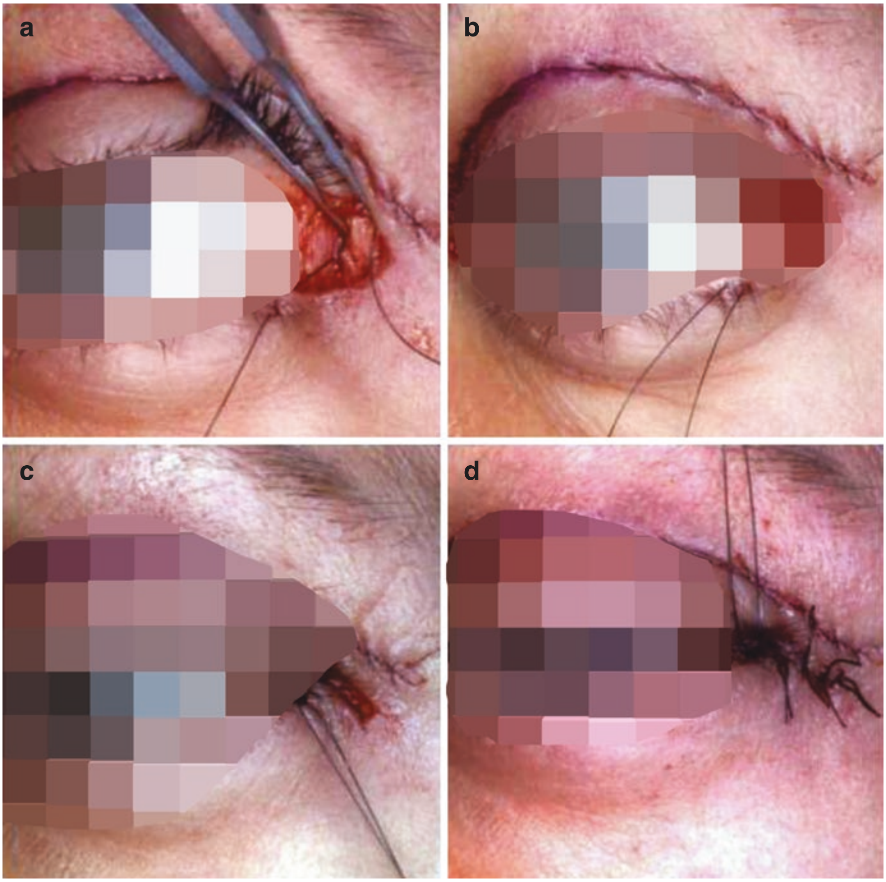

Fig. 53.8 Tarsal suspension (McCord). (**a**–**c**) Suture is passed through the skin at the middle of lateral aspect of the upper eyelid, emerging at the middle of lateral tarsus. At this point, inverting the knot by placing the suture through the periosteum at the whitnell's tubercle and advanced through the lower tarsal plate, emerging on the suffering at the skin, and the lateral canthotomy is closed. (**d**) Additional stiches using silk sutures to close the small lateral wound

The lateral tarsal strip procedure is accomplished by performing a lateral canthotomy and inferior cantholysis. The inferior border of the tarsus is released from its underlying attachments to conjunctive, lower eyelid retractors, and orbital septum. A limited mucocutaneous junction excision is performed, and the tarsus is freed from its anterior attachments to conjunctiva, lower eyelid retractors, and orbital septum. A limited mucocutaneous junction excision is performed, and the tarsus. If excess tissue is evident, it can be excised conservatively. A 5-0 nylon

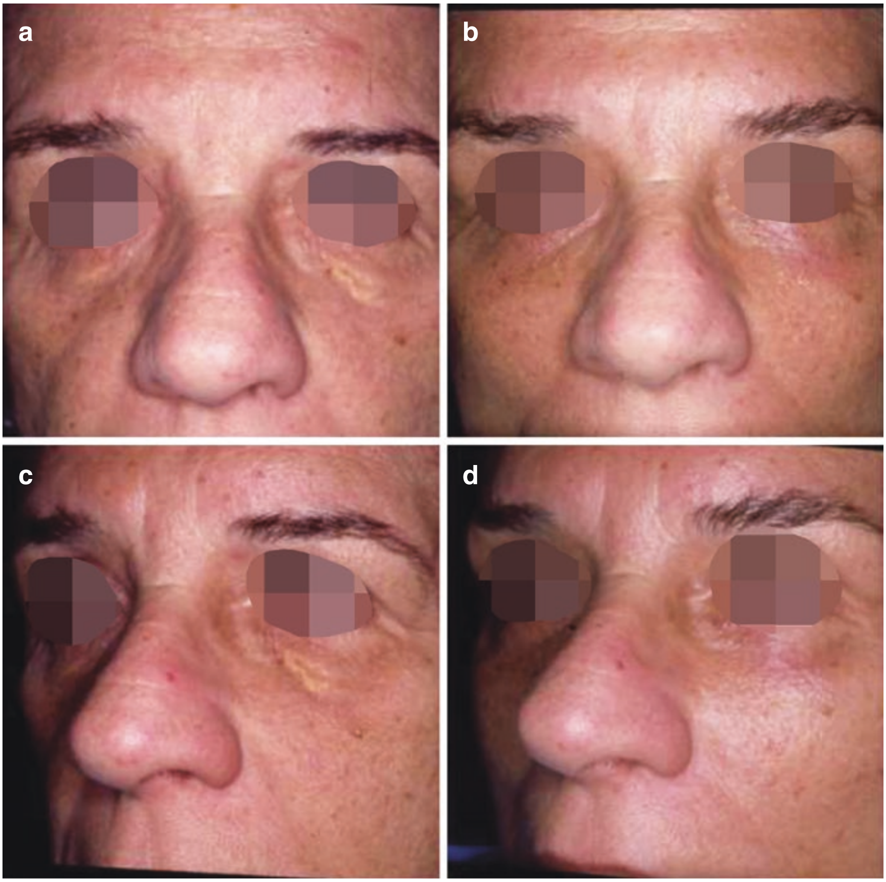

Fig. 53.9 A 68-year-old female patient with severe laxity and bilateral lower eyelids retraction. (**a**, **c**) Preoperative – tarsal suspension. (**b**, **d**) Same patient, 1 year after surgery

sutured is then passed from posterior to anterior through the edge of the tarsus. It is then attached to the periosteum at the normal anatomic level, inside the lateral orbital rim inferior to the intact superior curb of the lateral canthal tendon. Lateral canthal angle reformation is then performed with 5-0 nylon suture, passing the suture through the cut margin to the tarsal strip, out the gray line, through the upper eyelid gray line, and out throng the cut edge of the upper eyelid. At this position, the suture is tied. The lateral canthal angle suture is tied permanently, and the skin is closed with 6-0 silk sutures (Figs. 53.11, 53.12, and 53.13).

Fig. 53.10 A 59-year-old female patient with severe laxity and bilateral lower eyelids retraction. (**a**, **c**) Preoperative – tarsal suspension. (**b**, **d**) Same patient, 1 year after surgery

Fig. 53.11 Tarsal strip (Anderson & Gordy) (**a**) Lateral canthotomy and inferior cantholysis. (**b**, **c**) Nylon sutured is then passed from posterior to anterior through the edge of the tarsus. Lateral canthal angle reformation is then performed, passing the suture through the cut margin to the tarsal strip, out the gray line, through the upper eyelid gray line, and out through the cut edge of the upper eyelid. (**d**) Additional stiches using silk sutures to close the small lateral wound

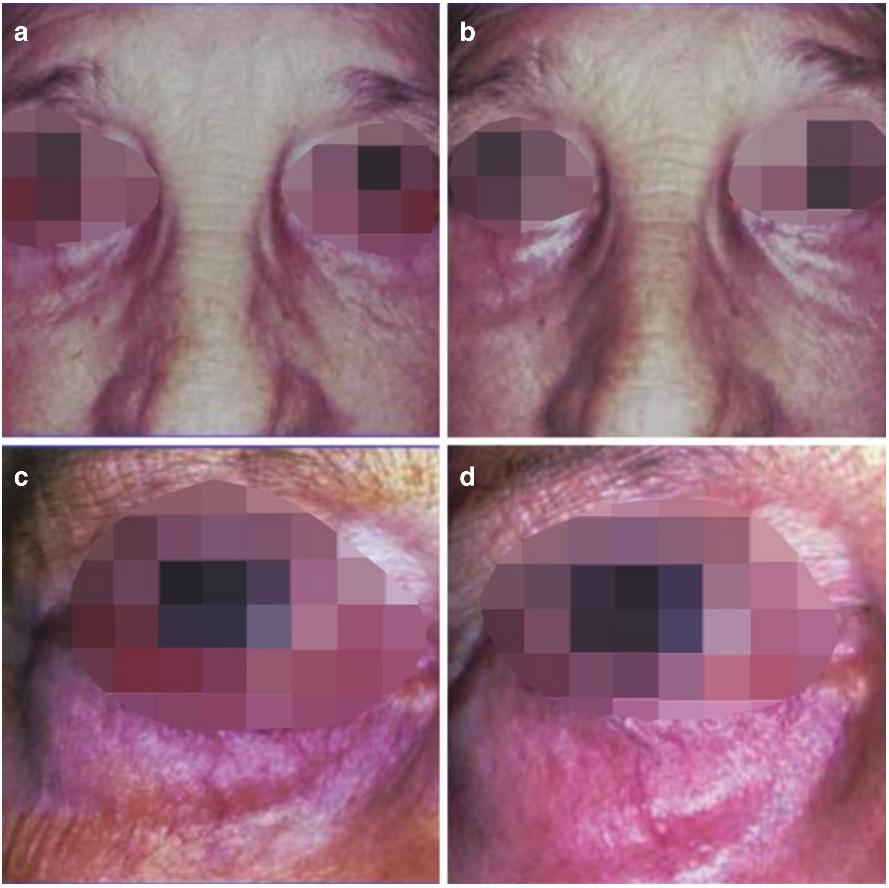

Fig. 53.12 A 78-year-old female patient with bilateral lower eyelid ectropion and elongated lower eyelids. (**a**, **c**) Preoperative – tarsal strip. (**b**, **d**) Same patient, 1 year after surgery

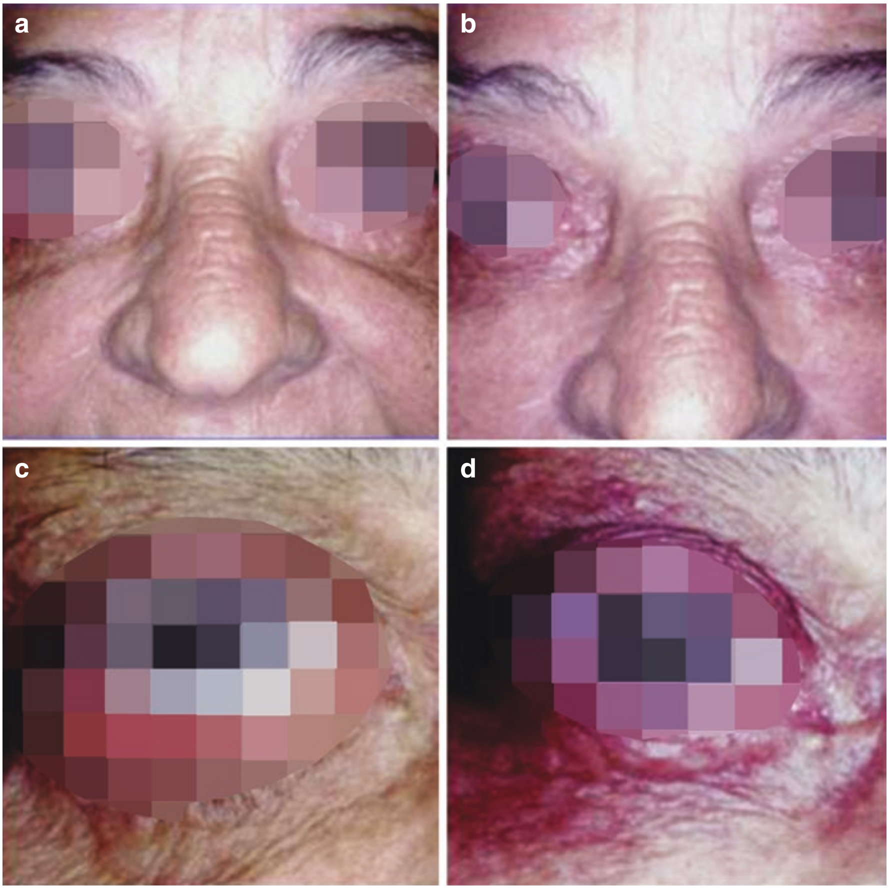

Fig. 53.13 A 74-year-old female patient with unilateral lower eyelid ectropion and elongated lower eyelid. (**a**, **c**) Preoperative – tarsal strip. (**b**, **d**) Same patient, 1 year after surgery

53.3 Conclusion

Surgeons performing lower-lid blepharoplastics and mid-face lifts frequently need to stabilize the lower lid. It is obvious that we have a menu of operative procedures available for the lower lid and lateral canthal area, and each one of these procedures has slightly different indications. It is good advice to the surgeon that he or she understands the indication and the techniques for all of these procedures so that he or she will be able to approach each problem selectively and obtain the best operative results.

The choice between canthoplasty and canthopexy depends on part on the state of lower-lid margin. If the margin is elongated, a shortening and strong fixation procedure is the best choice. If the lid shows a less degree of laxity, the simple canthopexy may suffice. Selecting the most appropriate method of fixation is a matter of surgical judgment and experience.

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Chapter 54
Improvement of Temporal-Orbital-Palpebral Regions Through Extended Blepharoplasty

Nelson Letizio and Jaime Anger

54.1 Introduction

The region of the orbit is one of the most important facial areas because it is related to expression and communication. Due to its location, it is fundamental in the body's harmony and appearance.

The orbit can be divided into subunits of aesthetic importance: the eyebrow, upper eyelid, lower eyelid, and malar region.

Throughout the history of mankind, the eyebrows have always been considered important for the facial aesthetics and were being manipulated under the influence of the culture of each people, including with the use of tattoos to evidence or to correct the loss of its traces.

There are multiple reports of eyelashes' surgical correction. More recently, we have performed the lifting of the lateral corners, with percutaneous traction wires, known as traction sheaves (Fig. 54.1).

The upper eyelids should be treated conservatively, with long incisions to maintain an elongated, natural, and more attractive appearance (Fig. 54.2).

The treatment of lower eyelids represents a challenge in facial cosmetic surgery. The anatomical changes resulting from the face's aging process, especially those that occur in the lower eyelid and the malar region, have already been well described by the different authors [1–4]. The type and the graduation of each modification vary according to each individual. The most extreme aspect of alteration of the face's middle third, classified as type IV by Hester, in 2000, is characterized by the

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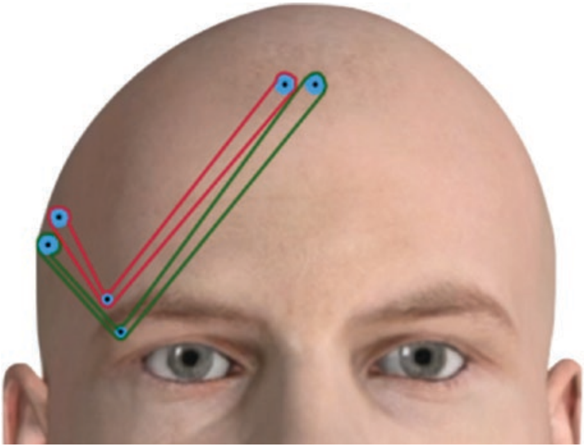

Fig. 54.1 Marking of the drawstring attachment points

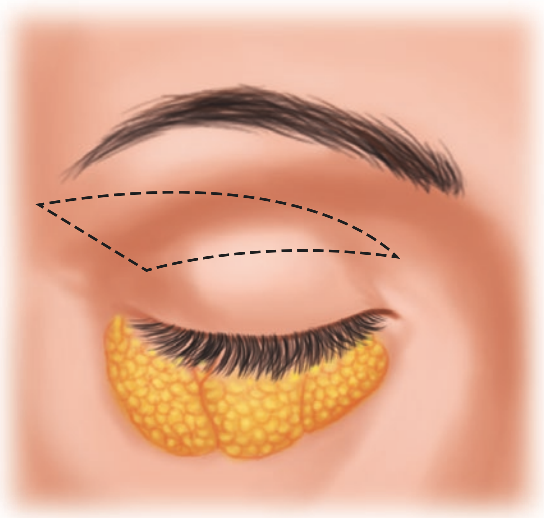

Fig. 54.2 Demarcation of the incision in the upper eyelid

protrusion of eyelid fat, the excess sagging skin and muscle tissue in the lower eyelid, the descent of the eyelid's joining with the malar region, and the descent of malar prominence also by skeletonization of the orbit border, the deepening of the nasolabial sulcus, and the presence of a malar sac [4].

The basic anatomical cause of these changes is the sagging tissues. In the most extreme cases, these tissues descend over the orbito-malar ligament, which, being relatively fixed, gives the aged external appearance. The same process occurs with the nasolabial sulcus, resulting in a deeper aspect [5].

Correction of these anatomical changes is the current objective of surgical techniques. Increasingly, the need for muscle repositioning has been emphasized, and the number of patients submitted to lower blepharoplasty with muscle treatment has progressively increased [6].

The surgical techniques described for correction of the lower eyelid with tissue vertical elevation and orbicularis oculi muscle fixation at the orbit's upper margin are based on the direct transcutaneous approach. This preference has been defended by several authors due to the technical difficulty and also to the morbidity of the hole procedure performed by the transconjunctival pathway. Nevertheless, transconjunctival blepharoplasty has developed rapidly in recent years, aided by the modernization of lighting and hemostasis equipment [7–10]. An important technological advance was the use of laser rays for the execution of incisions, as an aid in the process of hemostasis and the cuts accuracy. All these innovations made the execution of technical details by the transconjunctival route possible, previously only feasible by the transcutaneous route [11].

We present our experience in 1476 cases using the transconjunctival pathway to correct lower eyelid and the middle third of the face aging by mobilization of the orbicularis oculi muscle and its elevation and fixation in the superior orbital rim. The main advantage of conjunctival technique is the preservation of the orbital septum and the orbicularis muscle, which reduces the risk of altering the position of the lower eyelid [12].

In the transcutaneous technique, the skin, orbicularis oculi muscle, and the eyelid pouches are treated by infraciliary incision. By previous access we have excellent exposure and dissection of the musculature, septum, and orbital fat. In the postoperative period, complications such as eyelid retraction and ectropion are relatively high (15–20%).

These complications are related to the possible denervation of the musculature and the retraction of the medial lamella due to the healing fusion between the capsular-palpebral fascia and the septum [13].

Recent studies by Lessa [12] demonstrate that myotomy can cause significant changes in the nerves, connective tissue, and diameter of the fibers of the orbicularis oculi muscle. These authors suggest the use of techniques that preserve the integrity of the orbicularis muscle during lower eyelid blepharoplasty (conjunctival access).

54.2 Surgical Technique

Patients undergo sedation or general anesthesia with the presence of anesthesiologist. It is used infiltration with local anesthesia in the temporo-frontal region with lidocaine 0.25% with epinephrine 1:200,000, when treatment of the eyebrows. Bilateral temporal incisions are made at 2 cm of the capillary and frontal implantation in the same characteristics. Through the incisions is performed detachment of the frontal and temporal regions in the sub-galeal plane, releasing the upper and lower temporal septa, in addition to the temporal ligament (Fig. 54.3).

The release of these structures allows lateral elevation of the eyebrows as a unit, together with the lower and upper eyelids' lateral portion, in order to improve the result. This traction is useful when the release of the orbicularis retaining ligament is needed, lateral thickening and when it is performed the canthopexy.

Fig. 54.3 Release of structures through temporal and frontal incision

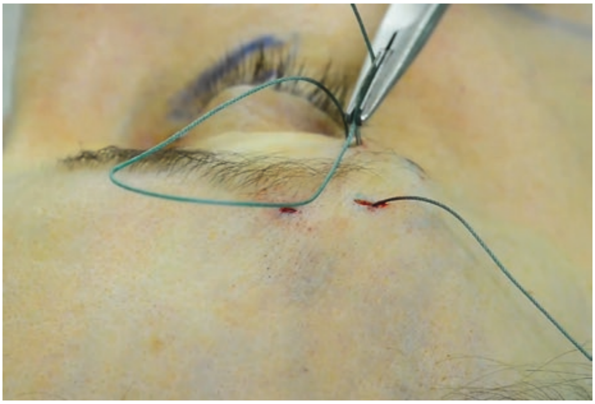

Fig. 54.4 Traction polyester yarn being pierced

2-0 polyester thread are pierced from the front incision to the eyebrow incisions with the Reverdin needle in the subcutaneous planes and then through the incisions with a surgical needle, again being passed to the temporal region, in the same spatial plane, with Reverdin needle (Fig. 54.4).

The fixation in the temporal fascia for traction is performed by raising the eyebrow at the previously selected points; for each specific case, the second fixation is performed in the galea and in the periosteum of the frontal region. The choice of traction points is important and should be appropriate for each case. This is a tactic that reflects the flexibility of this procedure to act according to the case.

The eyebrows' superolateral traction in conjunction with the lateral corner of the eyelids lengthens the shape of the orbital region, with the intention of becoming more youthful and with a more pleasant appearance, and especially with less surgical stigma.

54.2.1 Upper Eyelids

After the selective traction of the eyebrows, the surgical access in the skin spindle is marked as an elongated crescent, as described by Loeb in 1988, marking the excess skin that will be removed. The areas where fat grafting will be needed and also the areas that will be submitted to dermabrasion laser as the final stage of surgery are marked. The eyelid bags are marked, as well as areas of excess projection of the malar fats that will be liposuctioned [14].

After the insertion of the eye protectors, the local infiltration of 0.5% lidocaine and adrenaline in a ratio of 1:100,000 is done. The incisions of the upper eyelids with blade scalpel 15 are performed superficially; then deepened with CO_2 laser with 7 watts of power, the skin spindle is resected. The previous access by the muscular tissue is done with the use of laser ray, which allows access to the adipose tissue and its excesses resection when necessary [15].

When there is a need for releasing of the orbicularis retaining ligament, lateral thickening, or canthopexy without canthotomy, the muscular incision is enlarged beyond the orbital border with about 1 cm in length to access the upper temporal fascia laterally. It is made with the help of CO_2 laser in cut mode.

54.2.2 Lower Eyelids

The tarsal border is carefully hooked up and pulled with two Gilles hooks, so it is exposed to the conjunctiva palpebral. Then, a 7-watt laser is incised at 6 mm from the tarsal border, sectioning the mucosa and capsule-palpebral fascia (posterior lamella) to the middle lamella (palpebral septum and bags), which maintains the septum intact, a tactic employed to avoid cicatricial retraction and lower eyelid descent (Fig. 54.5) [16].

At this stage, the hooks are repositioned to fix the orbicularis muscle, which allows vision for the lower eyelids bags treatment and irradiation with the laser of

Fig. 54.5 Use of the CO_2 laser as a cutting tool for greater precision and less trauma

Fig. 54.6 The transconjunctival approach provides a broad view to the tissues

the septum and posterior face of the muscle, when necessary, aiming to promote tissue retraction. This maneuver improves the tonus of the structures, and the obtained retraction elevates the ciliary edge, improving the aspect of the inferior eyelid (Fig. 54.6) [17].

The release of deep structures, specifically the orbicular retaining ligament and lateral thickening, through the incision of the upper eyelid, will allow the super-lateral traction of these structures as a unit (Fig. 54.7).

With specific instruments, the lateral thickening (LOT) and orbicular retaining ligament (ORL) are released, which will allow the area to be mobilized as a unit. The canthopexy without a canthotomy with preservation of the lateral canthal ligament becomes easy to perform (Fig. 54.8).

These procedures usually performed transcutaneously can be performed by conjunctival pathway, and when there is a need to remove excess of the lower eyelid, it can be done through the incision of the upper eyelid.

After the structures are released, the lateral cutaneous muscle flap is superolaterally tractioned and fixed in the temporal fascia just above the orbital bone border. The excess of muscle is folded over itself realizing "jaquetão" ("big jacket") that will avoid a depression in the muscular fixation (Fig. 54.9).

The incisions edges approximation of the upper eyelid is performed by intradermal suture with 5-0 monocryl. There is no need to suture the lower eyelid access pathway.

The skin abrasions are then performed with only one step to avoid hypochromia, with CO_2 laser with 22 watts of power, the entire length of the lower eyelid, and the lateral portion of the orbit, with the purpose of retracting the tissue and improving skin appearance, avoiding surgical resection of the skin (Fig. 54.10).

Adipose tissue grafts are performed in the previously analyzed and marked areas, most frequently in nasojugal sulcus, malar orbit, upper eyelids, below eyebrows, glabellar sulcus, and temporal region. The usual anatomical plan of grafting is the supraperiosteal in small amounts to avoid the formation of nodules (Fig. 54.11).

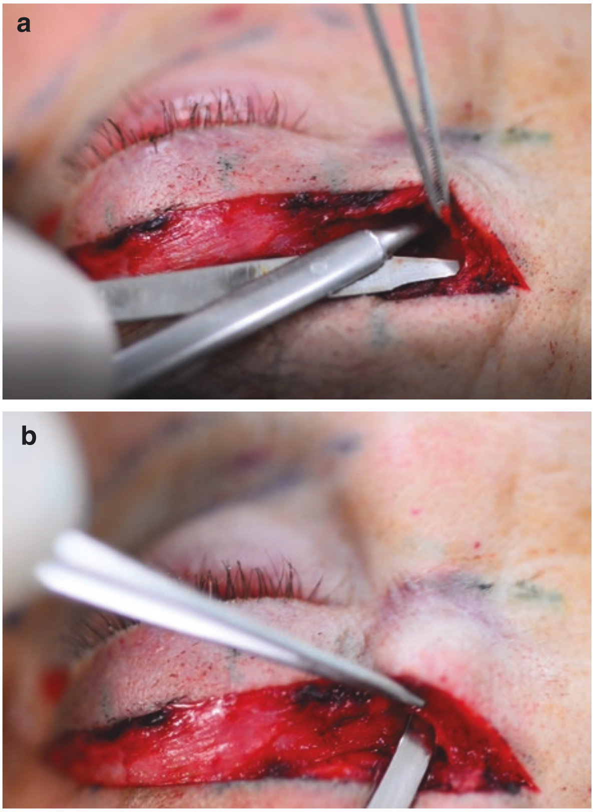

Fig. 54.7 After resection of the upper eyelids skin (**a**), the superior lateral dissection of the orbicularis muscle begins with Iris scissors blunt tip (**b**)

Fig. 54.8 Canthopexy without canthotomy

Fig. 54.9 The musculocutaneous flap is superolaterally tractioned and fixed in the temporal fascia, resulting in elevation of the lateral third of the lower eyelids

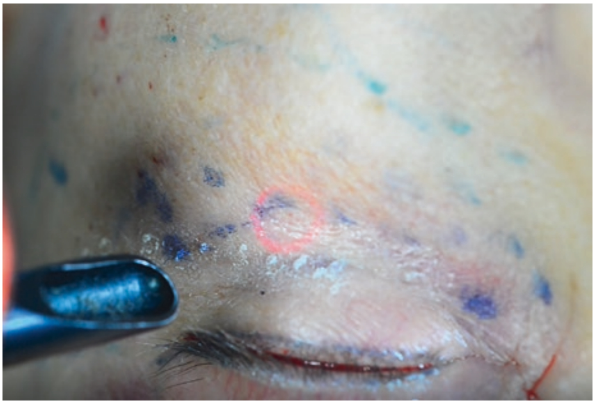

Fig. 54.10 CO_2 laser dermabrasion

54.3 Reviews

There are reports which demonstrate that most complications or insufficient results after lower blepharoplasty are related to excess tissue withdrawal. Removal of skin and orbicularis oculi muscle can result in ectropion and sclera exposure. Increasingly it has been recommended that the surgeon resist the tendency to remove larger amounts of skin because it is not so easy to correctly calculate in the intraoperative period the amount of skin that should be removed. It is more prudent to take the risk of undergoing a surgical review and to remove some excess skin in a secondary surgical procedure than to correct an ectropion. It should be noted that it has already been demonstrated that laser abrasion promotes skin contraction, enough to reduce the need for its removal.

Excessive surgical manipulation also contributes to increase the possibility of tissue fibrosis. Even if the amount of tissue maintained at the end of surgery is considered adequate, the long-term retraction process can lead to complications. Lessa

Fig. 54.11 Adipose tissue grafts

in 2019 compared the inferior blepharoplasty with and without myotomy, demonstrating that there is a decrease in nerve action after myotomy, justifying postoperative complications such as malposition of the lower eyelids. So it concludes that the myotomy causes changes in the collagen, nerves, and the diameter of the muscle fibers and suggests that the conjunctival procedure preserves the integrity of the muscle, being considered the best option. This author considers canthopexy as an additional resource. The transconjunctival technique would be the most recommended because it does not have the external incisions and also for causing less trauma to the tissues, as shown in our results (Figs. 54.12, 54.13, 54.14, 54.15, and 54.16).

The muscle repositioning is the basis of repairing the eyelid and the face's middle third aging. So far it has been argued that it would be technically impossible to treat the orbicularis oculi muscle adequately without extensive surgical exposure by the cutaneous route. The important steps in this procedure are the individualization of the orbicularis oculi muscle and the possibility of its elevation and fixation in firm structures in order to obtain the desired result. As this text demonstrated, it is possible to perform these procedures with excellent visibility and with the necessary effectiveness. It includes the fixation of the muscular border in the temporal fascia and at the edge of the orbit, with the effectiveness similar to that previously described by Hamra and Hester, performed by the transcutaneous route.

Some authors point out that adipose tissue has a close anatomical relationship with the aponeurotic muscle system, and, therefore, they consider the correction of

Fig. 54.12 A 42-year-old patient

Fig. 54.13 A 50-year-old patient

Fig. 54.14 A 58-year-old patient

Fig. 54.15 A 64-year-old patient

Fig. 54.16 A 67-year-old patient

fat decrease by muscle mobilization more effective than by fixation of adipose tissue. For this reason, in this series of cases, the fatty tissue was removed when necessary, but in no case was the adipose tissue individualized and fixed.

Adequate visualization allows the myotomy to be performed. The extension of only 1 cm in the incision in the lateral direction of the upper eyelid prevents changes in the position of the inferior eyelids and the inadvertent injury of the innervation of the orbicular musculature. The inferior and superior bloody border, resulting from the orbicularis muscle myotomy, should be approximated and superimposed with the superior border in anterior position. This way, it eliminates the possibility of visible depression in the skin on the lateral part of the commissure, which may occur when a simple myomectomy is performed.

The incision with the laser ray in the conjunctiva of the lower eyelid gives an extremely precise cut with simultaneous hemostasis, reducing the possibility of edema and ecchymosis, preventing fibrosis in the chronic phase of healing.

The application of laser ray emission in the eye's orbicularis muscle induces a retraction of the lower eyelid, improving muscle-septal tone. The immediate retraction of the treated muscle is already visible. The final abrasion on the skin's outer portion of the eyelids avoids the need for final removal of the lower eyelid skin and improves the aesthetic appearance by attenuating the skin folds. These procedures decrease the incidence of complications such as ectropion and apparent sclera.

It should be noted that the incision in the conjunctiva of the lower eyelid is not approximated to avoid the formation of granulomas.

The scientific knowledge of causes of the changes in the aging process and in the external aesthetic aspect motivated new technologies. In the case of blepharoplasty, there is a need for more expensive and specialized equipment for its execution. This is probably the biggest obstacle to the diffusion of this technique, especially the need for a laser device. However, it is a less aggressive and less likely complication technique.

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Chapter 55
Aesthetic Osteotomies of Facial Skeleton to Improve Facial Contour

Renato da Silva Freitas and Flávia David João De Masi Nassif

55.1 Introduction

Since ancient times, society values beauty between men and women. Human attractiveness is the harmonization of several elements, subjective or not, being difficult to standardize a reference system [1]. The concepts of beauty have been changing over the decades. Cephalometric and anthropometric references may serve as a guide, but what is considered attractive may undergo cultural and time variations [2].

A young, attractive face has a malar highlight in the ideal position and a malar fat pad, which retains fullness in the superior malar area and contributes to the convex shape of the face. Conversely, a widened malar complex and descended malar fat cannot provide sufficient projection or an attractive malar highlight in the midface and result in an old-looking face [3]. The typical Asian face tends to be broader and shorter compared to Caucasians. It has a smaller anterior projection and more flattened middle third. Due to these characteristics, with aging, Asians present a prominent malar eminence with a wide mandibular angle [3].

Nowadays, plastic surgeons take into account the opinion of the patient along with their experience to planning surgical procedures that include the improvement of face attractiveness [1].

The vertical components of the face should be evaluated, as well as the facial index. The facial index is the ratio between width between zygomas, for face width evaluation, and the measurement at nasion to symphysis, for height definition.

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According to Farkas and Munro, the average facial index for women is 86.2% and for men 88.5% [4].

A profile analysis of photographs and clinical examination is of great help for proper surgical planning. The relationship between maxilla and mandible divides the face profile in straight, concave, and convex. In addition, it is necessary to evaluate the nasolabial angle (between 90° and 120°), relation between glabella and maxilla, lip projection, labio-mental angle, and relation between the chin and neck [4].

The osteotomies are an important armament for the aesthetic improvement of the face, changing the structural aspect of the face, mainly of the middle and lower third. The purpose of orthognathic surgery is to achieve a harmonious appearance of the face with a functional stomatognathic system, preferably Class I [2, 5]. In addition to bone and soft tissue analysis performed in orthognathic surgery, the teeth are part of the surgical planning. This should be evaluated in a multidisciplinary way, to avoid an adequate occlusion with an unsatisfactory aesthetic component [2, 4].

The three principles that support orthognathic:

1. The facial soft tissues support.
2. Adequate soft tissue support can be achieved more predictably by expanding the volume of the skeleton than by reducing it.
3. Efforts to expand the facial skeleton often result in skeletal disproportion, which can be extremely attractive under the appropriate conditions [2].

Implants and applications of augmenting substances, such as hyaluronic acid, are an option to improve facial proportion without the need to preoperatively prepare. The disadvantage of these methods is often transient results and the need of additional procedures in the future. Also, using these materials, it is not possible to achieve functional improvements.

However, when the surgeon is evaluating face of patients with effect of elderly, some characteristics are present. This group of patient has atrophy, of soft tissue as well as bone structure. Due to teeth lost, maxilla suffers absorption and the profile changes. Hypoplasia of middle third is identified, with loosen of nasal projection. The smile is not graciously, with smaller exposition of incisive teeth. Mandible generally presents with anti-clock rotation, given a chin projection. The lip also demonstrates these atrophies. Upper lip is thin, and vermilion is not protruding. Nasojugal groove normally is profound, by the insertion of muscles and malar fat falling over. All characteristics can be modified performing osteotomies and advancements.

55.2 Facial Osteotomies

Over the past 50 years, there have been significant advances in craniofacial surgery [6]. Most maxillofacial deformities may be treated with three basic osteotomies: Le Fort I osteotomy, bilateral sagittal split osteotomy (BSSO), and the horizontal osteotomy of the symphysis of the chin (bone genioplasty) [7]. Besides majority of plastic surgeons do not perform major osteotomies, the concept of bone support is important. The aim of the face-lift is to create a three-dimensional, young-looking face rather than to remove wrinkles by skin tightening [3]. Some professionals have utilized implants to give these supports, as chin and malar, associated with fat grafting.

55.3 Le Fort I Osteotomy

Le Fort osteotomies were described by Rene Le Fort in 1901. Le Fort I procedure modifies the position of the upper lip, the nasal tip, the alar base, and the nasolabial angle. Le Fort II allows the surgeon to change nasomaxillary projection without altering orbital volume and zygomatic projection. And Le Fort III allows the surgeon to change position and orbital volume, zygomatic projection, position of nasal root and fronto-nasal angle, nasal length, and position of the maxilla [7].

Le Fort I osteotomy has become the main procedure to resolve most of the anteroposterior, vertical, transverse, and rotational deformities. Once sectioned, the maxillary dentoalveolar segment can be repositioned in any direction as a single unit [7]. It is a procedure of 1–2 hours of duration, with quick recovery, discharge in 24 hours, and unbelievable result to rejuvenation (Fig. 55.1).

Technically, the maxilla exposure is performed through an intrabuccal incision above the gingiva, leaving a minimum of 5–8 mm mucosa to facilitate final

Fig. 55.1 Patient with maxilla hypoplasia, undergone to Le Fort I

closure [7]. Exposure of the anterior wall of the maxilla occurs through subperiosteal dissection, identifying the inferior orbital foramen, exposing the lateral zygomatic-maxillary pillar, the zygoma body, and the anterior portion of the zygomatic arch. This should be sufficient to accommodate the fastening plates [7]. The planned osteotomy is marked after full bone exposure. The osteotomy should be 5 mm above the root apexes. There are a number of variations in the standard Le Fort osteotomy, and the procedure should be adapted according to each patient [7]. The nasal septum and vomer maxillary crest are separated by a septum osteotome directed downwards and posteriorly. To complete the horizontal maxillary osteotomies from the lateral nasal wall through the anterior wall of the maxilla and through the posterolateral maxillary wall, a saw is used [7]. Once the osteotomy is completed, the maxilla is lowered. This procedure can only be done with digital pressure by placing the thumbs at the base of the piriform aperture. With the maxilla unstructured and fully mobilized, it can be multi-segmented as needed [7].

Attention should be given to the blood supply to the maxilla. With complete mobilization of the maxilla, the descending palatine vessels are frequently ruptured, and the mobilized maxilla derives its vascularization from the remaining sources, mainly of the ascending palatine and pharyngeal vessels [7].

When the maxilla is retrusive, the wider portion of the dental arch is positioned more posteriorly relative to the anterior oral commissure. This patient has poor exposition of incisive teeth. Postoperatively, there is marked enhancement of the soft tissue definition with a well-defined zygomatic complex, a submalar hollow, and the absence of jowls [2].

55.4 Mandibular Osteotomy

Elderly patients have laxity of neck, with loss of definition of cervical angle and widening of the cervicomental angle, skin dyspigmentation, rhytides, loss of the mandibular contour, accumulation of submental fat, volume loss, and prominence of the platysmal bands. Classical neck lifting proposes to open the submental area, undermining the skin, resect the fat excess, plicate the platysmal bands (sometimes resect it), and, nowadays, resect the submandibular glands. Also, laterally applicate stitches to traction latero-superior of platysma and skin, and resect the excess of the skin behind the ear. However, many patients present these abnormalities due the retropositioning of the mandible. Reductional surgery as described brings back all the neck structures and normally will have good result for short period.

When the surgeon understands that the problem is the mandible retrusion, it is possible to propose the relocation of the bone to anatomical position. Obwegeser BSSO is used to correct most cases of mandibular retrognathism and prognathism [7].

Technically, the incision begins approximately 1–2 cm above the occlusal plane and continues to the region of the first molar. The incision is deepened through the periosteum, exposing the bone [7]. With full medial exposure, a curve retractor is placed to protect the neurovascular bundle. The osteotomy of the medial ramus is deepened to approximately half the thickness at this level and then continues obliquely to the external oblique line. An alternate saw is used to continue the osteotomy laterally along the outer oblique ridge to the region between the first and second molars. The corticotomy is then converted into a complete osteotomy, dividing the spongy portion of the mandibular ramus by a series of osteotomes. The fixation is obtained by several techniques, depending on the circumstances: with two or three bicortical positional screws, with a monocortical plate and a single bi-positional screw, or with monocortical plates alone. The fixation may be fully transoral or with a transbucal approach. If the occlusion is satisfactory, the wounds are approximated with a resorbable suture [7].

After mandibular advancements, there is a significant postoperative increase of SNB angle that represents increasing of mandible projection, associated with a fuller aspect of the lower lip, with vertical enlargement of the cutaneous part. Also, it provides an enlargement of the lower face, with mandibular and chin projection [8], and increase in lower anterior facial height. It will be expected a reduction in facial convexity, an increase in submental length, reduction in any submental soft tissue sag, and a reduction of the lower-chin-submental plane angle [9] (Fig. 55.2). Cervical muscles as digastric suffer the effect of cervical advancement, becoming stretched out due to their insertion of mandible arch.

Fig. 55.2 Patient with micrognathia, undergone BSSO advancement

55.5 Mentoplasty

The chin deformities may exist independently of mandibular defects. The chin itself can be volumetrically deficient (microgenia), large (macrogenia), retropositive (retrogenia), or asymmetrical in any of the three planes [7, 10]. The patient is usually concerned with the effects of skin laxity in the neck region but may not recognize the importance of the underlying facial skeleton and hard tissue structures of the neck. During the evaluation of patients with desire of neck rejuvenation, commonly most of surgeons think about cervical liposuction, face-lift, and corset platysmaplasty for a better contour. However, the advancement of the chin can improve the cervical angle with a combined work between muscles and bones. This effect is primarily due to digastric attachments from the mentum and mastoid. As the muscles of the mouth floor are attached on the anterior mandible spine, advancing the mentum may have a more direct effect of elevating position of the hyoid, sharpening the angle between the jaw and neck and bringing harmony to cervical angle [11]. The advancement genioplasty increases the submental length, decreases the lower lip-chin-submental plane angle deepening the labiomental fold, and reduces facial convexity and relative nasal prominence [9] (Fig. 55.3).

The average and the most attractive position of the chin can vary tremendously based on any of these analyses. Perhaps the easiest rule of thumb is that the chin should be positioned “ideally” at the plane of the nasion and not beyond the lower lip border with an adjustment for gender (more prominent in men and less prominent in women) [12]. More accurately is the method that utilizes the angle between the horizontal plan (passing through the upper part of external meatus and inferior border of the orbit) and vertical plan (trough the nasion point). For men, the ideal position of pogonion (or anterior part of chin) is on the line and for women is 2 mm behind this reference.

The surgeon has the possibility to use implants (silicone and polyethylene), fat grafting, fillers, and genioplasty. Silicone is probably the most common method to treat microgenia. The reason is the facility of the procedure with low cost. This implant may have the risk of rotation, infection, bone absorption, and dental root compromises. Although alloplastic implants have been most commonly used for correction of minimal sagittal defects, horizontal osteotomy of the symphysis (bone genioplasty) is a much more versatile procedure. The chin can be repositioned in multiple planes, allowing the correction of significant sagittal, vertical, and rotational deformities, without affecting the dental occlusion [7]. Some improvement of airway, and obstructive sleep apnea, may observed in some patients submitted to sliding genioplasty.

The genioplasty procedure is differentiated further and classified by variations in technique, the reciprocal movements of the mandible segments, and the final result desired [12]. In the sliding genioplasty, the osteotomy segment slides anteriorly or posteriorly, and the vertical dimension of the lower third of the face is altered accordingly. In the jumping genioplasty, the caudal segment is moved anteriorly and placed in front of the mandible, almost like an implant. The lower soft tissue

Fig. 55.3 Patient submitted to face-lifting and sliding genioplasty

attachments of the segment should be preserved to avoid bone resorption. This nomenclature was used for the first time by Gillies and indicates the attempt to improve the sagittal projection of the chin and decrease the height of the lower facial third [11].

55.6 Conclusion

Surgeons currently have a wide range of surgical procedures for treating facial cranial deformities or improving the aesthetic appearance of the face. They should be based on studies and personal experience for evaluation and proper planning of the procedure to ensure better patient outcomes.

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Chapter 56
Blepharoplasty: A Periorbital Rejuvenation Technique

Marcelo Paulo Vaccari Mazzetti and Ryane Schmidt Brock

56.1 Introduction

Facial rejuvenation surgical procedure is one of the most desired at aesthetic plastic surgery. The orbital area with its inferior fat bags and prominent lacrimal sulcus suggests an elderly and tired appearance.

There are many different techniques of eyelid surgical treatment; most of all it includes orbicularis muscle and skin resection and orbital fat removal [1].

The aging process includes anatomical and physiological changes according to intrinsic and extrinsic factors. The gravitational theory describes soft tissue laxity, muscle atrophy, fat volume, and bone absorption as reason to facial elderly modifications [1, 2].

For these reasons, it is important to evaluate each patient and their specific anatomical structures to program the best surgical technique to be used in each case.

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56.2 Surgical Technique

After a clinical examination of the patient and preoperative photography register, the patient is marked and prepared in dorsum decubitus.

The upper eyelid marking determines the skin redundancy that should be resected, the lower limit is 5 millimeter distant from the inferior palpebral margin, and the superior limit is market after a pinch test to evaluate the skin to be removed maintaining the eyes closed.

Ocular lubrificants are used to avoid corneal injuries. Skin antisepsis is done with aqueous chlorhexidine.

The patient can be under general anesthesia of venous sedation. Local anesthesia with lidocaine and epinephrine (1:120.000) is always done to prevent bleeding and pain.

Firstly, the incision at upper eyelid resect skin excess marked previously, then a linear segment of orbicularis oculi muscle is also resected, and local hemostasis is done (Fig. 56.1).

Upper eyelid fat pads, nasal and central ones, are resected, and in some cases, there are some adipose tissue at upper orbital margin or orbital roof. This supraorbital fat is also resected in order to restore the visibility of the pretarsal space and create a youthful appearance (Fig. 56.2).

Separate sutures is done at the upper eyelid with polyglactin 5.0 leaving a lateral gap, where the orbicularis oculi muscle flap will be fixed to orbital periosteum.

Fig. 56.1 Patient at the beginning of the blepharoplasty surgery with marking at left eyelid and skin incision and resection at the right eye

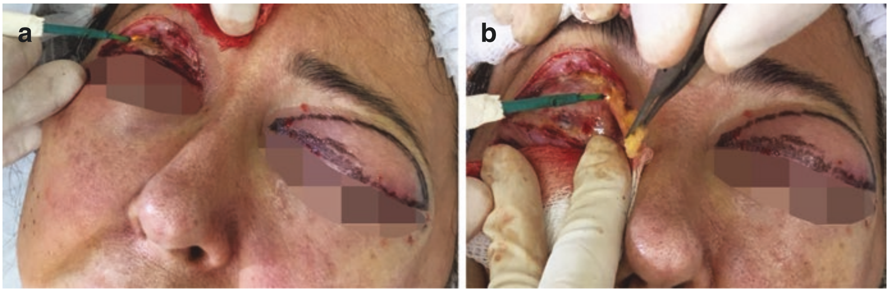

Fig. 56.2 (**a**) Intraoperative moment after skin resection and orbicularis muscle linear resection. (**b**) Resection of fat pads and adipose tissue of the upper orbital margin

After that, a subciliary incision is done at lower eyelid, just inferior the eyelashes, a lateral skin triangle is resected, the orbicularis muscle is dissected, and a lateral flap is created. The orbicularis retaining ligament is opened and the fat pad is visualized.

Inferior fat pads, nasal, central, and lateral ones, are resected or redistributed to avoid a deep postoperative inferior sulcus. Hemostasis is done, and the inferior retaining ligament is sutured with polyglactin 4.0 suture.

A muscle flap of the inferior orbicularis muscle is drawn and fixed to the lateral orbital periosteum margin with monocryl 4.0 suture. Two stiches are done elevating the lateral eye angle through the upper eyelid incision gap left open.

The skin tissue is slightly stretched with the finger to analyze if there is any excess that should be removed. Only a minimum quantity should be resected to avoid postoperative complications like ectropion or scleral show.

Separate sutures with polyglactin 5.0 are done at lower eyelid.

Adhesive micropore bandage is done at malar and inferior eyelid to avoid postoperative equimosis and edema (Figs. 56.3 and 56.4).

Postoperative care:

- At postoperative, it is prescribed analgesics and antibiotics. The patient position maintains dorsal decubitum with elevated dorsum.
- Cold compresses with saline are continuously done at both eyes during the first 3 days after surgery.
- Bandage and stiches are taken off after 5 days postoperative.
- All patients must avoid sun exposition during 4 months.
- Blepharoplasty is one of the techniques used to improve facial beauty and youth. There are many different techniques described in literature, and the best one should be chosen after a carefully preoperative planning.

Fig. 56.3 (**a**) – Patient at preoperative frontal view. (**b**) – Patient at 1 month postoperative, frontal view. (**c**) – Lateral view of patient at the preoperative. (**d**) – Lateral view of 1 month postoperative of blepharoplasty and facial minilifting

Fig. 56.4 (**a**) – Male patient frontal view of preoperative. (**b**) – Frontal view of 2 months postoperative of blepharoplasty. (**c**) – Oblique view of patient at preoperative. (**d**) – Postoperative of 2 months

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Chapter 57
Creation of the Upper Fold Eyelid in Asian Patients

Hélio Paoliello Jr and Ricardo Paoliello

57.1 Introduction

The existence of double eyelids (double eyelid) presents an evident feature of satisfaction among Asian youngsters [1, 2]. The congenital or "natural" double eyelid is characterized by presenting a shallow fold line when the eyes are closed; it is not fixed in the tarsus and therefore able to change with the movement of the eyes, tension equally distributed on the upper and lower flaps of the fold line and appropriate depth of the fold when the eyes are fully open [3].

According to Uchida [4], 50% of people in the east exhibit the superior orbito-palpebral groove; the other half will present it rudimentary or even absent. In those where the groove is absent, we have single eyelid, epicanthus, and excessive orbital septum fat [5]. These differences lie essentially in the type of insertion of the levator muscle. In western countries, this muscle has two tendon extensions, one tarsal and one dermal, while in the oriental practically only the tarsal prolongation.

In order to construct the superior orbito-palpebral sulcus in the Orientals, the palpebral dermis is placed close to the tarsus, interested the levator muscle of the eyelids, thus fortifying the dermal extension of this muscle (Fig. 57.1).

Top eyelid blepharoplasty is the most commonly performed plastic surgery among Asians and continues to gain popularity, although it is difficult to define absolute criteria for aesthetically pleasing eyelids, making the decision by individual will.

The techniques are divided into suture (non-incisional) and incisional in the construction of the double eyelid.

Blepharoplasty for non-incisional double eyelid construction (suture fixation) was the first type of "double eyelid" surgery reported in the literature, introduced by Mikamo in 1896 [6], who used a three-suture method (non-buried).

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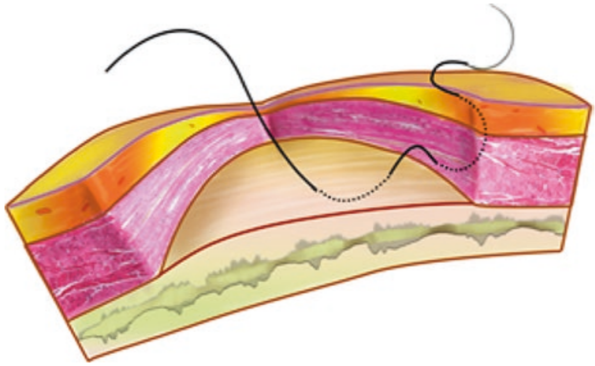

Fig. 57.1 Schematic of the suture of the inferior border to the tarsus

In 1926, Uchida used catheter in blepharoplasty to construct double eyelid with suture of three buried points [7].

In 1952, at the World Congress of Ophthalmology and Otorhinolaryngology in the Philippines, Sayoc [8] presented his technique for westernization of the eyelids through the construction of the superior orbito-palpebral groove, seeking to resemble the one that did not possess this anatomical trait the people of the west. Subsequently, other authors such as Millard [9] in 1955, Fernandez [10] in 1960, Uchida [4] in 1962, and Boo-Chai [11] in 1963 published their techniques for the same purpose.

After time, the principles of the construction of the double fold continue the same: to fix superficial structures of the upper eyelid to the deep planes, giving rise to the superior eyelid sulcus.

The suture technique is advantageous, with minimal scarring, more easily reviewed, causes less edema, and allows for a faster recovery. However, Asian patients with pleated eyelids have thick soft tissue, which contribute to the excess volume in the eyelid and thus do not provide an effective and permanent result, due to the strong imposition of the thick layer of the eyelid on the fixation sutures. In addition, a patient with excess skin requires excision of redundant soft tissue. Therefore, the incisional technique is a preferred method for these patients. The technique of fixation of the tarsus (dermis from the upper eyelid to the tarsus) is the oldest and most commonly performed [5].

57.2 Method

We operate patients of varying ages from 16 years of age, all with absence or diminution of the orbito-palpebral groove.

From the techniques proposed, Fernandez's [10] radical incisional technique is the one we adopted, and our goal is to design this method to not only create the double eyelid but also correct other anatomical variations in Asian and descendants, such as ptosis, epicanthic fold (epicantus), and excess fat of the orbital septum, obtaining favorable results.

In some cases it is necessary to perform the Z-plastic for the treatment of epicantus, depending on the client's will and the surgeon's formal indication.

Based on the technique of Fernandez, the following anatomical structures in the constructions of the upper palpebral orbit groove are approached.

57.3 Surgical Anatomy

As described by Fernandez, a cross section of the upper eyelid, from the superficial to the deep, reveals the following layers [10]:

- Skin: the skin of the eyelid is very thin. Associated with the eyelashes are the glands of Zeis, sebaceous glands, which open into each hair follicle. The Moll glands, sweat glands, also open up to or near the follicles.
- Loose subcutaneous tissue: This layer contains little subcutaneous fat in the Caucasian, but abundant in the oriental.
- Muscle: This layer of striated muscle consists of the orbicularis oculi, which acts as the sphincter of the eyelid fissure. It is divided into orbital and eyelid parts.
- Submuscular layer: the sensory nerves are in this layer; therefore, local anesthesia should be injected deeply into the orbicularis muscle to produce a good anesthesia. This layer usually contains additional adipose tissue in the oriental.
- Fascial layer: this layer consists of the orbital septum, which lies directly below the orbicularis muscle, forming the anterior wall of the supraorbital fat compartment. This septum extends from the entire orbital border to the margin of the eyelid. The thickening of the septum forms the medial and lateral ligaments, which keep the tarsus in place. Deep to the supra-orbital fat is the portion of the levator muscle of the eyelid that forms the posterior wall of the supra-orbital fatty compartment. This layer is the most important structure in this type of surgery.
- Tarsus: This thin plaque of dense connective tissue contributes to the shape and support of the eyelids. The levator muscle of the upper eyelid is inserted along the upper border of the tarsus. The Meibomian sebaceous glands are located on the tarsal plate and open at the edge of the eyelid where its secretions maintain an airtight closure of the eyelids. The obstruction of these glands produces a calyx projecting into the conjunctival side of the eyelid.
- Conjunctiva: This layer of mucous membrane connects the eyeball to the eyelid, is divided into palpebral and bulbar portions, and is separated by a reflection called superior fornix. The conjunctiva is firmly attached to the lower surface of the tarsus, but loosely to the sclera.

The arterial supply of the upper eyelid is derived from the upper palpebral branch of the ophthalmic artery, which forms a rich anastomosis. The veins of the eyelid drain into the ophthalmic veins through the subconjunctival or retrotarsal veins.

Lymphatics drain laterally to the preauricular glands and medially to the facial and submaxillary groups. The facial nerve provides stimulation to the orbicularis oculi muscle to close the eyelid, and the oculomotor nerve supplies the levator muscle of the eyelid to open the eye.

The lacrimal gland is located in a depression in the superolateral angle of the orbit and is divided by the expansion of the levator muscle of the eyelid into two portions, one upper and one lower. The upper or orbital portion is longer and is attached to a depression in the orbital plaque of the frontal bone. It is deep to the orbital septum and is in the expansion of the elevator. The lower or palpebral portion is smaller and is in the palpebral conjunctiva to which it is adherent and through which its ducts open. The lower portion then attaches to the upper portion of the gland.

Comparison between the anatomy of the Caucasian and eastern eyelid without the palpebral fold reveals the reason for the absence of the fold. In the Caucasian eyelid, comparatively, there is little subcutaneous and supraorbital fat. Filaments of the expansion of the ascending muscle pass through the orbital septum and the orbicularis muscle to attach to the skin of the eyelid to produce the orbito-palpebral groove and the palpebral fold. In the eastern eyelid, there is a marked increase in subcutaneous and supraorbital fat and absence of the dermal extension of the levator muscle of the upper eyelid. The expansion of the levator muscle does not cross the orbital septum or the orbicularis muscle, does not attach to the skin, and terminates as a rigid thickening of deep fascia relative to supraorbital fat. The expansion sends thin extensions to the orbital septum to surround the supraorbital fat. An epicanthic fold is present medially and hides most of the caruncle.

57.3.1 Surgical Technique

Two are the types of operations proposed by Fernandez [10]: the simple and the radical.

57.3.1.1 Simple

Indicated for patients who exhibit little fat in the eyelid pouches, with features of the groove or in those in which the postoperative recovery should be abbreviated, consist the following:

- Demarcation of the 5–7 mm incision from the ciliary border, from the inner corner to the lateral orbital border. If small resection of the skin is necessary, the ellipse marking is completed, varying in height and length according to the anatomical characteristics of the patient.
- Infiltration of 2% lidocaine with vasoconstrictor in each upper eyelid in the supratarsal deep plane.

- Incision of the skin and orbicularis muscle, with tarsal exposure.
- Suture of the dermis from the lower border (distal) to the orbital septum with colorless unabsorbable monofilament wire 6-0, performing on average 4 single stitches.
- Intradermal suture or in separate stitches with 5-0 or 6-0 monofilament yarn, which are removed on the 5th postoperative day.
- Dressing with operculum.

57.3.1.2 Radical

Indicated in the Orientals with skin-fat excesses in the upper eyelids, consisting of:

- Elliptic demarcation similar to classic blepharoplasty, its lower margin a distance of 6–8 mm from the ciliary border in the middle segment of the inferior curvature of the ellipse, depending on the height of this eyelid, and extends laterally towards the tail of the eyebrow, be elliptical or modified ellipse without going beyond the lateral wall of the orbit (Fig. 57.2). The portion of skin to be removed will depend on the skin excess of the patient. It is important not to exaggerate this resection because, due to the removal of fat, there will be a tendency of the skin to retake occupying this space, causing a discreet superior eyelid ectropion.
- In this technique, the epicantus can be treated with Z-plastic, marking the upper arm laterally and inferiorly medially to the nasal plane.
- Infiltration with 2% lidocaine with vasoconstrictor, in deep supratarsal plane.
- Exercise of demarcated skin spindle.

Fig. 57.2 Marking

- Removal of a 4–6 mm tape of the orbicularis muscle and the pre-tarsal plexus (orbital septum), including maximum eyelid fat (Fig. 57.3).
- The tendon portion of the levator muscle (Fig. 57.4) of the upper eyelid is then exposed, which is sutured to the tarsus and dermis of the lower incision with spaced and equidistant stitches using colorless 6-0 unabsorbable monofilament yarn using 4–5 separate stitches (Figs. 57.5 and 57.6).
- Intradermal skin suture with 5-0 monofilament yarn.

When necessary the treatment of the epicantus is made incision of the Z and release of the flaps that are migrated and sutured with simple stitches of 6-0 silk. These points are removed at the 3rd or 4th postoperative day, depending on the age of the patient and the tension in the suture:

- Dressing with operculum, for a short period, being removed on discharge from the clinic or hospital. In the postoperative cold compresses of 0.9% NaCl saline solution for a short interval, 5–10 minutes, 03 times a day give more comfort to the patient. Keeping head high helps to drain edema.

Fig. 57.3 Removal of skin and orbicularis oculi muscle

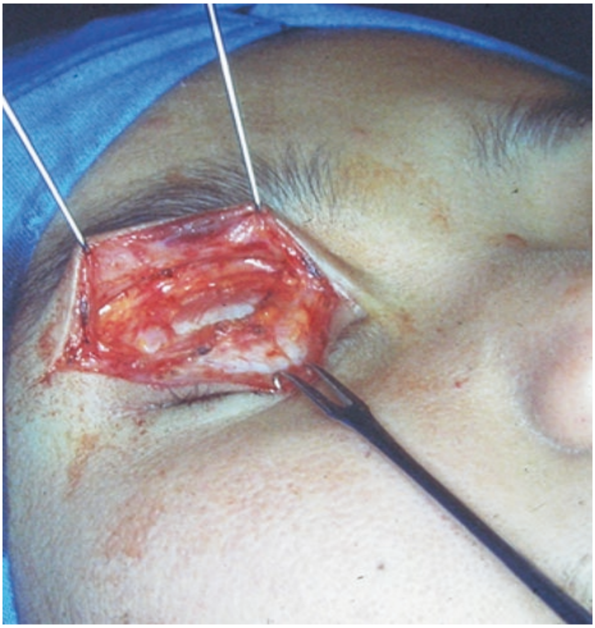

Fig. 57.4 Tendonous portion of the muscle

Fig. 57.5 Suture of attachment of the tarsus to the dermal edge of the lower flap

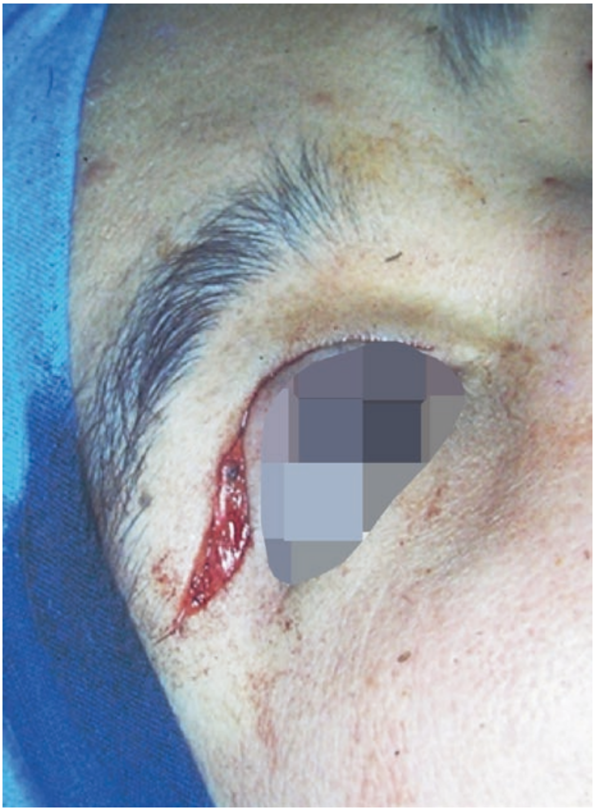

Fig. 57.6 Fixing suture completed. Furrow defined

57.4 Complications

The main complications associated with the suture technique are loss of the double fold, asymmetry, and inclusion of cyst due to a buried point [5].

And the complications described in the incisional techniques include partial or complete loss of the double eyelid line, prolonged edema, hematoma, asymmetries, upper eyelid ectropion, and infection [5].

Specifically described in the Fernandez incisional technique are the following complications [10]:

Hematoma and ecchymosis of the eyelid

This is the result of inadequate hemostasis, especially of vessels in supraorbital fat. Epinephrine in the local anesthetic can give a false sense of security. Careful electrocoagulation of blood vessels will reduce the occurrence of bruising, but ecchymoses are common in this surgery.

57.4.1 Patient Dissatisfaction

Careful determination of what the patient wants is very important, and the realistic dialogue as well as good patient physician relationship minimizes future problems. Initial dissatisfaction is often due to prolonged edema and apparent scarring. Edema is more pronounced when the radical technique is performed, so patients should be cleared beforehand (Figs. 57.7, 57.8, and 57.9).

57.4.2 Keratitis

This is the result of accidental oversight with corneal abrasion or ocular dressing and may result in prolonged discomfort. The evaluation of ophthalmologist contributes to the resolution.

57.4.3 Ectropion

It is usually the result of the suture of the dermis to the tarsus when the expansion of the levator muscle is very close to the ciliary border or when the lower incision is performed very close to the ciliary border.

Excessive edema and discoloration of the eyelid near the ciliary border

This is the result of inadequate lymphatic drainage because of the curvature of the lower incision very close to the ciliary border in the outer corner. This space must be at least 5 mm wide.

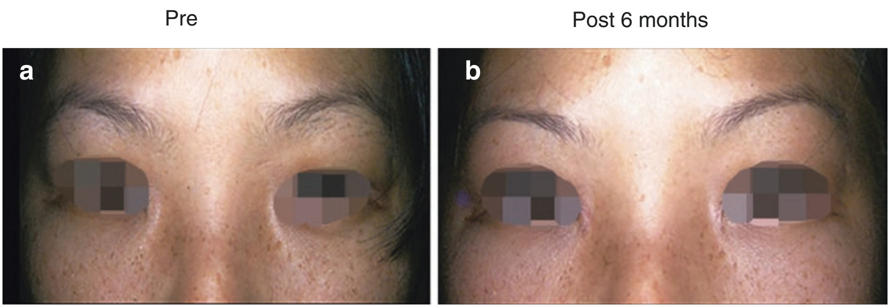

Fig. 57.7 Simple technique of Fernandez. (**a** pre, **b** post)

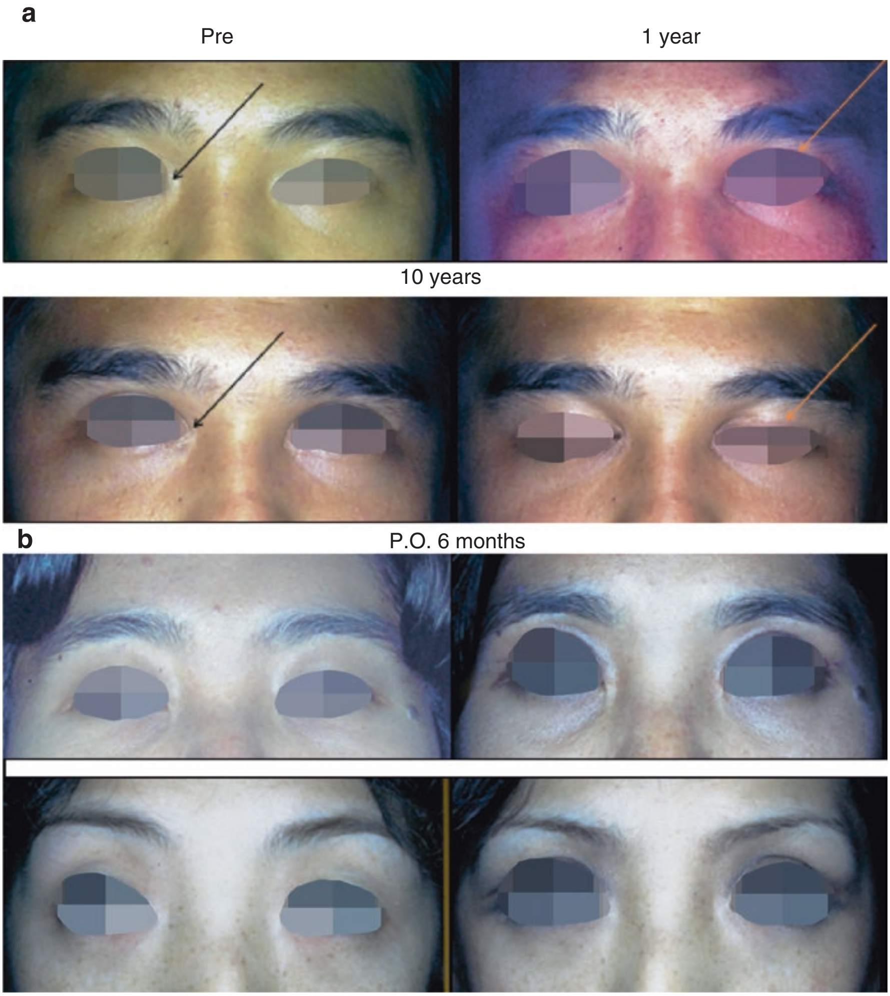

Fig. 57.8 Radical technique of Fernandez. Pre and post late with epicantus Z treatment (**a**). (**b**) Top photo, without epicantus treatment. Lower photo, with epicantus treatment

57.4.4 Hypertrophic Scars

In the oriental, the hypertrophy of the scars can become quite prominent in 2–3 months postoperative, especially of the zetaplasty. However, after this period, the vast majority of the scars are attenuated and become imperceptible.

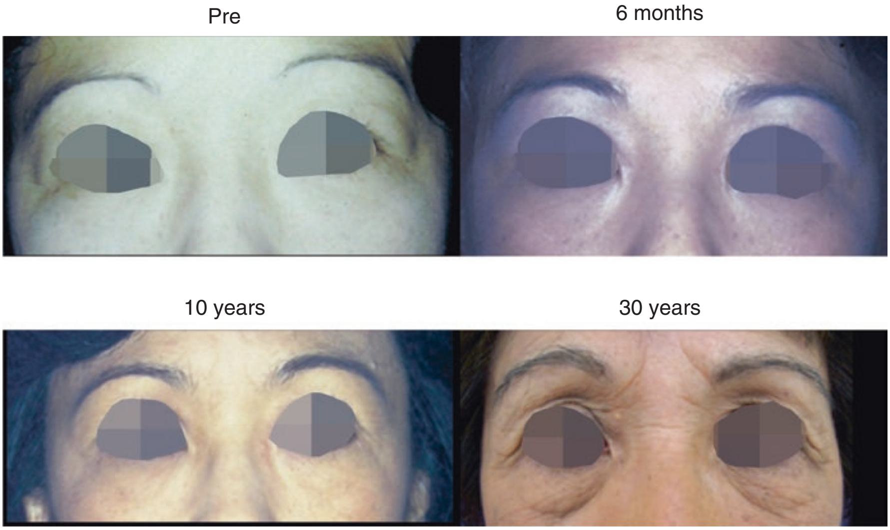

Fig. 57.9 Radical technique of Fernandez. Pre and late post

57.4.5 Bending Changes (Dysmorphism)

This is the result of hematoma, adhesions, and excessive removal of the skin and subcutaneous or submuscular fat.

57.5 Discussion

The strong influence of the west after the Second World War brought about changes in the secular eastern tradition [12], allowing the mixture of cultures to reveal to both parties the interest in each one's particularities.

The technique for westernization of the eyelids through the construction of the superior orbito-palpebral groove seeks to resemble the one that does not possess this anatomical trait the people of the west or the oriental ones that have it.

A double fold is established during contraction of the levator muscle of the upper eyelid by which the aponeurosis of the elevator penetrates the orbicularis muscle, advancing to the dermal area anterior to the tarsal plate. Generally, the Orientals do not have double folds because the aponeurosis of the elevator does not reach the skin of the upper eyelid. And they are characterized by single eyelid, epicanthic fold, and excessive orbital septum fat [12].

Among the techniques of non-incisional blepharoplasty (suture fixation) was the first type of "double eyelid" surgery to be reported in the literature, which was introduced by Mikamo [6] who used a three-suture method in 1896. The method used 6–8 mm silk sutures above the margin of the upper eyelid and the depth of the double fold depended on the time of removal of the suture 2–6 days after surgery, because in this procedure, the node was not buried. In the non-buried method, the suture is placed through the skin to the tarsal plate or to the upper border of the tarsal plate, tied above the skin and removed after a few days [6].

In 1926, Uchida used catheter in blepharoplasty to create the double-eyelid (fold) with three buried sutures [7]. In contrast, the non-incisional technique, the technique of buried points, is widely used, as it does not require the removal of the suture and causes fewer scars.

The techniques of suture fixation with buried points have the advantage of avoiding visible scarring, shorter operative time, faster recovery, and ease of revision. Because these non-incisional procedures do not include any or any skin, muscle, or fat excision, patients with redundant skin or excessive amounts of fat would not be considered appropriate candidates for this procedure.

It is believed that incisional techniques produce longer-lasting results by surgically attaching the layers rather than relying solely on the formation and adherence of the scar in a constantly moving structure [13, 14].

The incisional technique is used to create double eyelids as well as to correct other deformities, such as light upper palpebral ptosis or removal of excess fat.

57.6 Conclusion

When there is excess orbital fat, excess skin and ptosis of the upper eyelid, the incision procedure is the best technique to be performed.

The aponeurosis of the elevator should be exposed to achieve the objective of adequate suspension of the upper eyelid. Suture should be performed between the tarsus and the dermis of the lower incision next to the tendinous portion of the levator muscle in order to strengthen the adhesion between the tissues to facilitate the formation of the superior eyelid sulcus and prevent loosening of the eyelid.

The orbito-palpebral (double eyelid) grooves obtained with this technique are deep and permanent. However, when we apply the radical technique, upper eyelid edema persists, which may take up to 6 months for total regression.

57.7 Summary

The author presents in detail the surgical technique proposed by Fernandez for the westernization of the eyelids of the Orientals through the construction of the superior orbito-palpebral groove. It considers as main advantage of this technique the obtaining of deep and permanent furrows.

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Chapter 58
Lip Shortening and Vermilion Augmentation to Improve Facial Contour

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Perioral region has been difficult to manage since it is in the middle of the face and means constant movement; commonly this area has been approached using chemicals (phenol) and/or dermabrasion.

Because of its complex movements, anatomical structures, and a highly irrigated vascularized and nervous area, surgical techniques have been restricted trying to be less evident or almost invisible. General trend has focused on facial-lift not considering this area as a priority and handling it with auxiliary procedures in spite of complementary ones.

Even when a number of patients have preferred face-lift, with traction maneuver of the skin upwards and sideways, few complaints have been reported concerning to droopy lips or vermilion loss.

This might be due to an increased number of young patients in whom this anomaly is not so evident and that nowadays several options to correct this deviation are available.

Our surgical experience is specially related to authors mentioned later, together with fillers and lipotransfer usage, particularly in vermilion augmentation.

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Nevertheless, we have noticed some cases overestimating the results and creating real deformities.

Another important impact to delimit the area has been found with piercings and tattoos, as they create a double contour and a camouflage site.

In addition, the so-called senile lip scrolls as a screen over the teeth and is remarkable in the upper lip, besides, when smiling avoids teeth show up at least in a third of their size, perceiving low motility.

Our first contact was with the technique defined by Converse, circumscribed to vermilion line with approximately 5 mm skin resections. In this technique scarce vessels' cauterization is advisable to stop bleeding, since it is the same pathway to a small artery and a deep burn could eventually be made, altering orbicular muscle, driving to a deformity similar to lip paralysis, and restraining muscle functions to speak or even eat, as could be seen in Figs. 58.1 and 58.2. Mucosal detachment should be carried out at almost half of the vermilion together with upper traction trying to reduce lip skin related to skin/vermilion. To achieve increase and rotation gets a better defined Cupid's bow even with little improvement in filter zone and scarce pillar projection, which might also depend on genetic factors.

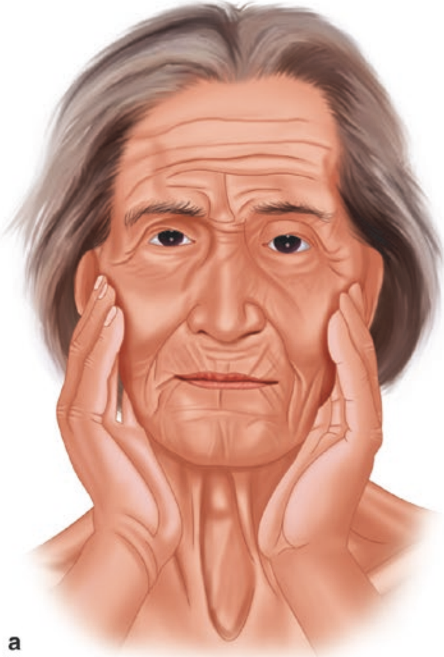
Vermilion, Cupid's bow, filter, and pillars' area represent beauty signs in some occidental cultures, so there is a trend to stress them. Moreover, they should be kept anatomically (Fig. 58.3), as their lost is an aging signal that should always be a regeneration site for youthful, so it should be managed together with facial rejuvenation, always approaching to harmony in size and form, in agreement with motility area and its anatomy.

CARDOSO'S technique (Figs. 58.11 and 58.12) includes skin resections following paths on the basal area of the nose, even pushing them into nostrils to improve contour in filter area and, subsequently, Cupid's bow. Skin resections in this area could be bigger and coagulation a bit tighter; besides, with a good quality suture, this area could be better than vermilion line.

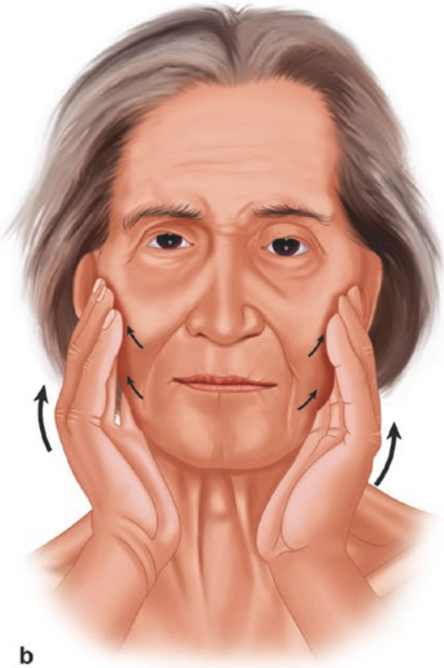
With this technique no skin detachments, in general terms, are advisable because when reducing lip lengthening, its rotation is achieved as a complete segment; even coagulation by itself creates some retraction of all the structures (Figs. 58.4, 58.5, 58.6, 58.7, 58.8, 58.9, and 58.10). Usually, flap traction is performed upwards, but with this technique, it is difficult to respect size, pillars, and filter projection as the idea is traction of all the structures as a complete group, thus very complex for individual management but keeping almost the same form.

Both could be complementary techniques using lipotransfer at low doses, in order to provide volume and improve contour of this region, mainly in vermilion area to get an increase, effect also achieved with other products with hyaluronic acid, although this techniques have been overused frequently in young people and by non-expert hands, leading to deformities.

Fig. 58.1 Manual traction



a



b

Fig. 58.2 Lipo-injection for lip volume

Fig. 58.3 Post lipo-injection of vermilion, 6 months postoperatively

Fig. 58.4 Pre- and post-secondary lift and senile lip postoperatively

Fig. 58.5 Pre-senile lip, immediate postoperative

Fig. 58.6 Hyaluronic acid lip, postoperative

Fig. 58.7 Immediate postoperative

Fig. 58.8 15 days postoperative lift lip

Fig. 58.9 Preoperative

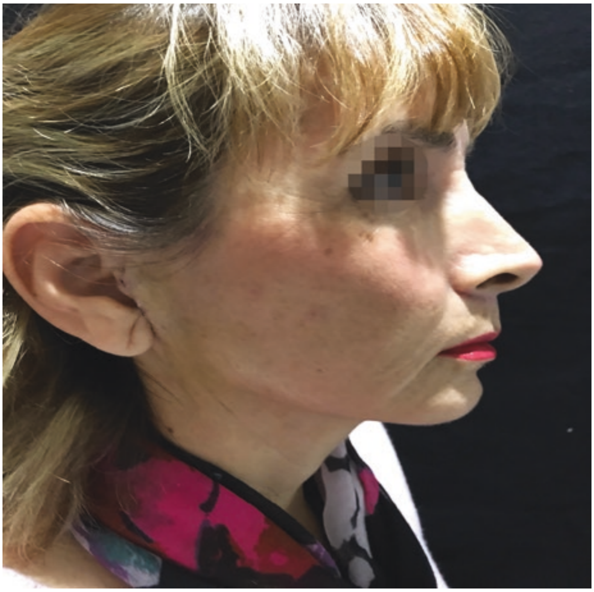


Fig. 58.10 Transoperative TEC OVAL

Fig. 58.11 Postoperative lift TEC

Fig. 58.12 Postoperative hyaluronic acid, proportion of lip structures

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Part VII
Post Operatory Approaches After Rhytidoplasty

Chapter 59
Hair Transplantation for the Reconstruction of the Hairline Following a Face-Lift

Henrique Radwanski

59.1 Introduction

Rhytidectomy is an aesthetic surgical procedure that aims to attenuate facial flaccidity and is also called a face-lift because the skin and underlying tissues are dissected and repositioned. The individual steps of this operation are skin incision, undermining of flaps, hemostasis, traction of flaps, and resection of excess skin with final suture. Each one of these surgical acts can cause permanent lesion to hair follicles, leave a visible scar, or disrupt the continuity of the hairline. The surgeon must be careful to respect the inclination of the hair shafts when performing incisions, avoid hemostasis of the fine vessels along the edge of the flaps, be delicate in final closure, and assure a correct vector of traction so as not to cause excessive raising of the hairline (i.e. the sideburn and the postauricular hairline) [1, 2].

Whenever a patient presents with hair loss following a face-lift, the specialist should proceed with caution. Tension on the suture may cause some hair follicles to shed and enter a resting phase, known as telogen; the scar and surrounding skin becomes apparently hairless, and this will cause great anxiety to the patient and her primary surgeon. Hair growth is normally seen starting in three months, and should regrow completely by the ninth month post-op. Specific treatment is not usually necessary; topical minoxidil 5% may be useful to stimulate hair growth. A decision to transplant should only be taken after a three-month wait.

The following situations may require the participation of a hair transplant specialist:

- Visible scars along the hairline, or because they are widened or hypochromic
- A step-off of the hairline
- Excessive raising of the temporal (sideburn) or cervical hairline

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59.2 Method

Most patients with unaesthetic results from a rhytidectomy are usually acutely unsatisfied and require an empathetic relationship; when they are recommended by their primary surgeon, it behooves the specialist to act in close partnership [3].

Some aspects of hair restoration must be approached from the first consultation. As opposed to a face-lift, results take many months. Follicles are removed from a donor area and will be transplanted to a recipient area; these grafts will take between 6 and 10 months to grow and show full density. It is well-known that follicular units grow in cicatricial tissue, yet final density might not be the same as over healthy skin. In some cases, fat grafting might be necessary to create an increased vascularity under a scar tissue. Finally, a second session of hair transplantation may be required to achieve ideal density [4].

A detailed evaluation must include:

Close examination of the areas that need reparation, estimating the total number of grafts. Scar tissue is checked for adequate blood supply (i.e., rapid capillary filling).

Donor area is typically the occipital region, where density is highest and where hair is thickest. A dermatoscope allows for estimation of the number of follicular units per square centimeter; ideally, this is >80 FU/cm^2. Skin elasticity is an important factor if the FUT procedure is decided on [5].

Incisions from previous surgeries must be checked to avoid unwanted tension in closure if the FUT procedure is performed.

Hair restoration includes the removal of a certain amount of follicles from the donor area, with subsequent decrease in the potential number of hairs for future harvesting, and this must be explained to the patient. Furthermore, there are two methods to harvest follicular units (FUs), and the patient should be well informed so as to participate in the decision-making.

FUT or follicular unit transplantation (also called FUSS: follicular unit strip surgery) requires the removal of a strip of scalp skin, which will then be dissected by the assistants under microscopy to produce the FUs. A thin, linear scar is left in the donor area and should be placed (1) where there is greatest hair density and (2) where the scar remains well hidden [6].

FUE or follicular unit excision (formally extraction) is a less-invasive procedure, where the FUs are punched with a very thin cutting cylinder (i.e., micro-punch with between 0.95 and 0.80 mm diameter) and then excised. Although this method avoids leaving a linear scar, there are two disadvantages: it requires shaving the donor area and usually yields less number of grafts.

Finally, the setting for this procedure should also be discussed with the patient. In the younger individual, with no comorbidities, and for shorter procedures, an outpatient environment is adequate; for older patients, and whenever greater clinical care is warranted, operation is planned in a hospital setting with a light endovenous sedation and constant monitoring [7].

Following this explanatory consultation, the patient is prepared as for any minor plastic surgery procedure: laboratory exams as needed as well as a clinical work-up. Photographs are taken from many angles, showing both the defects and the donor area. It is recommended that the planned hairline be demarcated and also photographed. A clear and detailed term of informed consent must be written and signed, as a future litigation is always a possibility. A close and honest communication with the primary plastic surgeon, who should be updated as to the planned procedure, is also mandatory to decrease any attrition.

59.2.1 Surgical Technique

On the day of surgery, the donor area and recipient sites are demarcated; local anesthesia (with or without endovenous sedation) is gently infiltrated.

Removal of strip is performed.

The strip is taken by the team of assistants, who dissect the follicular units under 10X microscopy.

A rotation machine is used to excise follicular units from the donor area in the FUE method. Punch diameter is between 0.85 and 0.95 mm. Care is taken to avoid transection.

The recipient area is finely tattooed with methylene blue.

Needles (G18 and G19) are used to place the grafts, with attention to correct angulation of insertion.

Alternatively, the grafts may also be placed with implanters.

At the end of surgery, both the donor area and the recipient sites are washed with normal saline and no dressings are placed. The patient's head is washed by an assistant on the next day and thereafter by the patient daily [8–10].

59.3 Complications

Hair restoration surgery has a notoriously low complication rate. The scalp is very resistant to infection, and even unsightly scars remain hidden and do not usually require revision. The most frequent complaint is low density, and this may be due to a poor hair growth. The survival of follicular units depends on maintaining their viability throughout the procedure, and a trained team of technicians must check all steps of the preparation, preservation, and implantation of these grafts. Placing the grafts with forceps requires dexterity to avoid lesion to the bulb and consequent apoptosis. Nevertheless, even in the hands of experts, a less than ideal density sometimes occurs. It is therefore prudent to explain to the patient that a secondary procedure may be necessary to obtain a higher concentration. See Figs. 59.1, 59.2, 59.3, 59.4, 59.5, 59.6, 59.7, 59.8, 59.9, 59.10, 59.11, and 59.12 [11].

Fig. 59.1 Examples of unaesthetic results from a rhytidectomy that may be corrected by hair restoration: excessive elevation of the sideburn, visible scars, and step-off of the hairline

Fig. 59.2 The FUT technique includes the removal of a strip of the skin from the donor area. Closure is done in two layers so as to remove all tension from the dermis, where the bulbs are located

Fig. 59.3 The strip procedure requires a team of technicians that will dissect the follicular units individually under 10× magnification

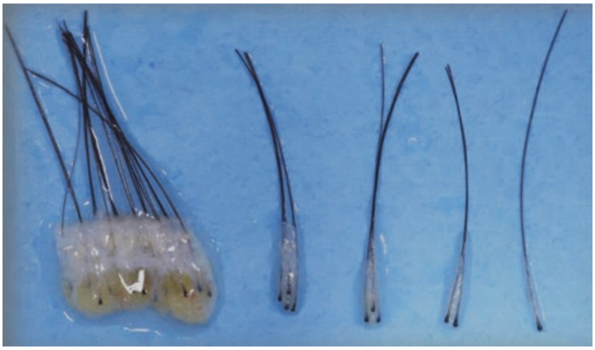

Fig. 59.4 Microscopic dissection of follicular units assures that hairs will grow in a natural fashion

Fig. 59.5 A rotation engine allows the removal of the follicular units straight from the scalp with the FUE technique

59.4 Discussion

Hair restoration is usually performed by a plastic surgeon or a dermatologist. This specialist should be able to offer the patient the best technique to recreate the hairline, either by the FUT method or by the FUE approach; no single technique will suit every patient. Throughout the procedure, it is fundamental to correctly prepare and preserve the follicular units, assuring the viability of the grafts. For this, the surgeon is assisted by a team of trained technicians. With careful planning and precise skill, it is possible to restore a hairline with acceptable density and natural aspect [12].

In the past, a local retro-auricular rotation flap was designed to mimic the sideburn; although this resulted in excellent density, the aspect was not always natural due to the incorrect angle of the hairs and the visibility of the scars used for placement of the flap. To cover large areas of scar, a plastic surgeon should consider using a tissue expander; however, this is usually not the case in defects secondary to a face-lift. Finally, with the increasing popularity of SMP (scalp micro-pigmentation), the patient who does not accept a surgical procedure might consider this procedure to camouflage scar tissue [13].

Fig. 59.6 Follicular unit grafts that are excised by the FUE method are considered more fragile, and the use of implanters may increase survival rate by not traumatizing the bulb

Fig. 59.7 Following infiltration of local anesthetic, the area to be transplanted is lightly tattooed; after the placement of the grafts, the recipient area is gently washed with saline using a syringe and small caliber needle

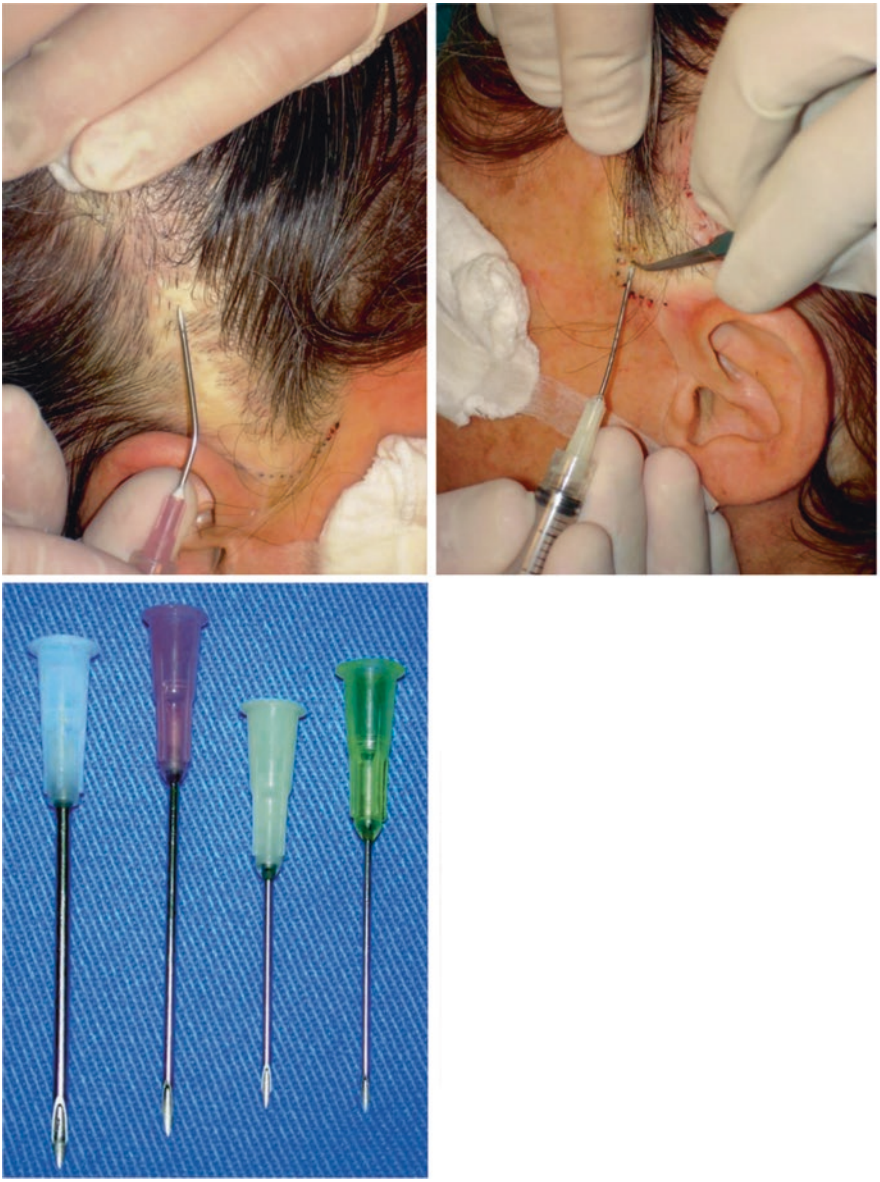

Fig. 59.8 Correct angulation is essential to guarantee that the hairs will grow in the direction that is typical in the temporal hairline. Needles G18 and G19 are used to make perforations

Fig. 59.9 A 64-year-old patient was referred by her primary surgeon 6 months after her face-lift. A large area became hairless, possibly from excess tension on the flap. One session of hair transplantation was performed. The result is observed 1 year after the hair restoration

The FUT method (removal of strip of the skin) is preferred by patients who do not wish to shave the donor area, such as women and older men. In cases where the amount of follicles is not great, the strip is relatively short and the linear scar is quite acceptable. On the other hand, for some patients, the linear scar is undesirable; the surgeon can then offer the FUE technique, where follicles are extracted individually.

Fig. 59.10 This 54-year-old patient had a major stigma from her face-lift, with wide scars in the temporal region. With abundant donor area, this defect was corrected in one session of hair transplantation by the FUT technique

In either case, the hair transplantation requires attention to some finer points: correct angulation of insertion of the grafts, a continuous (but slightly irregular) hairline along the temporal margin, and good density so as to adequately hide scars. To achieve this high concentration of follicular units per square centimeter, two or three passes are required, which progressively becomes more difficult as the grafts tend to be pushed out (popping out) as more follicles are inserted [14].

Revisions are planned regularly; the patient is advised that hair growth begins after 3 months post-op. Topical medication (e.g., minoxidil 5%) may be a valuable adjunct. At 1 year following surgery, evaluation reveals the final result, and at this time, the patient may decide to submit to a complementary session if greater density is requested.

Fig. 59.11 Even lesser defects can cause significant anxiety in patients following a rhytidectomy, as in this 61-year-old patient; both the sideburn and the cervical hairline were restored with one single session of hair transplantation

Fig. 59.12 An excessive pulling of the facial flap may cause a gross aesthetic defect that is hard to hide; this 71-year-old patient had a complete reconstruction of her temporal hairline with one session of FUT hair transplantation

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Chapter 60
Nerves Injuries During Rhytidoplasty: How to Avoid and Surgical Reparation

Fausto Viterbo

Nerve injury in facial aesthetic surgery is not rare.

Specially in facial lifting, the injuries may occur in the sensory and motor nerves.

The sensory nerves more affected are the supraorbital and supratrochlear nerve and the infraorbital, great auricular and mental nerve [1], causing temporary or definitive sensory repercussions [2].

The facial nerve motor branches may be harmed as well and generate major alterations, since asymmetry in facial movements is very evident. The injured branches are the mandibular marginal, the zygomatic, the buccal, and the temporal branches [3–5]. The cervical branch injuries, that enervate the platysma muscle, are rare [6].

Another nerve that might be injured in facial lifting is the spinal accessory nerve that enervates the trapezius muscle [7].

Due to these facts, many authors like Wilhelmi et al. [8], analyze all the possible techniques available to elect the most appropriate one, but there is no consensus about which one is the best since all of them have no greater difference enough to elect one because of the other [9].

It is a common agreement between authors that among these sensory nerves, the great auricular nerve is the most injured one [10]. The patient loses upper ear sensitivity and it may cause some discomfort, but it is not so intense and the patient accepts it well. Its consequences are not severe, but depending on the patient, it can become an uncomfortable situation for both the patient and surgeon since it may disturb the patient's quality of life with numbness and even pain in the affected area [11].

The major problem in the great auricular nerve injury is the formation of neuroma, which can be an amputation neuroma, in a complete transection, or an "in-continuity" neuroma, which occurs in partial nerve injuries. To make neuroma

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diagnostic, in the physical examination, it is observed a pain spot in the infra- or behind-the-ear region. At the major pain spot, it is injected 2 cc lidocaine 2%. If the pain ceases, then it means it is a neuroma. Lewin and Tsur [12] show that the nerve can regenerate at a high speed, so if treated accordingly, it may recover the area sensation within some months. Neuroma treatment consists in surgical exploration, usually utilizing the same incision made during the lifting in the scar behind the ear and the occipital region. The skin flap is detached and the great auricular nerve is searched. A white nodular formation in continuity with the great auricular nerve is the neuroma.

There are many neuroma treatments. If it is an "in-continuity" neuroma, it is resected, and the great auricular nerve may be detached proximally and distally and an end-to-end nerve suture is attempted. If this is not possible, a nerve graft is the option.

A common situation, especially in old cases, is the non-identification of the distal ending of the auricular nerve. Some authors [11, 12] recommend, in this situation, neuroma resection and a stitch to compress the nerve applied to close the endoneural tubes and avoid axon growth again.

Another option is to make an end-to-side loop [13]. The neuroma is resected and the nerve is rotated on itself and sutured to the side of itself [13]. Another option is to use a vein graft longer than 7 cm and introduce the extremity of the nerve inside this vein [14]. Taking into account that in all vein tubulization experimental works the axons grow up to a maximum 3 cm, the chance of the axons in growth to remain inside the vein is very high [15].

All facial motor nerve lesions are very noticeable and disturb patients and surgeons [16].

The buccal and zygomatic branches may be injured in the intra-parotid area, especially in SMAS flap techniques, but fortunately they are uncommon [8]. In the majority of the cases, the lesion occurs distally, out of the parotid gland, in subcutaneous lifting dissection [17]. The buccal and zygomatic branch injuries may cause oral and smile asymmetries, ectropium, and lagoftalmus, creating a very disabling situation for the patient [17].

The temporal nerve lesion causes paralysis of the frontal muscle and also a portion of the corrugator muscle.

The mandibular marginal branch injury usually happens at the extra-parotid and in the most distal zone, determining paralysis of the lower lip depressor muscle and sometimes the depressor anguli oris too, which causes an asymmetrical smile limited to the lower lip. When treating submaxillary hypertrophied gland through cervical incision, there is a risk to harm this gland. We recommend opening the capsule gland horizontally and caudally, since the nerve crosses the cephalic area of this capsule.

If the lesion is detected trans-operatively, dissection and identification of the stumps is mandatory, and the ideal treatment is end-to-end suture with the thinnest sutures available, even with mononylon 6-0.

The most frequent nerve trauma occurs in the distal area, after emerging from the parotid, where these nerves may be very thin and the lesion undetectable trans-operatively. Therefore, the nerve lesion appears mostly after anesthesia recovering but should be considered only after 24 hours, because it may be due to local anesthetic infiltration.

The following months may be a very hard time for both the patient and doctor.

The doctor should ask for help to an experienced colleague in peripheral nerves and make a good psychological support to the patient.

Unless a detected nerve section has occurred, we recommend an expectant conduct.

We recommend starting with botulin toxin in the contralateral muscles to improve symmetry, electrical stimulation with portable equipment done by the patient for 15 minutes three times a day, and, in some severe cases, psychological and speech therapist support [17]. The great majority, more than 90%, presents good nerve regeneration and acceptable recovery in 3–4 months.

Electromyography should be done at the second and fourth month to evaluate muscle and nerve regeneration.

In cases with no or insufficient clinical recovery, surgical exploration is indicated until 6 months, preferably.

The surgery consists of identifying the proximal and distal endings of the affected nerve or nerves. When this occurs, both are connected end-to-end through simple epineural stitches with 8–10 zeros mononylon, according to the nerve diameter. Tensionless suture is mandatory, and sural nerve grafts, if necessary, are indicated in order to avoid any tension [18, 19].

Unfortunately, in the majority of the cases, the distal ending is to thin or not found. In these cases, we prefer to do a muscle neurotization, which means a nerve graft is inserted into the denervated muscle. It is better introducing two nerves in each muscle. Reis [20], in an experimental study in rats, found that two nerve grafts were superior than one but similar to three. The proximal endings of the nerve grafts are sutured end-to-end the proximal stump of the sectioned nerve.

The sural nerve is the first choice as a nerve donor because it is a long one, and its removal results in a minimal sequel of anesthesia in the lateral aspect of the foot [18].

In the sectioned temporal nerve, it is very uncommon to find the distal ending, and we use to do the frontal muscle neurotization with two nerve grafts. These nerve grafts are sutured side-to-end [21–25] in the proximal stump of the temporal nerve due to the diameter incompatibility of the very thin temporal nerve compared with the thicker sural nerve, and the other extremities of the sural nerve graft are introduced inside the muscle (Fig. 60.1).

The other reason to do side-to-end connection is that we should connect two receptor nerves to only one donor nerve. This solves disproportion issues and may take more axons growing in the sural grafts. Another advantage of side-to-end connection is that it is possible to use more than one nerve graft.

The zygomatic nerve injury may cause orbicularis oculi palsy [26]. The treatment may be done with the neurotization of the orbicularis oculi muscle with two nerve grafts sutured in the lateral of the zygomatic proximal stump (Fig. 60.2).

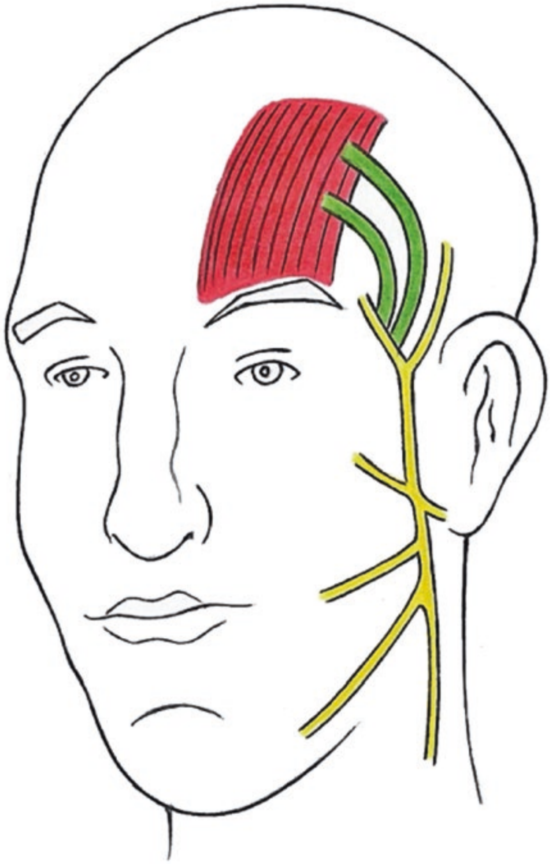

Fig. 60.1 Frontal muscle neurotization with two nerve grafts. These nerve grafts are sutured side-to-end in the proximal stump of the temporal nerve and inserted inside the frontal muscle

The buccal branch injuries, specially the most distal one, as a rule, make impossible to identify the stumps because of its minimum caliber. In this case, the zygomatic major muscle neurotization can be done through two nerve grafts sutured in the lateral aspect of the very proximal buccal branch (Fig. 60.3).

The mandibular marginal branch injury treatment consists in connecting both sectioned endings with end-to-end repair. In many cases, where the distal part is not identified, the option is depressor muscle and/or depressor anguli oris neurotization, using as donor nerve the proximal part of the mandibular marginal branch, or, in some cases, the contralateral mandibular marginal branch, depending on the anatomy of the patient (Fig. 60.4).

The cervical branch injury is very rare and the sequel will be platysma muscle palsy, which is not important since it does not bring important asymmetry.

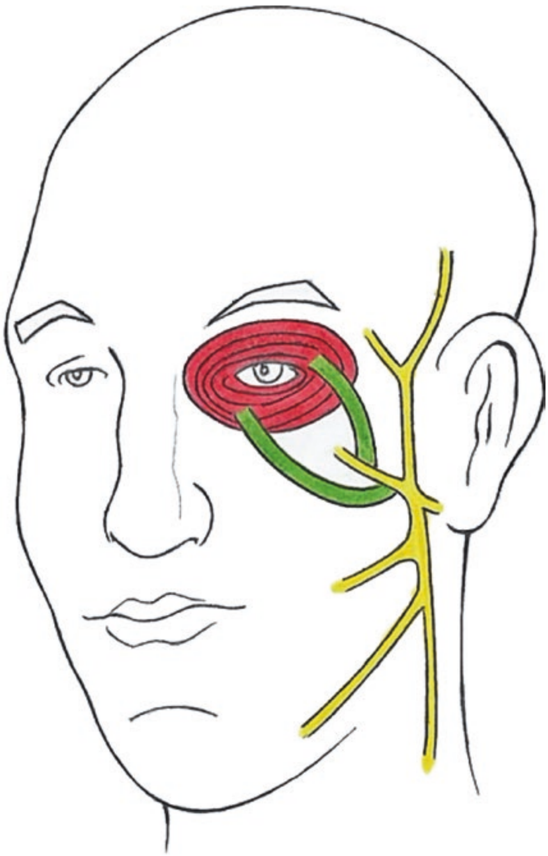

Fig. 60.2 Orbicularis oculi muscle neurotization with two nerve grafts. These nerve grafts are sutured side-to-end in the proximal stump of the zygomatic nerve and inserted inside the orbicularis oculi muscle

Another nerve that might be injured in facial lifting is the spinal accessory nerve that enervates the trapezius muscle. Although not common, this lesion causes a very noticeable shoulder fall. The treatment should be surgical exploration and nerve cooptation directly or through the nerve graft, as soon as possible, since its spontaneous recovery is rare [27].

In most of the nerve injury cases we have received, the skin or SMAS detachment is done with scissors.

We believe that when the detachment is done with scissors at the most distal area of the flap, that is, the area next to the ear, the surgeon has a better control of the flap thickness, and nerve injuries or skin necrosis are very rare. However, as the detachment goes further, toward the proximal region, that is, near the central area of the face, it may become too close to the surface and increase the chance of developing

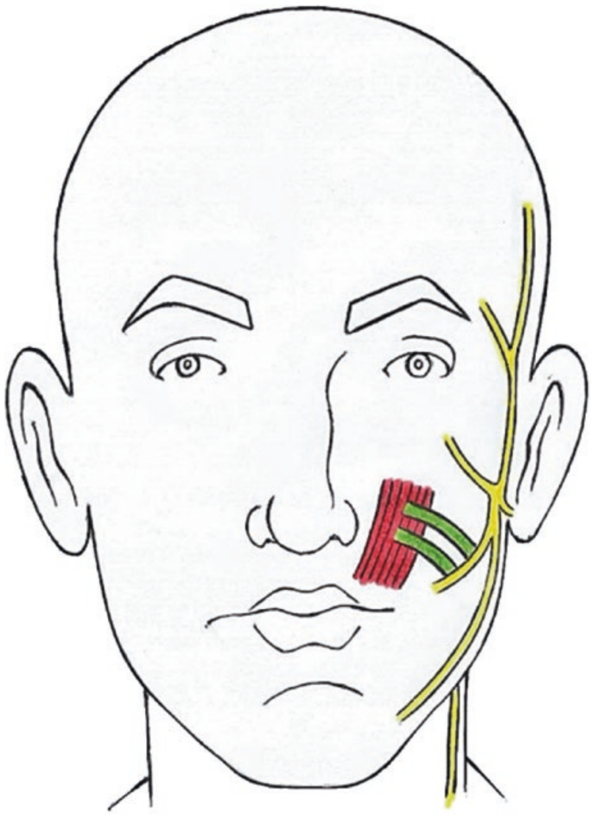

Fig. 60.3 Zygomatic major muscle neurotization with two nerve grafts. These nerve grafts are sutured side-to-end in the proximal stump of the buccal nerve and inserted inside the zygomatic major muscle

skin necrosis, or, the opposite, if it goes too deep, it would increase the risk of harming the nerves. In general thin patients are more susceptible to nerve injuries.

To avoid this risk, Trepsat [28] described a detacher that resembles a scissor with a metallic heart-shaped piece at the point. When the scissor handles are opened, the detachment is obtained. Viterbo [17, 21, 29] described a modification in Trepsat's detacher inverting how the mechanism works; the surgeon compresses the handle and the detacher tips open, causing skin avulsion. It is a simple change that provides more comfort to the surgeon, since this detachment is done several times and avoids muscle tiredness by compressing the handles and not opening it. This modification also brings safer and faster skin detachment.

In injury occurrences, corticoids, vitamin B12, Synaxial, and Etna are commonly recommended by doctors. Corticoids are used to decrease structural edema and lower the possibility of a theoretical nerve compression. Vitamin B12, Etna, and

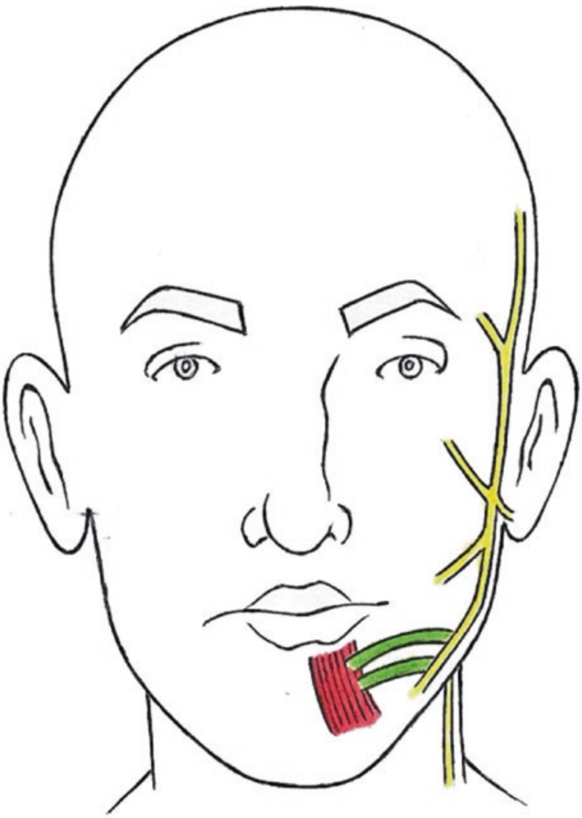

Fig. 60.4 Depressor muscle and/or depressor anguli oris muscle neurotization with two nerve grafts. These nerve grafts are sutured side-to-end in the proximal stump of the mandibular marginal branch nerve and inserted inside the depressor muscle and/or depressor anguli oris muscle

Synaxial are used expecting they enhance nerve regeneration, but the scientific confirmation is still weak and we don't recommend them.

Regarding the dissection plan, we believe skin detachment, without being too deep, is very safe. As for the SMAS elevation technique recommended by some authors [30, 31], it must be done very carefully since it can easily expose the facial branches, and due to that, we strongly agree with Wilhelmi et al. [8]. Beyond the risk issues, it is not proved yet the long-term superiority of SMAS elevation techniques compared with skin elevation and SMAS plicature in the face lifting.

Hematoma occurrences do not seem to us the cause of any nerve injury; bleeding during surgery may demand a fierce cauterization and this is what may lead to a nerve injury.

We defend the use of bipolar cauteries to decrease the extension of the tissue injury, and in cauterization-resistant bleeding cases, compression must be done. If compression seems not to be effective, then a small stitch in "x" done with cylindrical needle may settle this situation without causing nerve damage. The hemostatic net described by Auersvald and Auersvald [32] is very helpful in hematoma prevention, and we are using this for the last 4 years with zero hematoma.

When detecting a nerve injury during the surgical procedure, the surgeon must follow a routine: first, try to remain calm; second, with aid of a loupe, try to locate the affected nerve segment in its proximal and distal section. If he feels capable, he may stitch it with the thinner caliber thread available, even a nylon 6-0, with a cylindrical needle, and try to retain the stumps close with one or two stitches, depending on the nerve caliber. This, in general, solves the situation. If he doesn't have enough experience to perform this procedure, the surgeon must require for aid of a specialized colleague. Not having neither one of these options, the surgeon does not have experience and the colleague is not available to help, then he must end calmly the surgery and after finishing it, ask for someone experienced to evaluate the case.

If the case came to us after a while, we recommend the injection of botulinum toxin in the contralateral muscles to improve the symmetry.

Electrical stimulation must be initiated immediately after the nerve injuries, and applied for 15 minutes, three times a day, with micro-electric current portable device. This procedure is painless. If the patient is educated on how to use the device, he may even perform this procedure at home by himself.

The injection of botulinum toxin in the contralateral muscles to improve the symmetry is very useful while the nerve regeneration occurs.

It is important that the surgeon, in any hypothesis, must not abandon the patient. The patient should be seen weekly at the beginning of the treatment, and then every 15 days, and then once a month. Photos and videos should be taken. The patient should feel the doctor's interest in helping him.

The patient who suffers from facial palsy due to a trauma, tumor, infection, or congenital, accepts the result, even if not perfect, as a rule, with great satisfaction. The opposite happens with the nerve injury after aesthetic surgery since this patient has a higher demand level for the final result.

Ninety percent of the nerve injury cases in facial nerve during aesthetic surgeries evolves well and spontaneously. This ratio induces certain security to the surgeon, sometimes even exorbitant, leading the surgeon to be carefree with his patient too early.

The 10% of cases that does not evolve well, if not treated within 6 months after the injury, may experience definitive muscle atrophy. That is why it is important that this patient must be evaluated with electromyography every 2 months and then 6 months, and his muscle functions must be evaluated as well. If there is no improvement until the sixth month, the patient must be operated during this period with exploration and, if necessary, nerve grafting. Taking into account that the end-to-side neurorrhaphy does not harm any nerve, the interventions in facial paralysis after lifting became safe when done early, no later than 6 months.

The electrical stimulation presents benefits both in the muscle and in the nerve. The muscle affected by atrophy will have an improvement. To muscle not affected yet, the electrical stimulation will avoid it to suffer from atrophy and the nerve will present a higher axonal regeneration speed in comparison to the non-stimulated nerve [33–36].

It is important that the surgeon knows that face nerve injuries may occur to anyone. Prevention and being prepared are very important.

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Chapter 61
Secondary Rhytidoplasty

Paulo Roberto Becker-Amaral, Ronaldo Webster, and Leonardo Milanesi Possamai

61.1 Introduction

Facial esthetic surgery remains one of the more challenging procedures in plastic surgery. Unavoidably, despite technically perfect surgery, time and the patient's conditions affect the longevity of results. What seems to be acceptable in the eyes of the surgeon may not be so for the patient. After a primary facelift, the surgeon can correct several aspects of facial senescence. Muscular malpositioning, skin laxity, the shape of the orbit and eyes, mandibular contours, facial volume, and skin quality are commonly addressed via surgery.

After facelifting, any edema is gradually absorbed, but some facial volume is lost despite reconstitution (today, principally with fat). Over time, peri-orbicular wrinkles develop around the mouth and eyes, the cervical area and jowls become lax, and frontal creases begin to re-appear. Patients, seeking to prolong the longevity of earlier results, now request "maintenance" care that often includes minimally invasive procedures. All of botulinum toxin, fillers, collagen stimulators, suspension sutures, ablative and non-ablative laser treatments, and radiofrequency treatment can be used. However, as more time passes and the maintenance protocols fail to

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satisfy the patient, she/he will approach the surgeon once more. An accurate history of the primary facelift, psychological assessment, and a review of the maintenance protocols used prior to possible surgery are essential. The secondary facelift patient may be at increased anesthetic risk, because of new clinical diseases. These clinical problems may include hypertension, coronary disease, and diabetes. After comprehensive clinical evaluation, the surgical planning of the secondary facelift must feature alternative choices made by reference to the previous facelift and/or adjunct procedures.

Often, a false skin excess is evident. Previous scarring caused by subcutaneous and superficial muscular aponeurotic system (SMAS) tissue dissection may limit the amount of skin available for resection. Past surgical interventions are often associated with surgical deformities, scar malpositioning, hypertrophy, or keloids. The earlobe may be deformed, may be a "pixie ear," or may be hypertrophic [19]. Preauricular hair can be absent or cranially displaced. Platysmal bands may have reappeared. The peri-orbit can be altered or constricted. The submandibular glands may be evident. Small motor asymmetries may be noted, sometimes associated with neural trauma caused by prior surgery. Each of these problems must be faced to obtain a surgical outcome that the patient and doctor consider natural. Sometimes, the surgeon is asked to perform a small "touch-up" of the prior procedure. Quite often, this is a trap; some of the issues described above will render the outcome unsatisfactory from the patient's viewpoint. The following tactics can be generally used when considering a secondary facelift.

61.2 Methods

61.2.1 Clinical Evaluation and Anesthesia

Careful clinical evaluation is essential prior to surgery. Good perioperative anesthesia management is critical to prevent the development of complications during rhytidectomy, regardless of the surgical setting. Thus, the surgeon and his/her staff and the anesthetist must communicate during all phases of surgery. The surgeon must understand the benefits and risks of various anesthetic methods and medications and their interactions. If psychological and anatomical considerations permit, local anesthesia plus sedation can be used. A combination of lidocaine/adrenaline and/or ropivacaine diluted in 0.9% (w/v) saline is routinely infiltrated prior to incision and undermining, depending on clinical safety. Tumescent infiltrations magnify spaces and improve safety when undermining previously dissected areas. Vigilant hemodynamic control is imperative, including strict monitoring of oxygen saturation, blood pressure, and heart and respiratory rates. It's important to keep the patient in a proper temperature. Blood pressure control is of utmost importance [6]. Poorly controlled hypertension can be associated with perioperative bleeding and hematoma formation. Patients with a history of hypertension should establish appropriate blood pressure control preoperatively with the assistance of their primary care physicians [3, 9]. In our practice, intraoperative blood pressure is held in the low-to-normal range to minimize bleeding. However, extreme hypotension must be avoided because this can mask perforators that may bleed postoperatively when the blood pressure returns to normal or if rebound hypertension develops. In addition, tachycardia and hypertension are attributable primarily to pain and anxiety in awake patients. These should be treated appropriately after hypovolemia, anemia, and acidosis have been ruled out. The rhytidectomy patient is unique in that blood pressure should be strictly controlled to minimize subcutaneous bleeding and hematoma formation [4]. As blood pressure is influenced by patient anxiety, pain, nausea, and vomiting, effective control and prevention of these symptoms is recommended. Thus, a safe and effective anesthesia protocol is vital, as well as an attentive care routine in the recovery room [12].

61.2.2 Incisions and Skin Undermining

Precapillary incisions permit the establishment of vertical traction vectors without disrupting the hairline, which has often been altered by previous procedures (Fig. 61.1). A retrotragal incision can be used to minimize the visible length of the

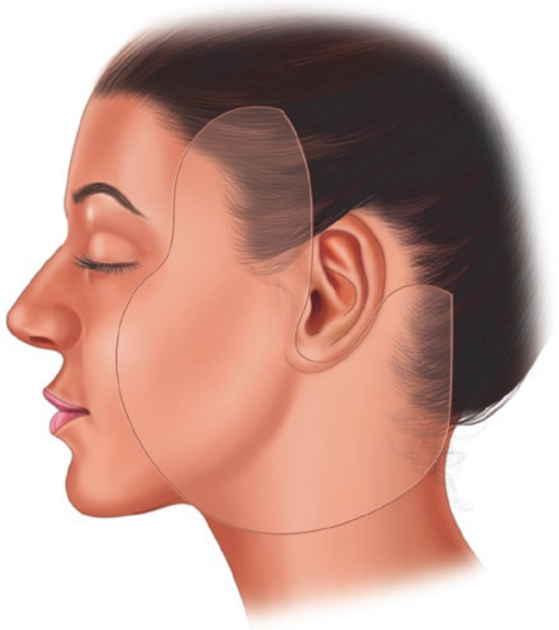

Fig. 61.1 Incisions and skin undermining in the secondary facelift

scar in front of the ear. The gradual skin tone gradient from the malar to the tragal area is preserved; the surgical marks are inconspicuous. In males, this approach is possible if beard follicles can be eliminated from the tragal area via direct ablation without damaging the vascularization; otherwise, a pretragal approach can be safely employed. An incision of 3 cm, parallel and just behind the submental groove, is done to allow procedures in the neck.

61.2.3 Facial and Neck Skin Undermining

Extension of skin undermining proceeds as required, with integration of the lateral facial detachment within the anterior cervical area (if necessary). Also, this is the required first step in SMAS redraping if laxity must be treated. Excessive undermining can cause swelling and vascular compromise of the skin flap. During secondary facelifting, the false skin excess must not be overlooked. Limited undermining can be performed in selected patients with minimal skin laxity and a wide, malar facial width; advancing the medial SMAS laterally may not be necessary. In contrast, narrow faces requiring volume recruitment upward to the zygomatic area must undergo extended skin undermining. Also, faces exhibiting skin redundancy medial to the lateral canthus, inferior jowling, or pronounced marionette lines, and those exhibiting massive weight loss, usually require extensive skin undermining [7, 17].

61.2.4 The SMAS Approach

Narrow faces requiring volume recruitment undergo SMAS-stacking plication; wider fuller faces are treated via SMASectomy [3]. When excess volume is preoperatively evident, a SMAS strip is carefully excised perpendicular to the vector of SMAS advancement, often obliquely at the junction of the static and mobile SMAS. When a vertical vector is preferred, this strip is excised more horizontally and then advanced. Pinpoint sutures can be used to imbricate the SMAS in areas exhibiting fullness or irregularities [17].

61.2.5 Open Treatment of the Neck

The platysma, fat, and neck skin are often addressed during primary facial rejuvenation, but any issues with these elements are prone to early recurrence and the development of deformities (Fig. 61.2). Platysmaplasty can be revisited in several ways.

Fig. 61.2 The plication of the platysma muscle and of the medial portion of the digastric muscles (Labbé's corset), as well as the plication of the SMAS or SMASectomy (Baker) attenuates laxity, and improves the cervicofacial contour

Corset or simple sutures can be placed, with or without inferior sectioning. The lateral, platysmal window technique is sometimes useful [15]. Digastric corset suturing, combined with cervical, suspensory ligament reconstruction (as described by Labbé et al.), is available if needed [8]. The submandibular glands can be approached if they are hypertrophic or displaced. Natural aging may still occur, but the platysmal bands and cervical contours are improved using this approach. In addition, extensive skin undermining permits even redraping. Fat issues are addressed via "superwet" injections, sharp excisions, or open liposuction, the precision of which is improved on visualization of the supraplatysmal and subplatysmal fat [2]. Today, patients with even faint platysmal bands may undergo combination neck skin undermining, fat excision/suction, and submental and lateral platysmaplasty [14, 15].

61.2.6 Traction of the Skin

The skin traction is vertical and soft and delicate, and the skin resection is ever moderate, to achieve a natural result.

61.2.7 Volumization

The fat injection into facially deflated areas constituted a major breakthrough in facelifting. Prior to the introduction of this technique, residual hollowing of the midface and deep nasolabial grooves was occasionally observed. As our understanding of facial fat compartments evolved, so did the technique of fat augmentation, which addresses (principally) issues with the deep malar fat pad and the nasolabial region [18]. Treatment of the latter region creates youthful malar highlights that SMAS alone often cannot achieve. The oral commissure and marionette areas are also often augmented; this is becoming a routine form of facial rejuvenation. Fat is injected via 1-mL syringes deep along the periosteum of the midface, in a layered manner. This is often integrated with lower and upper eyelid surgery. Frontal and temporal areas of resorption can also be fat-grafted.

61.2.8 Use of Lasers and Peel Resurfacing During a Secondary Facelifting

Laser and chemical peels are useful adjuncts when rejuvenating the aging face. Selective application in problem regions such as the perioral and periorbital areas minimizes postoperative discomfort and improves the skin contours. Superficial-to-moderate facial wrinkles are treated with a combination of Jessner solution and 35% (v/v) trichloroacetic acid. Lasers can also be applied in problem areas; carbon dioxide lasers are very effective in the midface region, especially the oral and orbital peri-orbicular areas [19] (Figs. 61.3, 61.4, and 61.5).

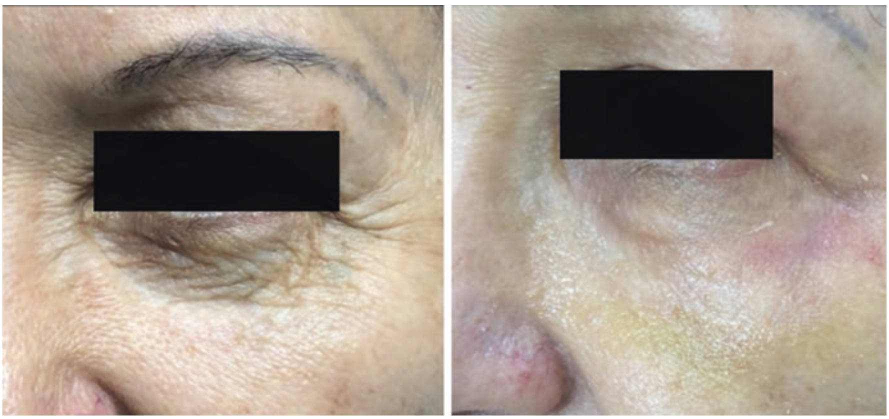

Fig. 61.3 CO_2 laser and fat grafting

Fig. 61.4 CO_2 laser

Fig. 61.5 Secondary facelift and chemical peel with Jessner solution and 35% trichloroacetic acid

61.2.9 Peri-auricular Areas and the Scalp: Scar Visibility, Brow Position, and the Earlobe

Excessive tension caused by lack of planning and/or the false skin excess must be avoided. Precapillary incisions can be employed to maintain the position of hair in the pre- and postauricular areas. A pinpoint approach to the brow, as proposed by Castañares et al., can be performed in selected cases [20]. Videoendoscopic or subcutaneous dissection can also be used, depending on the patient's history. During the postoperative period, caudal extension of the earlobe secondary to traction applied by the submandibular tissues can occur. Such an earlobe, often termed a "pixie ear," is unnatural, and patients often request repair. The issue can be avoided in the first place by paying careful attention to the skin traction vectors and relieving tension during skin closure in this area [10].

61.2.10 Case Reports

61.2.10.1 Case 1 (Figs. 61.6 and 61.7)

61.2.10.2 Case 2 (Fig. 61.8)

Fig. 61.6 A 55-year-old female patient. Secondary facelift with extended cervicoplasty, digastric corset, SMG partial resection, and Auersvald's net

Fig. 61.7 Auersvald's net in an isolated neck procedure. Can be used in a full-face undermining

Fig. 61.8 A 56-year-old female patient. Superior and inferior blepharoplasty with micro- and nano-fat grafting (20 ml). Extended cervicoplasty, digastric corset, corset platysmaplasty, lateral platysmal window, submandibular gland plication in the posterior portion of digastric muscle, and Auersvald's net. Chemical peel with Jessner solution and 35% trichloroacetic acid

61.3 Complications

The complication rate of secondary rhytidectomy is similar to that of primary rhytidoplasty [5, 11]. Although rare, complications that we have encountered include skin sloughing, infection, and hematoma [16]. To overcome irregularities and reduce bleeding, Auersvald's net is very valuable, improving the final results [1] and virtually eliminating the occurrence of postoperative hematomas. Esthetic deformities include persistent neck banding, fat malpositioning or irregularities (particularly in the submental area), and persistent jowling [13]. Furthermore, neck opening has become increasingly common, greatly improving the esthetic appearance. Rarely, patients develop severe, recurrent platysmal bands. Persistent jowling is a function of patient selection and age; younger patients maintain much better long-term results.

61.4 Conclusions

Secondary facelifts must be performed only on carefully selected patients. The better the facial proportions (thus, the closer the face to the esthetic ideal), the better the results in terms of both duration and appeal. Fat grafting during secondary facelifting is indispensable. Skin resurfacing with lasers and trichloroacetic acid peeling can improve overall appearance. Full necks must be treated carefully to ensure the desired outcomes. Neck opening affords lasting benefits. Endoscopic and limited temporal brow lifts are now the mainstream practices. These more limited approaches yield natural results with minimal morbidity.

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The English in this document has been checked by at least two professional editors, both native speakers of English. For a certificate, please see http://www.textcheck.com/certificate/4JU0zH

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Chapter 62
Correction of Unsatisfactory Results in Ritidoplasty and Secondary Procedures

Juarez M. Avelar and Roque Di Mattia Junior

62.1 Introduction

Rhytidoplasty is one of the most frequent aesthetic surgeries in plastic surgery, since every person sooner or later in life will present a surgical indication. Obviously only a few are concerned about the aesthetic appearance of facial aging and are motivated to consult a professional they trust.

The first facial surgeries are credited to the French surgeon Passot [9] who only after a few years received acceptance from the professionals of the time and progressively from the population thanks to the numerous technical contributions that have been incorporated until today.

However, it still remains an open field for new ideas aimed at minimizing postoperative care as well as postoperative complications and reducing the number of patients dissatisfied with the results achieved by highly qualified surgeons. A positive demonstration of our results shows that approximately 20% of our patients operated on in a period of 10–15 years after the first surgery returned to be reoperated, as aging is inexorable.

Our patients who seek to perform another rhytidectomy present several factors that add to the natural organic phenomenon that contribute to the motivation of the search for a new surgery, such as loss of elasticity and dehydration of the skin, early wrinkles due to genetic inheritance or diseases degenerative disorders, excessive intake of alcoholic beverages (alcoholism), hormonal changes and emotional disturbances, personal aspects, as well as numerous other factors. In fact, as it is a

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palliative procedure but with a lasting result of several years and even decades, the various factors are determinants to anticipate another secondary facelift that usually occurs between the ages of 60 and 70 years.

There is an even more common cause for performing a second procedure, in a shorter period, after the primary rhytidectomy, which is the change in weight. In fact, the patient who lost significant weight after the first facelift has a decrease in adipose subdermal tissue, causing excess skin, mainly in the lower third of the face and neck.

Menopause (which may be early or not), or oophorectomy, with decreases in estrogen levels, associated or not with emotional changes, can dramatically cause aging of the structure and appearance of the skin. In addition, other aggravating factors, such as frequent and prolonged exposure to the sun, especially without sun protection factor and smoking. This is particularly evident in fair-skinned people, such as Europeans and their descendants. Patients with "turkey gobbler neck" and in the submental region associated or not with fat accumulation in this region may possibly require a second surgery in a shorter time. This observation made by the surgeon must be emphatically presented to the patient. Usually recurrences appear in this submental region and in the angle of the jaw, when the primary facelift is usually indicated around 45 years and the secondary one, on average, after 10–15 years of the first one. When exactly the second surgery is to be performed depends on the patient's desire and the surgeon's precise indication.

In addition to the secondary surgeries in our patients, there are still others that did not reach satisfactory results and seek corrections of structural alterations resulting from previous interventions performed by nonspecialists (Figs. 62.1, 62.2, 62.3, 62.4, 62.5, 62.6, and 62.7). Unfortunately, our specialty is constantly "invaded" by professionals of other nonqualified surgeons, who perform aesthetic surgeries on the face and noninvasive procedures (Fig. 62.3). In our country, there are medical colleges of high level of medical training that inserted aesthetic surgery of the face in university curriculums of other specialties. Thus, professionals unfamiliar with fundamental principles of plastic surgery perform rhytidoplasty. As if that were not enough, there are still other professionals, including nonphysicians, who perform noninvasive procedures without the necessary and indispensable technical care of asepsis and antisepsis.

There are patients who become obsessed with the idea of anticipating the second surgery, either because they are in unstable marriage or after trauma or personal tragedy, who believe that surgery will restore their self-esteem. These deserve special evaluation by the surgeon or even should not be operated and can be oriented to seek psychological support with a qualified professional.

It is evident that repeated surgeries considerably change the structure of the skin, especially at the level of dermal collagen, due to the various stretches of the tissue, causing ischemia that alter the cellular biology, careful handling and stretching of the tissue, resulting in a thinner, "plasticized" appearance. In addition, there are a large number of patients operated in other services by not plastic surgeons with unsatisfactory results, sometimes with severe deformities requiring aesthetic repair and often even reconstructive ones (Figs. 62.1, 62.2, 62.3, 62.4, 62.5, 62.6, and 62.7).

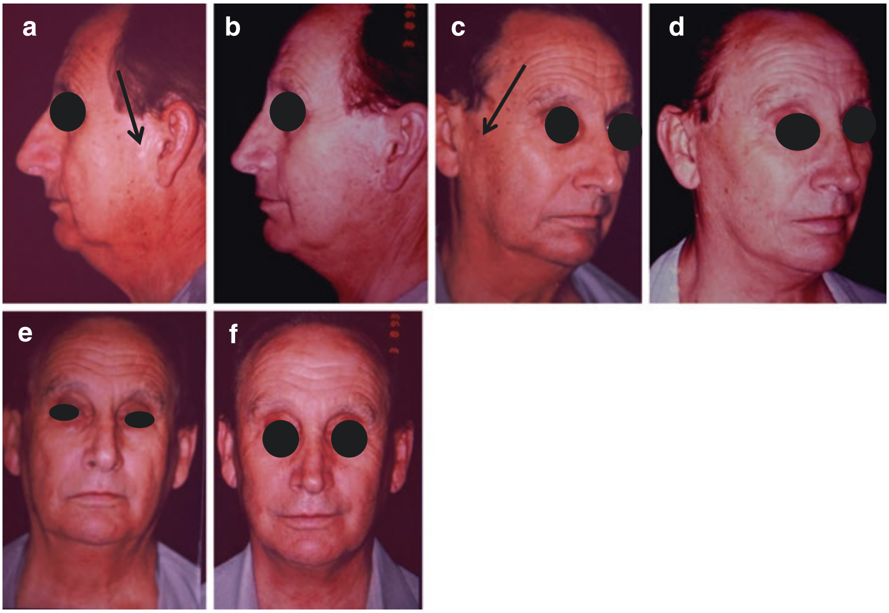

Fig. 62.1 A 67-year-old male patient underwent previous facelift performed elsewhere. A secondary reparation rhytidoplasty was performed combined with rhinoplasty and correction of septum deviation. Photos (**a**, **c**, **e**) – before reparation surgery with ungraceful scars far away from the ear, indicated by arrows due to previous facelift, flaccidity of the skin on the neck and face. Photos (**b**, **d**, **f**) – 1 year after facelift with improvement of facial contour and scars well positioned. Rhinoplasty was performed in combined procedure as well

62.2 Method

Secondary rhytidectomy is technically easier and faster than the first, due to the presence of cicatricial fibrosis, which with the infiltration of anesthetic and vasoconstrictor solution and tunneling reduces bleeding and consequently facilitates the detachment of the flaps. We reshape previous scars only at the end of surgery. The infiltration of anesthetic solution is prepared with 9% sodium chloride physiological solution, 2% lidocaine without vasoconstrictor, and epinephrine 1: 200,000. Next, we complement the infiltration by making a hyperhydration of the subdermal space in every demarcated area of the face and neck with solution prepared with 9% physiological saline 500 ml and 1 ampoule of 1:1000 epinephrine. Following tunneling is then performed, without liposuction, with straight and cylindrical cannula and afterward using a flat and curve cannula with irregularities on each border on the regions of the neck underneath the skin preserving the subdermal layer on the cutaneous flap [1–3].

We make skin incisions according to Pitanguy's technique (Fig. 62.4a, b) [11]. Due to tunnelization procedure, the thickness of the cutaneous flap is preserved, avoiding dermal tissue damage, marked fibrosis, and postoperative bleeding

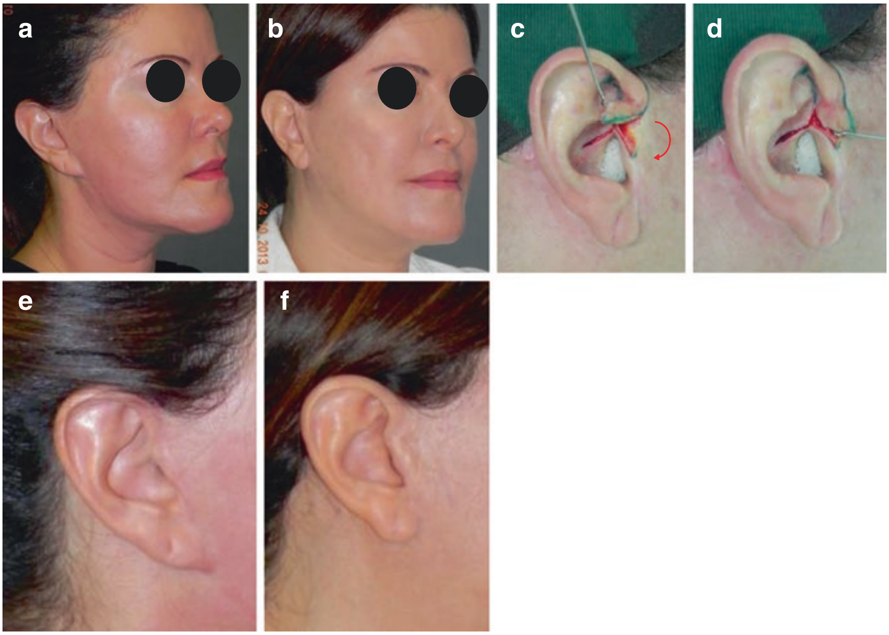

Fig. 62.2 Reconstruction of the tragus after amputation during previous rhytidoplasty performed elsewhere. Photo (**a**), one can see the absence of the tragus caused by a facelift surgery; photo (**b**), same patient after reconstructions of the tragus; photos (**c** and **d**), preoperative photos showing creating a chondrocutaneous flap on the root of the helix inside the conchal cavity is raised and rotated forward and sutured on the anterior border of the auditory meatus; photo (**e**), right ear in close up before surgery showing the absence of the tragus; (**f**), same ear after reconstruction of the tragus

(Fig. 62.3f–h). Likewise, we perform rigorous hemostasis. When necessary, we associate a liposuction, carefully, in the remaining adiposities, using a cannula of submental number 3 and syringe, or surgical instruments developed by Avelar [3, 4].

We performed the SMAS plication, which was very well described and recommended by Mitz and Peyronie in [8]. Few years early, Skoog in 1974 described treatment of deep structures, and later Owsley in 1977 very well elucidated by [7]. The platysma bands, when it is evident, we do plication with separate stitches of 3-0 colorless mononylon in front of the tragus to the cervical region in the posterior part of the auricle as well. In the vast majority of cases, we associate secondary blepharoplasty according to surgical planning.

Done the plication of SMAS, we reposition and fix the dermal flap, with its subdermal layer preserved (Fig. 62.3g), with several separated internal stitchs, using monocryl 4-0, without marking the skin and make. A special stitch is done on the skin flap at the base of the auricular cartilage toward the earlobe to ensure the natural position of the ear after surgery (Figs. 62.1, 62.2, 62.3, 62.4, and 62.5).The cutaneous flap of the face is drawn as Pitanguy's technique [10], which means from tragus to the Darwin's tubercle on the posterior edge of the helix, where traction

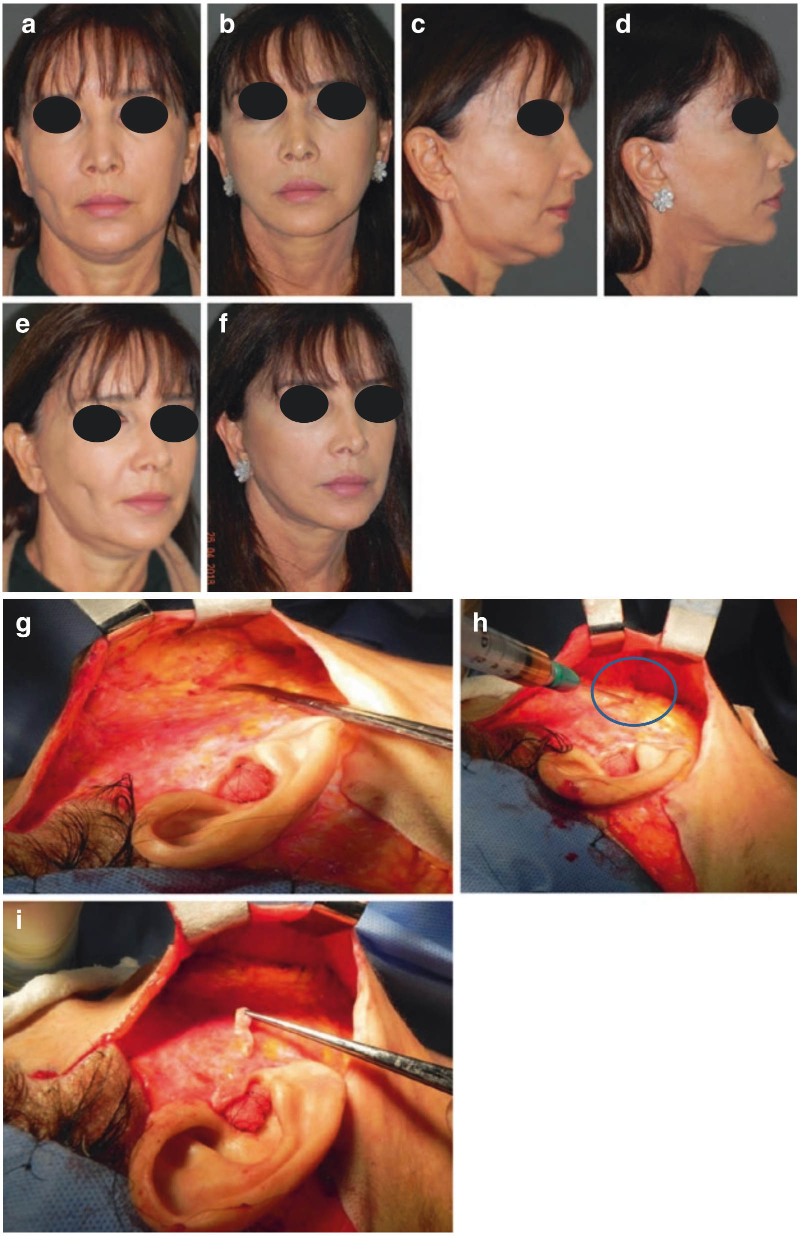

Fig. 62.3 Reparation of severe scar retraction on the middle of the right side of the face caused by a facelift and several times by nonsurgical procedures performed elsewhere by not plastic surgeon. Photos (**a**, **c** and **e**) – before surgery showing unaesthetic depression; photos (**b**, **d** and **f**) – after reparation with smooth result performed by a new rhytidoplasty. Photo (**g**) – during operation showing wide cutaneous tunnelization using Avelar's surgical instruments, showing the thickness of skin flap with preservation of subdermal layer. The skin flap is pulled upward, and the subcutaneous depression was sutured; photo (**h**) – fat injection was also performed to give more regularity on the subcutaneous layer tissue; photo (**i**) – dermal graft was done to repair the severe subcutaneous depression

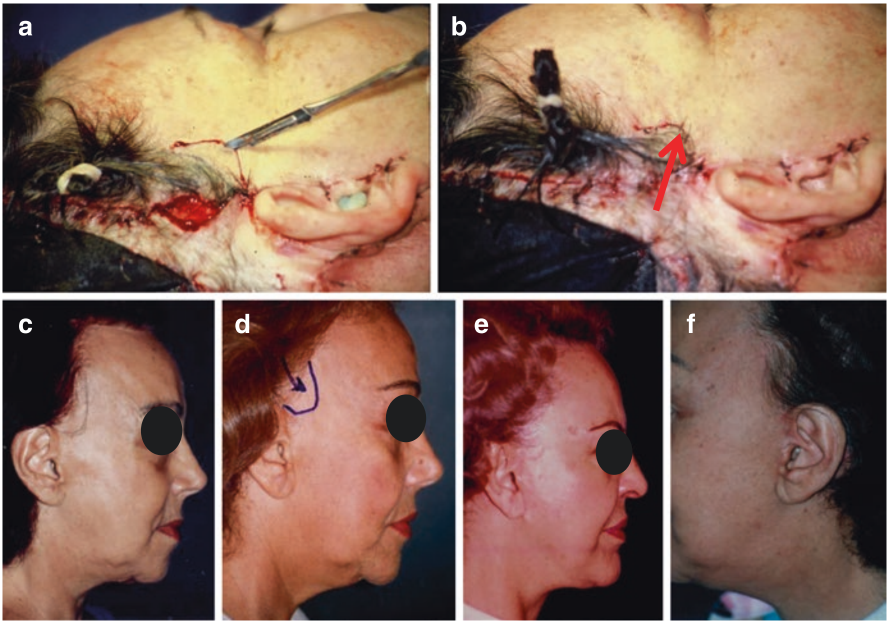

Fig. 62.4 Secondary facelift combined with creation of the sideburn bilaterally improving facial contour. Photos (**a** and **b**), during operation showing rotation of skin flap from the back and forward to create the sideburn, as indicated by arrow; photos (**c** and **d**), before operation showing surgical planning of creation of sideburn; photo (**e**), same patient on the right profile view after secondary rhytidoplasty associated with creation of sideburn showing inconspicuous scar; (**f**), post-operatory view of the left side of the same patient to demonstrate the improvement of facial contour combined with creation of sideburn

follows vectors in the anterior posterior direction. In the upper portion, the traction is slightly oblique up making "block" as recommended by Pitanguy [10] preserving the hairline. After traction, following the technical principles, the surplus skin is resected providing a natural-looking result to the face.

We routinely do not use drain and make the dressing with cotton gauze pad. The surgery is performed in a hospital environment with intravenous sedation or general anesthesia with the presence of the anesthesiologist.

The first dressing change occurs after 24 hours of the surgical procedure. With this systematization, hematoma is quite rare, and recurrence of SMAS ptosis, especially at the jaw angle, where complaints were more frequent. Once we began using this plication technique several years ago, the results have become more durable, and we rarely do secondary approach. Regarding with the unsatisfactory results from other services, most of them performed by nonspecialists, we observed sequels such as tragus erasure (Figs. 62.2, 62.6, and 62.7), performed with intentional or accidental removal of the tragus, exaggerated lobular traction (Figs. 62.1, 62.2, and 62.5), alopecia and loss of hairline definition (Figs. 62.4 and 62.6). In certain patients, we performed another complementary procedure during the surgery.

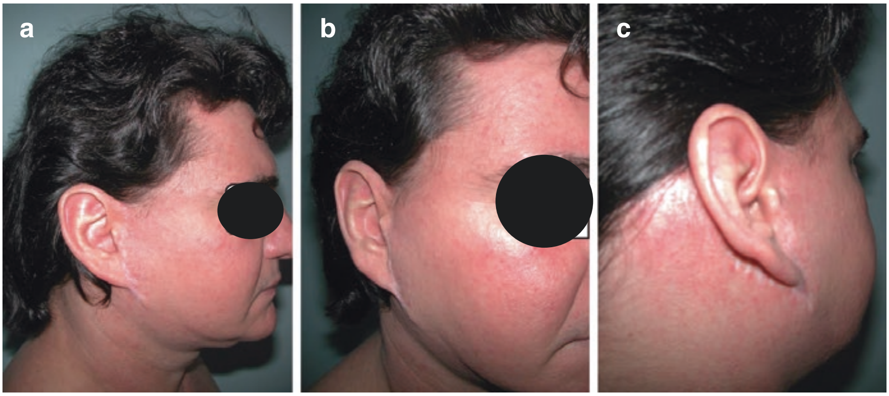

Fig. 62.5 Unaesthetic surgical result after rhytidoplasty operation performed elsewhere by non-specialist plastic surgeon. Photo (**a**, **b** and **c**) – a female patient with unaesthetic scars in front of the ear and on mastoide region besides the excessive traction of the earlobe

Fig. 62.6 A patient presenting the absence of tragus (indiquated by arrow) after rhytidoplasty operation performed elsewhere by nonspecialist surgeon

Fig. 62.7 A female patient complaint about the absence of the tragus after rhytidoplasty operation performed elsewhere by nonspecialist surgeon

62.3 Anatomical and Functional Changes in Patients Operated in Other Services with Nonspecialist Professionals

From the FUNCTIONAL sequels (motor and sensory) and AESTHETICS (most common that we receive in our clinic), we highlight in the first place, the first – that are temporary –

62.3.1 Functional

1. Motor nerve injuries such as temporary facial paralysis, which require specialized repair procedure
2. Sensory (temporary) nerve lesions causing pain, paresthesia, and pruritus in the preauricular regions and part of the earlobe, which evolve satisfactorily with the disappearance of hypoesthesia between 15 and 45 days and in the most extreme cases of 60–90 days.

62.3.1.1 Aesthetics

The most common are:

1. Loss of earlobe definition, by exaggerated traction of the flap of the lower third of the face at the level of the arch of the mandible and neck (Figs. 62.1, 62.2, and 62.5).
2. Preauricular and retroauricular tissue necrosis, caused by superficial detachment of the flap or exaggerated traction and tension of the same. It may also occur when drainage of the hematoma or seroma has not been adequately carried out resulting in several consequences such as infection or burn sponsored by the use of electric scalpel.
3. Loss of the "cutlet" due to excessive resection of the flap and scalp (Figs. 62.4 and 62.6) and alopecia of the temporal region due to excessive traction and tissue tension, cauterization of the follicles, or superficial dissection.
4. In the blepharoplasty associated with the facelift, eyelid ectropion and other complications must be adequately treated.
5. Contour loss and facial asymmetry due to wrong surgical techniques.
6. Adherence and fibrosis in submandibular and submental regions with association of liposuction in this area.
7. Keloid or hypertrophic scars more common in the retroauricular regions and rarer in preauricular regions.
8. Salivary gland fistulas (parotid), may occur with deep dissection of SMAS, must be adequately treated.
9. Remaining skin in the submental area due to withdrawal and/or insufficient traction of the fatty dermis with difficulty in solving the problem due to individual anatomical or genetic inheritance.
10. Resection of the tragus which border very much patients on aesthetic point of view as well as on functional since they complain about hearing disturbances (Figs. 62.2, 62.6, and 62.7).

62.4 Discussion and Conclusion

The facial deformities caused by the aging process, where skin sagging and ptosis of the deep structures occur, can be improved, attenuated, or even eliminated by the proper detachment, rotation, and traction of the SMAS – platysma complex [5]. This technique has brought the greatest advance in regard to the results of the rhytidoplasty, providing a perfect repositioning of the deep structures of the face allowing the skin to be properly done [6].

With the SMAS plication mainly at the height of the jaw angle, we obtained a much more effective and lasting correction of the ptosis in this region, being this location the point of greatest relapse. We usually do the vector directions recommended by Pitanguy [10] in the dermal flap traction, taking care to maintain the hairline of the temporal region and performing a subgalea detachment in the temporal region, with attention and care not to injure the frontal branch of the facial nerve. We regularly use the "peninsula" technique [12] (Fig. 62.4), with the purpose of lifting the corner of the *supercilium* preserving also the implantation of the hair avoiding cicatricial stigma postsurgical. The single points with monocril 5-0, traction, and fixation of the flap, repositioning it on the detached bed, avoided the appearance of seroma and hematoma and the reduction of cutaneous edema, reflecting in a longer result and a very great satisfaction of the patients. With this technique, no case was reoperated [13].

We conclude that secondary rhytidoplasty with plication of SMAS with multiple sutures and fixation of the dermal flap with separate stitches is a safe and very efficient technique that avoided the appearance of complications – in the immediate postoperative period such as seroma and especially late hematoma such as ptosis precocious angle of the jaw and widening of scars – lasting and satisfactory result. Reconstruction of the tragus is a useful procedure since patients' complaint about objective and subjective sings. Correct surgical technique and an efficient patient-doctor relationship, which begins at the first consultation, with a detailed explanation of the intra- and postoperative periods, provides the complete satisfaction of both of them.

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Chapter 63
Secondary Approaches on Rhytidoplasty

Lybio Martire Junior

63.1 Introduction

Secondary rhytidoplasty can be understood as any rhytidoplasty that is made secondarily to another, that is, which has not been done for the first time. It may aim to correct unsightly sequelae produced by the primary procedure, or it may be performed only because the time of the first procedure has passed making it necessary to perform a second intervention [4–8].

In this chapter, we will emphasize secondary rhytidoplasty when the former does not present sequelae or unsightly results in order to show how we should approach the case in which the patient undergoes a new rhytidectomy and what considerations should be regarded to avoid complications or unaesthetic sequelae [3].

The primary goals that a rejuvenating surgery should achieve, being it primary or secondary, are improvement in appearance, restoring of the youthfulness features in the patient, and, of course, their satisfaction [1].

It is necessary to consider that the result of a rhytidectomy should have a natural appearance, which means preserving the patient's normal and original characteristics, such as the height of the implant in front of the ear hairline and the distance between the orbital border and the beginning of the capillary implantation in the temporal region. It should also be considered the normal characteristics of the tragus and the auricular lobe, the frontal region without retreat of the capillary implantation, therefore without enlarging its area, the density of the scalp, besides, of

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Fig. 63.1 Ideal result of a rhytidoplasty with properly positioned scars and preservation of the patient's original characteristics

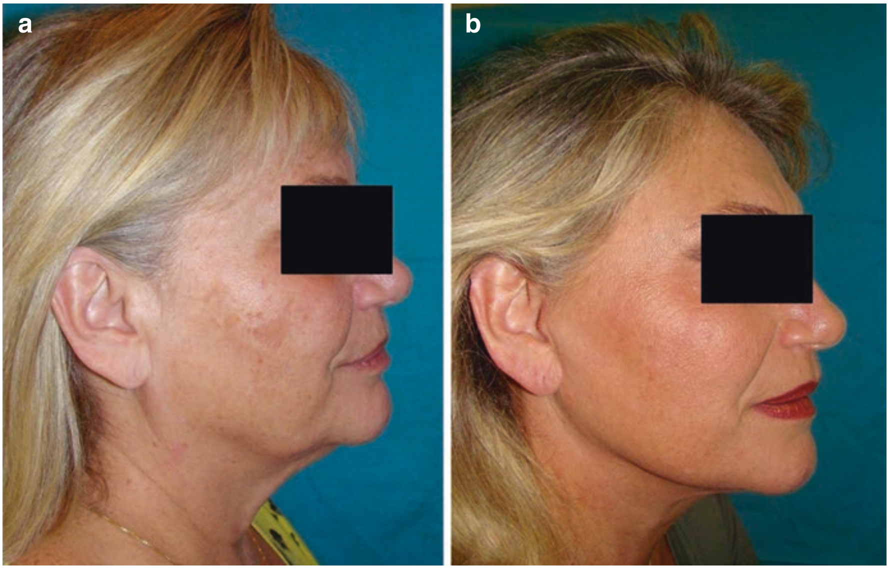


Fig. 63.2 Ideal result of rhytidoplasty. (**a**) Preoperative stage. (**b**) Postoperative stage of a rhytidoplasty with no visible stigmas, which means a natural appearance

course, the obtaining of well-positioned and imperceptible scars in which the hair grows naturally when inside the scalp (Figs. 63.1 and 63.2) [2].

63.2 Complications

The most common undesirable stigmata of rhytidoplasty leading to unsightly, unnatural, and avoidable outcomes are *a greatly enlarged frontal region*, *pulled earlobe*, *erased tragus*, *elevation of capillary implantation*, *retreat of temporal* *capillary implantation*, *badly positioned and/or enlarged scars, alopecia*, *and tissue necrosis* (Fig. 63.3) [9].

These problems can, however, be avoided with the observation and management by the surgeon of the procedures presented here.

Nevertheless, there is a condition that does not depend on the surgeon's care: the hypertrophic or keloid scar, because it is due to individual genetic factors (Figs. 63.4 and 63.5).

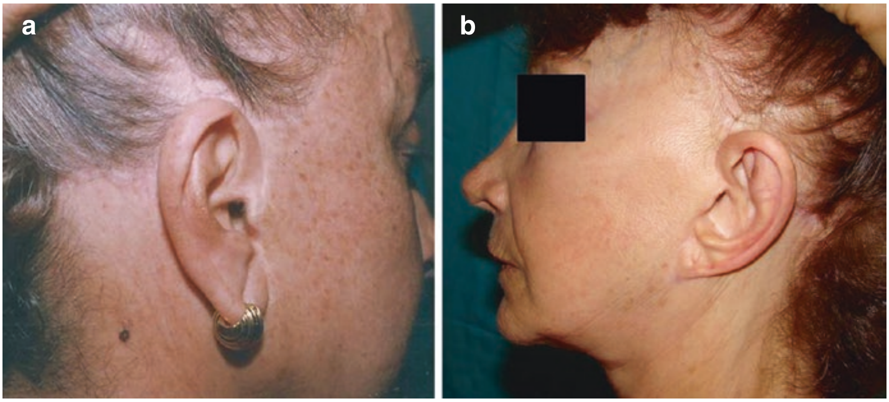


Fig. 63.3 Inadequate results. (**a**) Elevation of capillary implantation, visible scar, hair rarefaction, and alopecia in the back of auricular area. (**b**) Erased tragus and pulled earlobe, temporal alopecia, loss of the natural hair implantation line

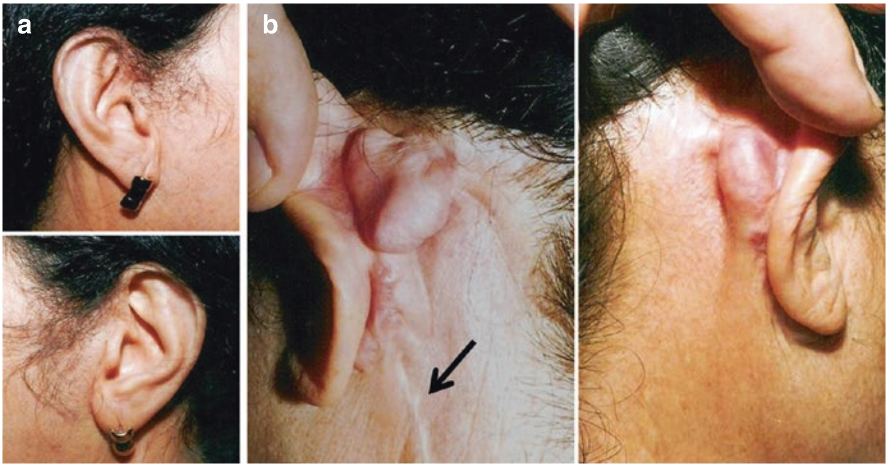


Fig. 63.4 (**a**) Patient with a normal rhytidoplasty preauricular scar. (**b**) The arrow shows an old scar behind the ear with no abnormalities, but there was an auricular keloid after the rhytidoplasty

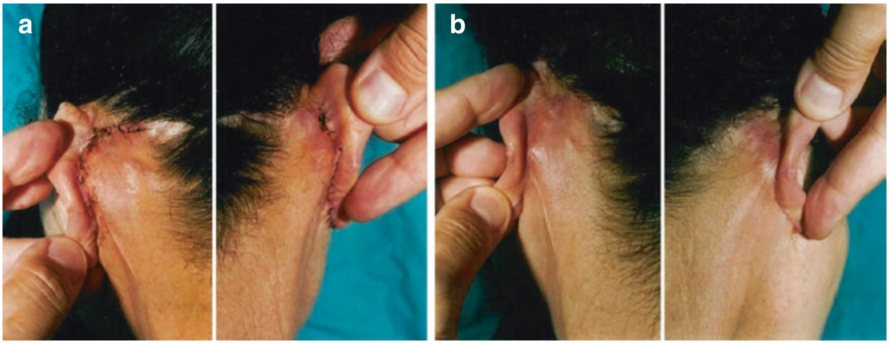


Fig. 63.5 (**a**) After removal of the keloid. (**b**) After treatment with beta therapy (90 strontium) starting the day after surgery

63.3 Method

As a method, it was used the observation of our case studies highlighting the tactics used to minimize the unaesthetic results and complications in secondary rhytidectomy.

63.4 Discussion

Initially it should be taken into account that a rejuvenation surgery is never definitive, for although it has the capacity and the objective to "turn back the clock" of the appearance, the aging continues to be a natural process and the biological clock, which is individualized and linked to the genetic characteristics, also cannot be changed. This condition must be explained to the patient in the first surgery, and it must also be mentioned when the patient seeks the surgeon for a new intervention, because it is known that making the patient understand the goals, possibilities, and circumstances that involve their surgery will be very important for their satisfaction with the procedure.

As an example, let us consider that a first surgery is performed when a female patient is 55 years old. A certain result is obtained, and it will be different if she undergoes a new procedure at age 75. It is clear that the durability of the surgery and the effect produced with it will not be the same because the aging in this point of her timeline will be much faster and, in addition, the skin may have different characteristics.

Therefore, the first care, in a secondary rhytidectomy, for the procedure to reach satisfactorily its objectives is the proper explanation in the appointment, making the patient understand what may be obtained as a result in their case specifically.

It is also common for patients and nonprofessional people to ask whether a face surgery for flaccidity and wrinkle correction can be done more than once and especially if the repetition of the surgery could lead to unnatural results.

It must be explained that a rhytidoplasty can be performed as many times as wished, as long as the surgeon takes the necessary care and is attentive to the maintenance of the aforementioned characteristics whose preservation is mainly responsible for the naturalness of the result.

When the patient in whom we will perform a secondary rhytidectomy shows pre- and retro-auricular well-positioned scars, we can follow them by marking a little behind the previous ones to replace them with the new ones (Fig. 63.6).

If the preauricular scar is pre-tragal, it is better to maintain this conduct by placing the new scar 1 mm behind the previous scar. However, if the scar is on the inner tragus line, it can be accompanied in that position since the tragus is preserved (Fig. 63.6).

If the retro-auricular scar is also well positioned and if below it, in the flow direction, there is sufficient capillary area in a way that allows us to remove tissue and still preserve the hair area, we can make the marking 1 mm above it. This can be done if the removal of tissue preserves the hair area and the scar remains intracapillary.

However, if the scar is positioned outside the scalp, but shows good quality, being almost unnoticeable, it is better to ignore it and place the new scar inside the scalp properly, unless there is a complaint by the patient, about the anterior scar, which is not common in these cases [10].

Nevertheless, when the hair is scarce or the implantation of the hair behind the ear is high, it will be preferable to place the scar in the hairline implantation,

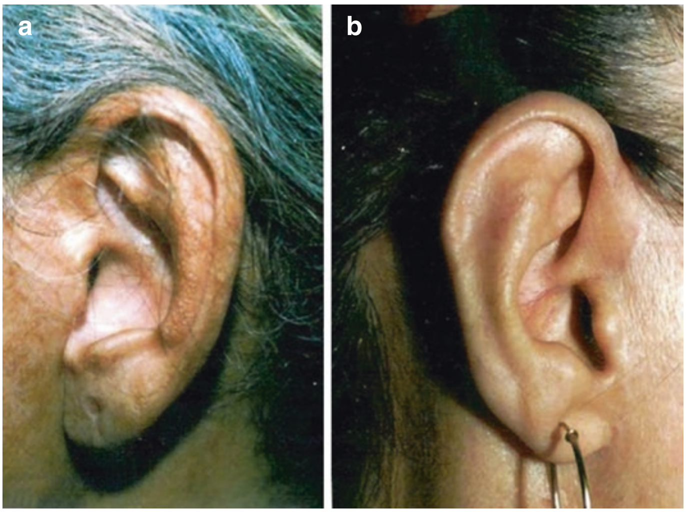


Fig. 63.6 (**a**) Scar on the inner line of tragus. (**b**) Pre-tragal scar

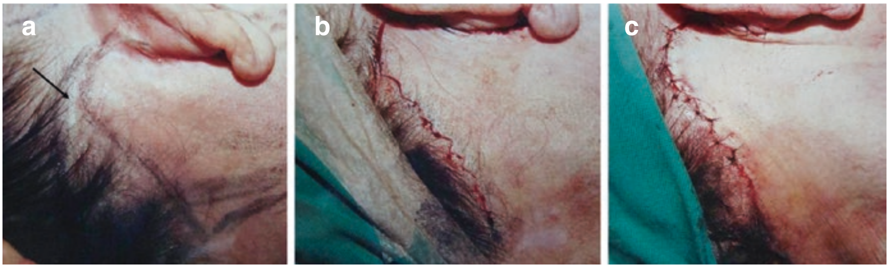


Fig. 63.7 (**a**) The arrow shows the scar of previous rhytidoplasty. (**b**) Serrated precapillary incision. (**c**) Immediate postoperative stage

Fig. 63.8 Late postoperative stage of a serrated scar in secondary rhytidoplasty

becoming precapillary because, in this way, we can repeat the procedure as many times as wished without changing the hair area.

A device that can be used to conceal the scar placed in the line of implantation of the hair is to make it serrated, because in this way it becomes more imperceptible (Figs. 63.7 and 63.8).

Regarding the existence of a temporal scar, even if it is a good-quality one and it is well positioned, it will be a better procedure, in a secondary rhytidectomy, in women, not to extend the preauricular scar to the temporal region.

This conduct does not increase the distance between the temporal hair implantation line and the orbital border and neither elevates the hair implantation line (Figs. 63.9a, b and 63.10).

Another approach that can be used is positioning the temporal scar on the hair implantation line, leaving it precapillary. However, we prefer not to use this feature, because the scar, even if it is of good quality, may be visible (Fig. 63.12a).

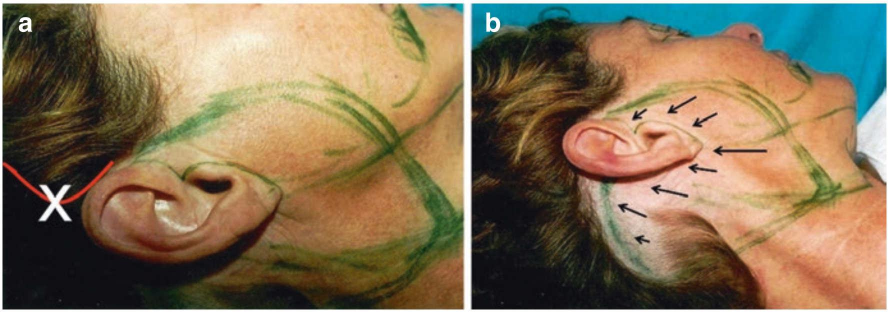
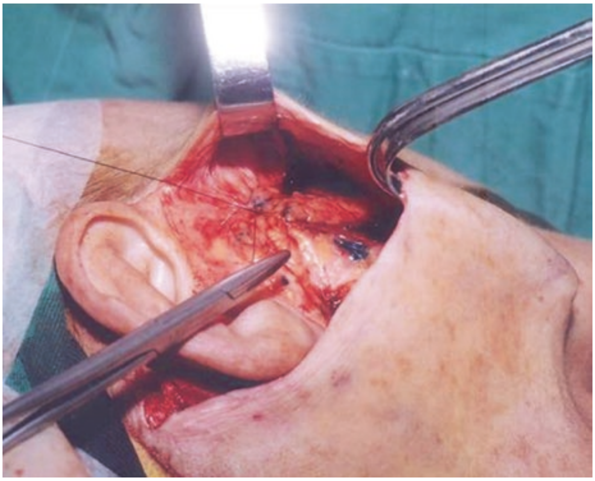


Fig. 63.9 (**a**) Marking of surgery without temporal scar. (**b**) The arrows show how the lines' force should be when the temporal scar is not made

Fig. 63.10 The photo shows that when performing a rhytidoplasty, the temporal incision is not necessary



For the treatment and elevation of the middle one-third of the face, we used the technique we described as *lifting of the face by the eyelid,* a type of myocutaneous blepharoplasty, but with periosteal pexy. In our opinion, it achieves better and more effective results in the treatment of the middle one- third of the face (Figs. 63.11b and 63.12b).

The surgeon should also be aware of the skin flap traction lines in a secondary rhytidectomy for properly placing of the flap (Fig. 63.9b).

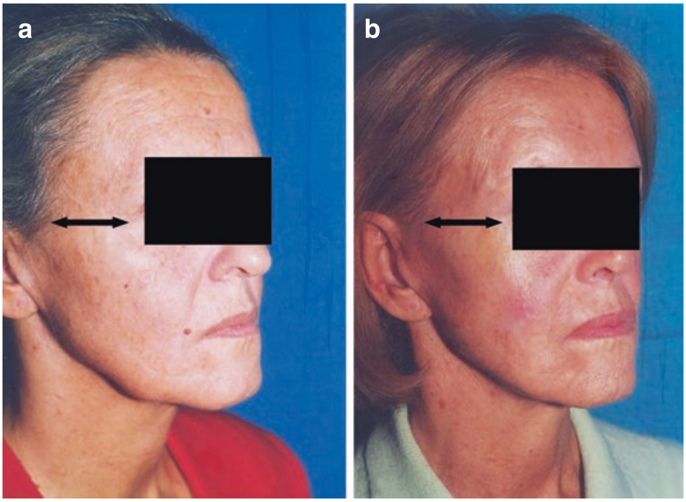


Fig. 63.11 (**a**) Patient with retreat of the capillary implantation in temporal region caused by the first surgery. (**b**) The secondary rhytidoplasty did not aggravate the existing condition because there was no temporal incision

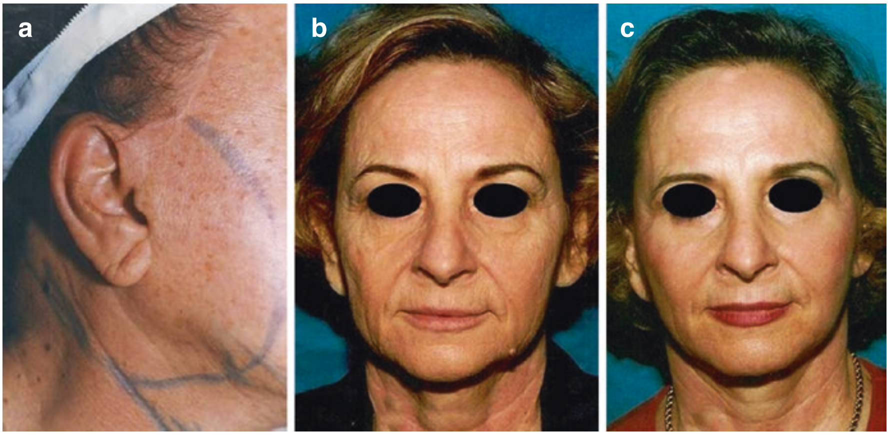


Fig. 63.12 (**a**) Patient with scar on the front hairline with good quality but showing the new labeling of secondary rhytidoplasty not reaching the temporal region. (**b**) Preoperative stage of a patient with anterior rhytidoplasty. (**c**) Postoperative stage in which the middle one-third of the face was treated without temporal scar

63.5 Conclusion

In a secondary rhytidoplasty, the surgeon should be aware of the care and tactics described in this chapter to avoid the most common unsightly results of this surgery: *a greatly enlarged frontal region*, *pulled earlobe*, *erased tragus, elevation of the capillary implantation*, *retreat of temporal capillary implantation*, *badly positioned scars*, *and alopecia.*

63.6 Summary

Secondary rhytidoplasty means any rhytidectomy that is done secondarily to another, that is, it is not done for the first time.

This chapter describes the most common unsightly results that should be avoided in this type of surgery and the tactics that can be used to avoid them.

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Chapter 64
Complications in Rhytidoplasty: How to Prevent and Treat Them

Aristóteles Bersou Júnior

Summary In the evaluation of short- and medium-term results regarded as unsatisfactory by patients submitted to facial rhytidoplasty, the most common complaints are skin irregularities, such as dark spots, ripples, linear marks, prolonged cutaneous numbness, visible, widened and poorly positioned scars, areas of hypochromia, cicatrices resulting from necroses, alopecia, prolonged edema that does not subside with lymphatic drainage, earlobes pulled down and in a different position than before, and lack of hair near the sideburns, among other problems resulting from a common factor: excesses.

Excesses are the most important factors contributing to the lack of success.

64.1 Main Factors in the Lack of Success

1. *Excessive skin removal*: In the effort to pull the skin further, in order to make someone look even younger, the effect is usually the opposite, because a too stretched skin is unable to achieve a perfect edge-to-edge coaptation in the relief around the ears without producing complications, such as the widening of scars, sagging earlobes, alopecia, and a distorted hairline.
2. *Excessive traction*: It is the consequence of excessive skin removal. *The reduction in the vascularization of the edge of a flap is directly proportional to the traction exerted on it and to the distance detached*. Skin necrosis in the retroauricular area is the first thing to be observed. Since it is very thin, its ischemia generates a sudden darkening of the skin, the presence of blisters due to epitheliolysis, and infection (Fig. 64.1a–d).

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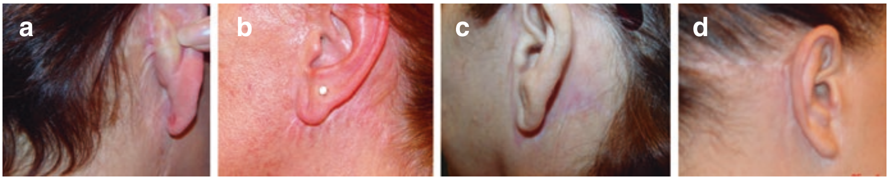

Fig. 64.1 (**a**–**d**). Consequences of excessive traction, unsightly scars

Fig. 64.2 The form of the commissures, which change position, losing their natural aspect and gaining in artificiality

Among other consequences of the excessive traction, we can usually observe the appearance of oblique lines, from the angle of the mouth to the ears, as well as the alteration in the form of the commissures, which change position, losing their natural aspect and gaining in artificiality (Fig. 64.2).

3. *Ill-timed cauterization*: The cautery must be used with the utmost care, because fulguration may burn more than necessary, particularly when the surgery is conducted only under general anesthesia. Particularly important is to know the technical characteristics of the electric scalpel and the amperage that is being used during cauterization, as well as the anatomical knowledge of the dangerous areas. Most of the neurological lesions are caused by the cautery.
4. *Very thin flaps*: The sum of long, thin, and tense flaps is usually catastrophic, especially in thin patients and smokers. The dissection of flaps in the face, going from the temporal region to the occipital one with little or no distension by anesthetic fluid, simply with general anesthesia and curved tip scissors turned to the skin, is an increased risk factor in the preparation of the flap. The scissor tip turned to the skin has a tendency to go up during the detachment move, generating linear marks that end abruptly in non-detached areas, creating unaesthetic contrasts.
5. *Hematomas*: To keep the blood pressure too low during a surgery may lead to a retraction of the vessels which, once sectioned, will not bleed. Without bleeding,

it is more difficult to visualize the vessel to be cauterized. The increase in blood pressure when the patient wakes up from the anesthesia may provoke a small bleeding, which grows larger among the already detached structures, gradually occupying more space, distending, infiltrating in deep and superficial spaces. In the retroauricular area, hematoma is one of the leading causes of necroses.

6. *Traumatic, tense sutures*: The same suture that closes a wound may, due to its tension, tear up and even necrose the sutured edges, which are the linear marks that appear in the sutured skin (Fig. 64.3).
7. *Infection*: It results from several factors related to cause and effect of thin flaps, tense and avascular edges, with very tight sutures, hematomas, and epitheliolysis, often associated to the patients' lack of care, when dirty hair adhered to the wounds facilitate the proliferation of bacteria and of their consequences. The most common foci of infection are located in the point of fixation of the hair flap close to the helix and in the retroauricular area, where humidity, tight stitches to join the flap and the ear, and the thinness of the tissue combine to trigger an infection.
8. *Alopecia*: For a woman with dense and well-treated hair, to suffer hair loss due to treatments, deficiency, or hormonal factors related to age or diseases, is a relatively acceptable situation, since it usually occurs gradually. In the event of alopecia caused by rejuvenation surgeries, it is very difficult and disturbing to accept the problem, generated by the unpleasant aspect of hairless areas surrounded by so far abundant hair, in an acute and traumatic way (Fig. 64.4).

   (a) *Hair does not accept traction*: The delicate structures that form a hair do not accept traction or compression for a long time; vascular nutrition ceases, and the hair falls out.
   (b) *Thin hair, greater care*: Old age and the thinness of the scalp usually determine thin hair and little volume. When located in areas of suture by different

Fig. 64.3 Point marks due to excess traction and dyschromia due to necrosis

Fig. 64.4 Alopecia caused by excessive horizontal traction and very tight stitches. Tattoo employed to cover up the area without hair

Fig. 64.5 Excessive horizontal pull rotation flap made and hair replacement

techniques, they are more susceptible to fall out due to traction and compression.

(c) *Edge cauterization, clamps*: The scalp is profusely vascularized. Any incision or trauma promotes abundant bleeding, and an ill-timed cauterization may cause hair loss through the destruction of hair bulbs. Anesthetics associated with vasoconstrictors are essential to reduce bleeding, as well as the use of clamps, which should not be used for a long time, since they cause ischemia in the edges.

(d) *Horizontal traction of the sideburns*: The excessive excision of scalp, in order to the accommodate the skin near the sideburns in a horizontal direction, determines their disappearance, leading to a disharmony in the hairline (Fig. 64.5).

(e) *Very tight suture*: Regardless of the type of suture, either by simple stitches or by continuous suture, if the stitches are too tight, the suture will generate marks, cutting the tissues and provoking areas of alopecia and skin marks.

64.2 Precautions that Help Prevent Complications

Proportionally, inexperience and excessive traction are the main causes of complications in rhytidoplasty. The more a tissue is tensioned, the closer it gets to the point of complication.

The use of techniques and tactics widely spread and studied by several authors and the knowledge and constant practice of this type of procedure are of fundamental importance. Noble areas should be protected and possibly avoided. The knowledge of anatomy is indispensable, but since there are no two identical cases, and theory is very different from practice, where exception is the rule, you cannot be too careful.

64.3 Expansive Anesthesia [1]

The anesthetic formulation of 500 ml of Ringer's lactate, 20 ml of Xylocaine 2% without adrenaline, and 1 ml of adrenaline allows for a local anesthesia with low toxicity, long anesthetic effect, and the possibility of infiltrating a large volume, which we call expansive anesthesia. The hydric expansion of the areas to be detached provides safety and easiness to the act. The adipose tissue is easily distensible, as can be observed when injecting anesthetic solution in the areas to be detached. The separation of the subcutaneous cellular tissue from the firmer structures, which are the muscles, ligaments, vessels, nerves, and the skin itself, enables the visualization by transparency of those structures, which facilitates their dissection. The drop in temperature in the hydrically distended areas is manifest, a slight hypothermia which helps vasoconstriction without concealing a bleeding. This improved visualization makes it possible to coagulate the vessels in a more precise and selective way (Fig. 64.6).

Fig. 64.6 Expansive anesthesia, skin up, muscles, vessels, and nerves down, subcutaneous allowing safe dissection

64.4 Detachment

Even in the smallest detachments, it is essential to know the anatomy and physiology of the movement, the thickness of the flap, the precautions with the parotid gland, the facial nerve, and its ramifications, since an oversight may cause undesired sequelae.

After tissue distension through expansive anesthesia, and once incised the projected drawing with blade 15 and round scalpel handle that will be used in the entire dissection, the detachment of the retroauricular area is made easier by this distension, since it provides a limit, a hydric film between the subcutaneous cellular tissue, and the muscle fascia of the sternocleidomastoid. Dissection should be performed in the entire thickness of the dermal fat flap, preventing harm to the fascia. There is very little bleeding, but this area presents a high percentage for hematomas.

The detachment of the temporal region follows the same notion of hydric distension, which facilitates the separation between the scalp and the temporal vessels. With the standard of two thicknesses, the one regarding the retroauricular area and the other regarding the scalp, the preauricular area is dissected, first with the scalpel blade 15, up to 25 mm from the auricular pavilion. A 2-mm cannula is then used to aspirate the excess fat from the double chin and from the cheeks and to form several tunnels, preventing the vessels from being sectioned, thus reducing the risk of necroses and hematomas in the dissected areas. Using curved Metzenbaum-type scissors with the tip turned downward, the dissection is completed and facilitated by the previous detachment produced by the cannula, allowing to visualize the vessels that should be cauterized.

With or without SMAS, the procedure and the precautions shall be the same, always protected by expansive anesthesia. Special attention should be paid to the cauterization of the vessels, because it is very important to be acquainted with the device: in the face, used only in the coagulation mode, the blend cuts and coagulates where we should only coagulate with low voltage, 10 mA in the eyelids and 14 mA in the face, with delicate rounded tip tweezers, in order to catch just the vessel that is bleeding and coagulate it. The presence of the anesthetic fluid is very important, because it reduces fulguration and works as a thermal insulation on the nerves, preventing undesirable damages.

The hemostatic revision is conducted by sprinkling Ringer's lactate over the dissected area under pressure, with a 10 ml syringe and 21G × 11/4 needle; retracted vessels will bleed, which greatly reduces the probability of hematomas.

The traction exerted on the flap determines the risk of complications: too tense, necrosis; too loose, poor outcome. The presence of the anesthetic fluid, which has already been largely absorbed and dried with compresses, allows for a safe and effective traction. The fact that the flap is slightly swollen during the sutures reduces the final tension on the stitches after the absorption of the anesthetic.

64.5 Complications: How to Treat Them

In sequelae where the scars are widened and the earlobes are pulled downward, a new dissection becomes necessary. At the subcutaneous level, it is important to release the flap by following the white line formed by the cicatrization of the tissues of the previous surgery; if no nerve had been sectioned before, they will be protected by following this mark.

Baroudi's stitches [2] are fundamental to solve this type of problem, by the advance they allow to promote when trailing the flap toward the ear in order to equalize the tensions distributed by the numerous stitches (Fig. 64.7).

In alopecias, hair implant is the best solution, when clinical treatments proved to be ineffective (Fig. 64.8a–d).

Fat grafting in areas depressed by sequelae of scars makes it possible to normalize the defects. In the lines caused by the detachment with scissors close to the skin, the area should be accurately delimited, the expansive anesthesia should be applied in a large volume in order to distend all the sequelae, and the fat should be grafted with thin cannulae, always by retroinjection (Fig. 64.9a, b).

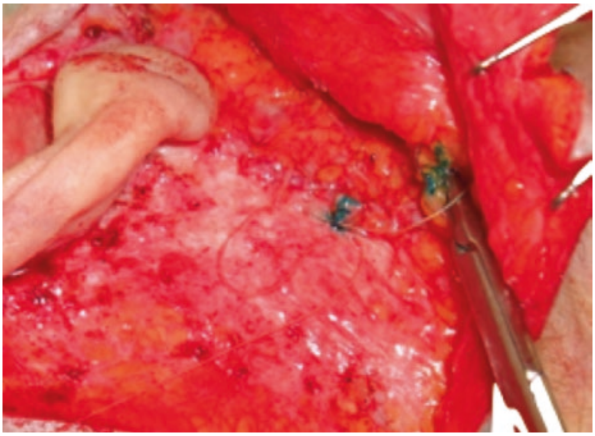

Fig. 64.7 Baroudi's stitches trailing the flap toward the ear

Fig. 64.8 (**a**–**d**) Hair implant, lifting sequel, excess traction. (Photos courtesy of – Dr. Antonio Ruston)

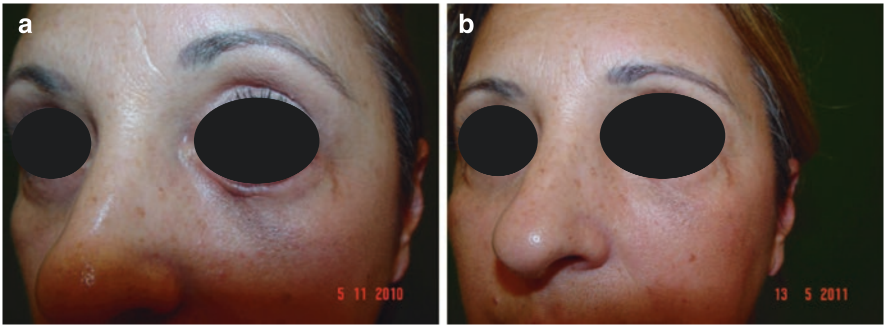

Fig. 64.9 (**a**, **b**) Patient operated three times in another service with worsening of the retraction. Correction by fat grafting in one surgical time and physiotherapy

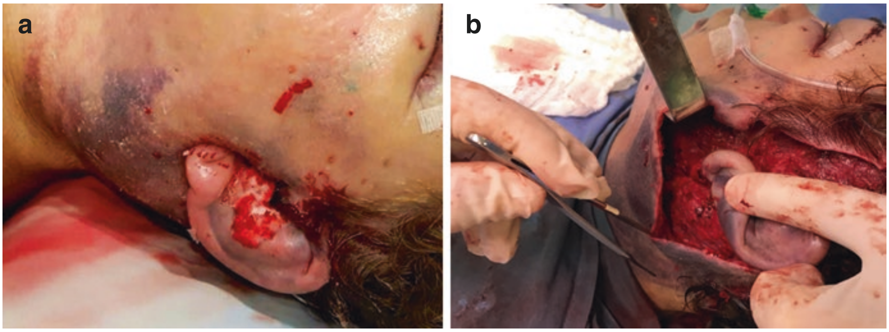

Fig. 64.10 (**a**, **b**) Large volume hematoma, surgery reviewed

Hematomas are the most common source of future problems, and early diagnosis is of fundamental importance. In small hematomas, aspiration by needle is usually enough. Once aspirated, we should inject and wash the area several times with cold Ringer's lactate until the liquid comes out clear. It is important to create a vacuum, by pulling the piston of the syringe, to bring the areas together.

The orifice of the needle should be closed with adhesive tapes, and a pressure dressing should be placed over the aspirated area (Fig. 64.10a, b).

Larger hematomas must be opened earlier. In the operating room, under anesthetic sedation, the most important thing is to keep the blood pressure constant and at a normal level. After removing the coagula, it is mandatory to wash the whole detached area several times under pressure with Ringer's lactate, until the color of the skin becomes lighter. The cauterization should be perfectly performed, the sutures should be remade, and a new drain should be inserted.

The skin may present signs of epitheliolysis. Ointments or protective creams are important and should be soaked in cold saline solution, which help keep the area protected, slightly cooled, and hydrated (Fig. 64.11).

Fig. 64.11 Epitheliolysis. Protected skin, and drain for 4 days

64.5.1 Making the Drainage (Fig. 64.12)

In the event of signs of suffering in the edge of the wounds, at risk of infection and necrosis, oxygen therapy in a hyperbaric chamber [3] is indicated. In these cases, early action achieves excellent results. The pressure recommended for the face is 1.5 atm, with the patient inside the chamber for 1 hour on average. Five to ten sessions are indicated, depending on the evolution (Fig. 64.13).

Treatment with ozone therapy [4] profits from the quality of the third molecule of oxygen on the wounds, killing bacteria, oxygenating and providing energy to the ATP (adenosine triphosphate) for cell repair, and acting also as an anti-inflammatory. As an adjuvant in the treatment of sequelae from a hematoma or in devitalized areas, its application in a low volume, at a concentration of 10–20 micrograms per ml, is effective. It is injected directly in the flap, by introducing small amounts of the gas, with the use of 60 ml syringes and 30G × 1/2″ needle (Fig. 64.14a, b).

The antibiotic therapy is indicated in a preventive way in avascular flaps presenting suffering, with areas of epitheliolysis. Its effects help protect from major sequelae. Even if we know that, in areas of ischemia, the action of antibiotics alone is limited or nonexistent, they become efficient when associated with other treatments such as hyperbaric chamber or ozone therapy.

Early lymphatic drainage is fully indicated helps decongest traumatized areas through gentle movements on the skin, always in the direction of the lymph nodes, and favors a reduction in the edema and in ecchymoses and dark spots in the skin, by improving the venous stasis.

The superficial hydration of the skin, with products made from elastin and urea, provides more elasticity, reducing the damages caused by trauma and dehydration.

Fig. 64.12 Drain

Fig. 64.13 Hyperbaric chamber 5 meters long and 2.20 meters in circumference can serve up to 8 patients per session. (Photo courtesy of Dr. Moacir Eduardo Armelin)

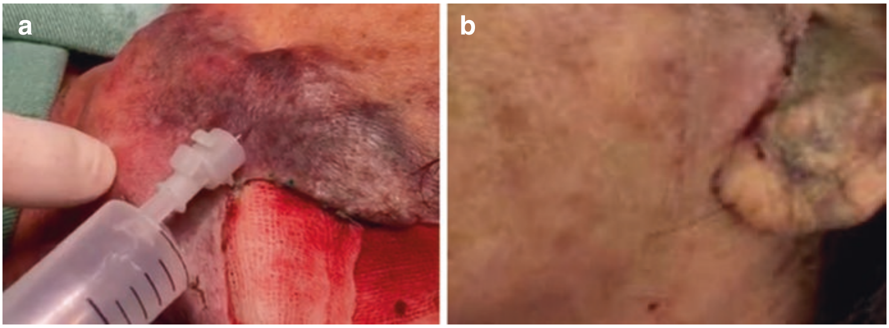

Fig. 64.14 (**a**) Ozone injected directly in the flap. (**b**) Aspect of the flap after 8 days. (Photos courtesy of Dr. André Miolo)

64.6 Conclusion

The great number of vessels that irrigate the face, besides warming and protecting it from harsh weather conditions and facilitating the cure of small wounds, is a major ally of the plastic surgeon. The vascularization perfomed by millions of small vessels enables the dissection of flaps, the traction, and the repositioning, but does not accept excess. Tissues must be treated delicately.

Most of the problems that appear are surgeon dependent: a slight tremor in the hands may cut a nerve or cause a hematoma, just as the lack of practice.

In restorations, knowledge is even more important, because we cannot make mistakes once again.

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