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17.1 Introduction

The anterior abdominal wall is a complex anatomical structure that protects the internal organs and gives an aesthetic image to human body. Lipoabdominoplasty is a new combination of abdominoplasty with liposuction for treatment of the abdomen. Correction of abdominal deformities is one of the most frequent procedures in plastic surgery, and the aesthetic, reconstructive, and functional aspects should always be considered. The aesthetic aspect is inherent to the operation as it creates a new silhouette, harmonizing the abdomen with the other segments of the body. The second component is related to the reconstructive aspects, with reinforcement of the rectus abdominalis for the treatment of flaccidity, herniation through the musculoaponeurotic wall, and also repair of the retracted and inelegant surgical scars. The functional aspect is beneficial to both of the other two aspects and favors normal breathing with natural accommodation of the internal organs being of vital importance, even for the reproductive system.

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17.2 History of Lipoabdominoplasty

The history of lipoabdominoplasty is similar to that of liposuction technique in Brazil. Thanks to my [1–4] original publications concerning a new approach to umbilicoplasty, I was invited by Illouz to speak about it at the French Congress of Aesthetic Plastic Surgery.

Since I first started to perform liposuction, I have encountered a number of doubts. Because only localized adiposities were removed by surgery, in some cases it was evident that some redundant skin remained. The anatomy of the compartment in which the cannula worked between the cutaneous covering and the muscles underneath was not well described. The behavior of the remaining fat tissue after surgery was unknown, nor were the clinical and metabolic repercussions of liposuction. In addition to those questions, several other circumstances occurred, during and after the liposuction procedure.

Nowadays, all these questions regarding the consequences of performing liposuction seem to be obvious, but during the period when beginning to employ the new technique, there were many problems for plastic surgeons and for patients everywhere. It was difficult to learn how to practice a new approach in different regions of the human body with all the peculiarities of each one. In fact, it was my obsessive pursuit to learn about it widely and very broadly. Nevertheless,

performing liposuction on the abdominal wall used to be even more complex, as the physical abnormalities, in addition to the expectations of the results, were a constant challenge.

After the liposuction procedure, it became mandatory to remove any redundant skin to achieve a good balance of the regions in harmony with the body's contours. When such a combined procedure was performed on the abdomen, several kinds of local complications occurred, such as seroma formation, hematoma, cutaneous slough, and skin necrosis, in addition to systemic complications and even death. Although this combined procedure was performed mostly by plastic surgeons, there were concerns [5, 6].

Regarding the anatomy of the subcutaneous compartment, I devoted a great deal of time to research in cadavers to gain knowledge of fat tissue and its distribution in all regions of the human body (Fig. 17.1) [7]. I also described the behavior of the subcutaneous tissue with regard to the selection of patients and indications for liposuction [8]. Therefore, this knowledge was of great support at that time, as the liposuction technique was relatively new. Even nowadays, that anatomical information is still very useful when fat suction is performed. The fibrotic and thick tissue that develops secondary to fat suction is very difficult to dissect, to undermine and to pull the panniculus for resection as well [5].

The clinical and metabolic alterations showed that there were not any specific disturbances after liposuction in a comparative study with patients who underwent aesthetic procedures (reduction mastoplasty, abdominoplasty, rhytidoplasty) [4, 9]. Other surgeons studied the same subject and found similar results [10].

Nevertheless, a very high incidence of local complications after liposuction in conjunction with conventional abdominoplasty intrigued me so much that I became very discouraged about performing a combined approach owing to the psychological repercussions for patients [11, 12]. Thus, in 1988, I made a radical decision not to perform any more of these associated procedures [12]. There were enough reasons to avoid performing this type of surgery for 10 years, from 1988 until 1998. During this period of time, only conventional abdominoplasty was performed on patients without localized adiposities, or isolated fat suction to remove only localized adiposities without skin resection.

For these reasons, our generation of plastic surgeons had the privilege of starting to employ the liposuction technique to achieve better results than performing conventional panniculus resection, as other authors have described the complications [13, 14]. However, we had to learn and acquire our knowledge secondary to our own efforts, with meticulous observations after

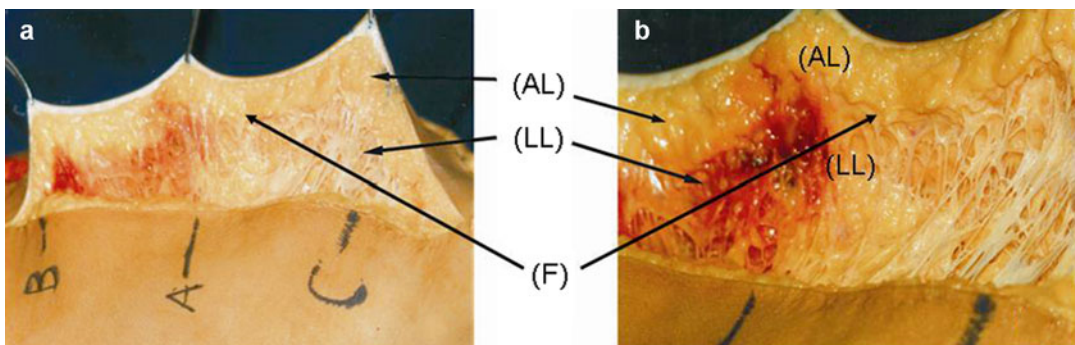


Fig. 17.1 Anatomy of the abdominal panniculus. The areolar layer (AL) and the lamellar layer (LL) are separated by the fascia superficialis (F). (a) Cadaver after performing liposuction on the right side of the abdomen. Three levels are marked on the abdominal cutaneous layer: (B) supraumbilical, (A) umbilical, (C) infraumbilical. The skin is pulled upward by three hooks to show the

panniculus. The arrows indicate that the AL remains of normal thickness and the LL shows that the fat tissue was liposuctioned. The F is mixed up with lamellar layer. (b) Close-up showing the thickness of the AL with preservation of the perforator vessels and connective tissue of the LL after liposuction

operations, with detailed descriptions in books, discussions at Congresses, and scientific articles in journals [5, 6].

Although the combined procedure was no longer being performed, research was into anatomy, in addition to the behavior of the remaining fat tissue, did not stop [8]. Study of the complications and research continued into a new approach to solve both deformities – the flaccidity and excess skin associated with the treatment of localized adiposities on the abdominal wall.

After a long period of anatomical study and analysis of my patients concerning the complications of conventional abdominoplasty, I came to the conclusion that the origin of such complications was mostly venous and lymphatic stasis, because the perforator vessels were damaged during panniculus dissection, according to the classical operation (Fig. 17.2).

Following my anatomical research, the perforator vessels coming from the rectus abdominalis to the remaining panniculus were preserved after fat suction. Based on that unknown moment, I spoke with Prof. Callia about my scientific curiosity when he gave me some slides on which he showed me that the perforator vessels really were

preserved after the liposuction procedure (Fig. 17.3). In fact, conventional abdominoplasty was carried out in a group of his female patients 6 months after the liposuction operation had been performed because they had complained about excessive redundant skin. I carefully analyzed his slides and compared them with mine, taken from my previous anatomical research in cadavers (Fig. 17.1). I concluded that it would be possible to perform panniculus resection combined with liposuction, as long as the perforator vessels were preserved. In addition, he gave me other slides showing a comparison between the behavior of the panniculus of a thin person and another one after liposuction properly performed on the lamellar layer (Fig. 17.3). Therefore, I found out that some skin with no fat tissue underneath could be removed with minimal bleeding, as the perforator vessels were not cut. For this reason, I am thankful to Prof. Callia for his encouragement in showing the right direction in which to follow my anatomical research to understand that mysterious knowledge concerning the behavior of perforator vessels after liposuction and also after panniculus resection.

After 10 years of studying the anatomy, I concluded that it would be possible to perform

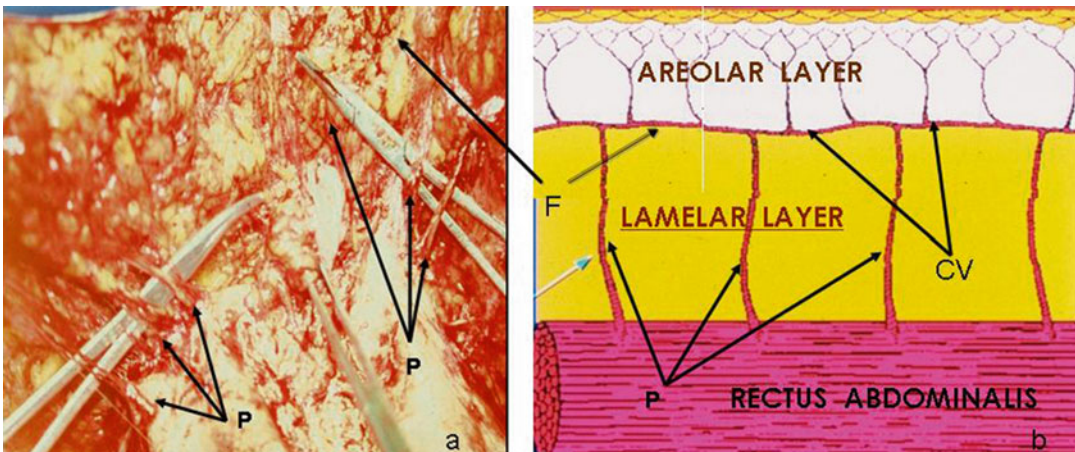


Fig. 17.2 The perforator vessels of the abdominal panniculus. (a) The forceps are introduced underneath the perforator vessels (*P*) preserved after the liposuction procedure. (b) Vascularization of the panniculus superficialis (*F*) is located between the lamellar and areolar layers with the communicating vessels (*CV*). The perfora-

tor vessels (*P*) go from the rectus abdominalis to the fascia superficialis where the communicating vessels (*CV*) make a bridge of communication between them. Small vessels go perpendicular through the fat tissue of the AL to supply blood to the subdermis and dermis. Photos courtesy of Caia and Batuirra

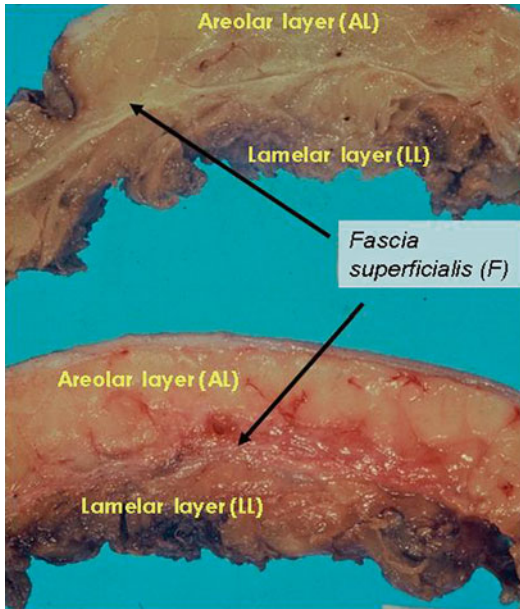


Fig. 17.3 Relationship between the AL and LL with the fascia superficialis. (*Top*) Section of a thin cadaver without liposuction. The AL is regular above the F, which is thin and well defined; the LL is thin and has no adiposity. (*Bottom*) Panniculus of a patient's abdomen 6 months after liposuction. The AL maintains its regularity; however, the F and LL are mixed up because of the trauma caused by the cannula. Photos courtesy of Callia and Baturra. I am thankful to the latter for the uncharted segment, which is a fundamental support to learning the anatomy of the panniculus to develop lipoabdominoplasty

liposuction associated with skin resection, without undermining the panniculus to maintain the perforator vessels. In fact, this is the basis of the concepts to improve abdominoplasty that I was obsessively pursuing.

The anatomical studies motivated me to perform on cadavers a full-thickness suction of the subcutaneous tissue in an elliptic area in the suprapubic region in addition to the medial thigh with localized adiposity. Afterward, skin resection was performed and similar structures to those found in cadavers after the liposuction procedure [8] were identified, which provided fundamental information. Liposuction was carried out afterwards below the fascia superficialis, that is, underneath the areolar layer of the panniculus, which slides from one border to another to facilitate the suturing of the surgical wound (Figs. 17.1 and 17.2). At that moment, I was sure that such an operation could be performed safely without any bleeding during and after surgery.

The first patients were operated on in early 1998, 10 years after the author's radical decision to stop performing the combined procedures of liposuction with skin resection. The first was a female patient presenting an unaesthetic and deep surgical scar in the suprapubic region (Fig. 17.4). The second was another female patient with dark and thick skin and localized

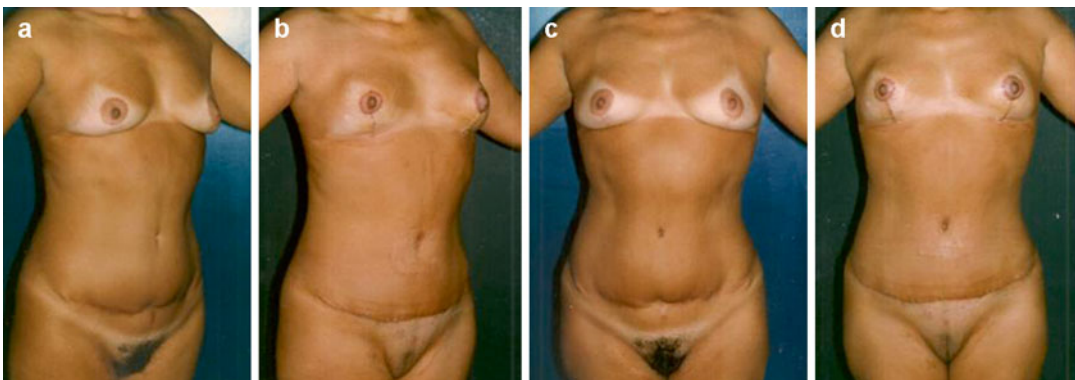


Fig. 17.4 A 53-year-old woman presented high and deep scars owing to previous abdominoplasty performed elsewhere and ptotic breasts. (a, c) Preoperative. (b, d) After lower lipoabdominoplasty in association with mastopexy

adiposity in the medial thigh region. First, the excess skin that should be removed was demarcated and also the area in which fat suction was to be performed. The operations were successfully carried out via the liposuction procedure on a full thickness area of skin, which was removed afterward without bleeding. Following the operation, liposuction was performed underneath the remaining panniculus without undermining it, and the border of the skin was sutured.

At that time, it was concluded that a new procedure could be performed to suction the accumulated fat combined with skin resection due to the redundant cutaneous covering after fat suction with minimal complications. In the original publication [15], this method was employed in 24 patients who underwent abdominoplasty combined with liposuction, which is a procedure performed in a closed vascular system as there was no damage to the perforator vessels, which is the main and essential concept of lipoabdominoplasty. To preserve the perforator vessels is the fundamental surgical principle of my new method, as the cannula does not damage the vessels coming from the muscles to supply the

remaining fat layer of the panniculus (Fig. 17.2). Another surgical principle is that each perforator vessel (artery, veins, lymphatics, and nerves) is not cut, which works as multiple pedicles of the remnant areolar layer, which provides a smooth and regular surface on the abdomen wall after surgery. The same method was employed in 38 patients for the treatment of medial thigh lift [16]. Also, similar operations were carried out in eight patients for flankplasty and torsoplasty (Fig. 17.5) [17] as they presented cutaneous folds combined with an excess of localized adiposities. I employed the same surgical principles for the treatment of axillary regions in 21 patients [18].

Therefore, the final conclusions of the new approach were to treat not only the abdominal wall, as the whole body may present localized adiposities and redundant skin as well. Owing to my anatomical investigations, several segments of the human body were adequately repaired with minimal complications using the same surgical principles, which are to preserve the perforator vessels to work as multiple pedicles to the abdominal wall, medial thigh lifting, flanks, and torso, and in the axillary regions.

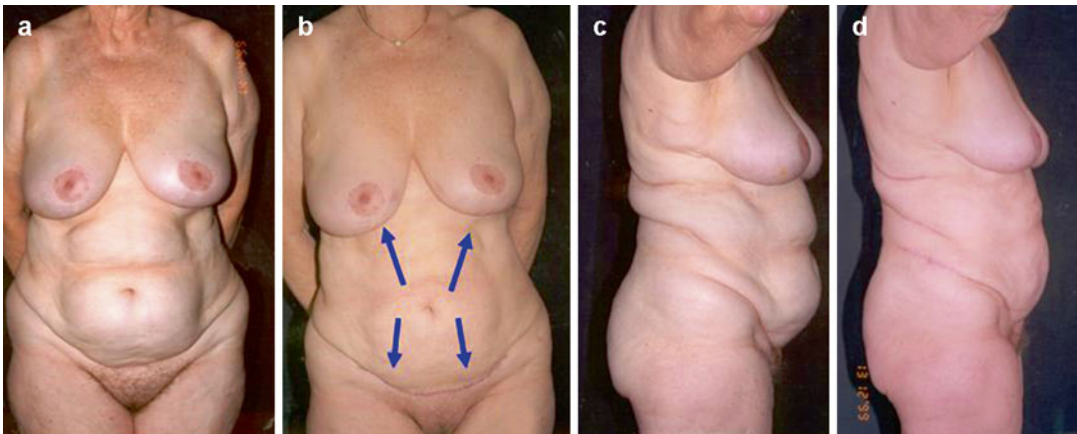


Fig. 17.5 A 75-year-old showing excess adipose tissue on the abdomen, flanks, and dorsum. She had previously undergone mastoplasty and had asked for abdominoplasty, but upper and lower lipoabdominoplasty was performed. (a, c) Preoperative. (b, d) After surgery

demonstrating the improvement of the body contouring. The inframammary scars are hidden in the mammary sulcus. The arrows on b show the direction of traction of the abdominal panniculus

The new concepts were presented by me at multiple meetings [19–33].

After all of my presentations and publications, other surgeons started to perform and to speak about the new concepts and surgical principles regarding abdominoplasty [34–36], in one case without giving me the credit at the end of 2001 [37]. In fact, this was Saldanha's first publication and presentation concerning abdominoplasty following my surgical principles that he learned from the publications and presentations.

17.3 Traditional Abdominoplasty

Abdominoplasty has been performed since nineteenth century for aesthetic treatment of the abdominal wall by abdominal lipectomy firstly described by Kelly (1899) [38] through elliptical horizontal skin resection with adipose tissue including the umbilical area. This was the beginning of a long and rich history along the last century followed by many other authors with horizontal incision as Malbec (1948) [39], Callia (1965) [40], Pontes (1966, 1982) [41, 42], Pitanguy (1967, 1977) [43, 44], Sinder (1975, 1979) [45, 46], vertical incision by Babcock (1916) [47], circular incision proposed by Gonzales-Ulloa (1960) [48], Vilain and Dubousset (1964) [49], submammary incision by Thorek (1939) [50], Rebello and Franco (1972) [51], Rebello (1982) [52], and recently I have introduced a half-moon-shaped skin resection in bilateral submammary folds [15].

Nevertheless, liposuction procedure was developed and popularized by Illouz [53, 54] (1980, 1992), which is the first surgical method for aesthetic treatment of the abdominal wall without performing skin resection. However, the use of lipoplasty enabled only localized adiposity as the skin excess and musculoaponeurotic disturbances require traditional techniques. Therefore, the indication of fat suction is restricting to patients presenting only localized adiposities on the anterior abdominal wall. When patients presenting with localized adiposities associated with excess skin require the combined

procedure in which my method may be employed with smooth and harmonious results on the abdomen, medial thigh lift, flanks, torso, upper extremities, face lifting, ear reconstruction, and on the reverse lower blepharoplasty.

17.3.1 Technique

The surgeon and patient must have a precise idea of what can be accomplished by lipoabdominoplasty and try to achieve the best for both. Some steps are essential for the success of the operation, which starts during a period from the first appointment until the final decision to schedule it. Didactically, they may be presented as:

- A. Surgical evaluation of the patients
- B. Selection of patients
- C. Surgical planning
- D. The operation
 - Selection and classification of the procedures
 - Type 1 – lower lipoabdominoplasty
 - Type 2 – upper lipoabdominoplasty
 - Type 3 – lower and Upper lipoabdominoplasty
 - Type 4 – full lipoabdominoplasty
 - (a) Surgical demarcations
 - (b) Liposuction procedure
 - (c) Full-thickness skin resection
 - (d) Creation of the new umbilical region during full lipoabdominoplasty
 - (e) Plication of the musculoaponeurotic wall
 - (f) Traction of the remaining panniculus and final suture
 - (g) Bandaging

17.3.1.1 Surgical Evaluation of the Patient

Prior to surgical evaluation, during consultation the surgeon must listen attentively to the complaints and even expectations of the patients concerning her or his body contouring. Although the abdomen is the only segment patients are mostly concerned with, the entire body may be evaluated. Abdominal examination is performed initially with the patient in the standing position between two vertical mirrors, one in front of the

Fig. 17.6 Examination room with mirrors. *thm* top horizontal mirror, *Oml* 45° oblique mirror on the left side, *Omr* 45° oblique mirror on the right side, *vml* vertical mirror on the left side, *vmr* vertical mirror on the right side, *b* bed for patient's examination in supine position



other, and another mirror is situated at a 45° angle on the top. The patient must not be wearing any clothes and the nurse always on the side following the examination, which is good support for both patient and doctor. The patient is given the possibility of seeing his or her body from the front and back at the same time while the abdomen is evaluated. The posterior regions of the dorsum and lateral silhouette on each side are seen as well (Figs. 17.6 and 17.7). It is useful for a patient to follow the physical examination as quite often he or she presents some sort of body asymmetry that has not been noticed before (Fig. 17.8). Therefore, it is possible to evaluate the elasticity of the skin, the accumulation of adiposity, musculoaponeurotic laxity, and the presence of scars due to previous surgeries and if there is some asymmetry in the abdominal wall and in the posterior regions. The abdomen is measured in three circumferences: (a) the hypochondriac circumference, (b) the umbilical circumference, and (c) the iliac crest circumference. Also, the vertical measurement in the midline is necessary to evaluate the possibility of skin resection during surgery (Figs. 17.9 and 17.10). The ideal candidate for abdominoplasty is normal in weight for his or her stature and height. Usually, in a normal person, when the distance between the external furcula to the umbilicus is less than 38 cm, it may jeopardize blood supply to the remaining

abdominal panniculus if all of the skin resection in the suprapubic region is done. It is more convenient to carry out the operation when this distance is greater. On the other hand, when the distance between the umbilicus and the pubis is more than 15 cm, it may be difficult to perform skin resection in all regions as it is mandatory in full lipoabdominoplasty. Under such circumstances, limited suprapubic resection is indicated without transposition of the umbilicus as occurs in lower abdominoplasty (Fig. 17.4). Therefore, location of the umbilicus is a good aesthetic and anatomical reference point concerning the selection of patients before performing abdominoplasty.

Afterwards the patient is placed in the supine position on the table with another mirror situated horizontally above so that he or she can see the deformities. At this time, it is important to evaluate the elasticity of the skin, the thickness of the abdominal panniculus, and muscular flaccidity as well. The patient can follow the examination through the mirror on top, which shows the alterations of the abdominal wall (Fig. 17.10). When there is a hernia of the umbilicus and diastasis of the rectus abdominalis is evident, it is useful to show these to the patient. The amount of excess skin may be carefully evaluated by placing the thumbs at the lateral borders of the symphysis pubis and grasping the abdominal panniculus between the thumbs and fingers of each hand.

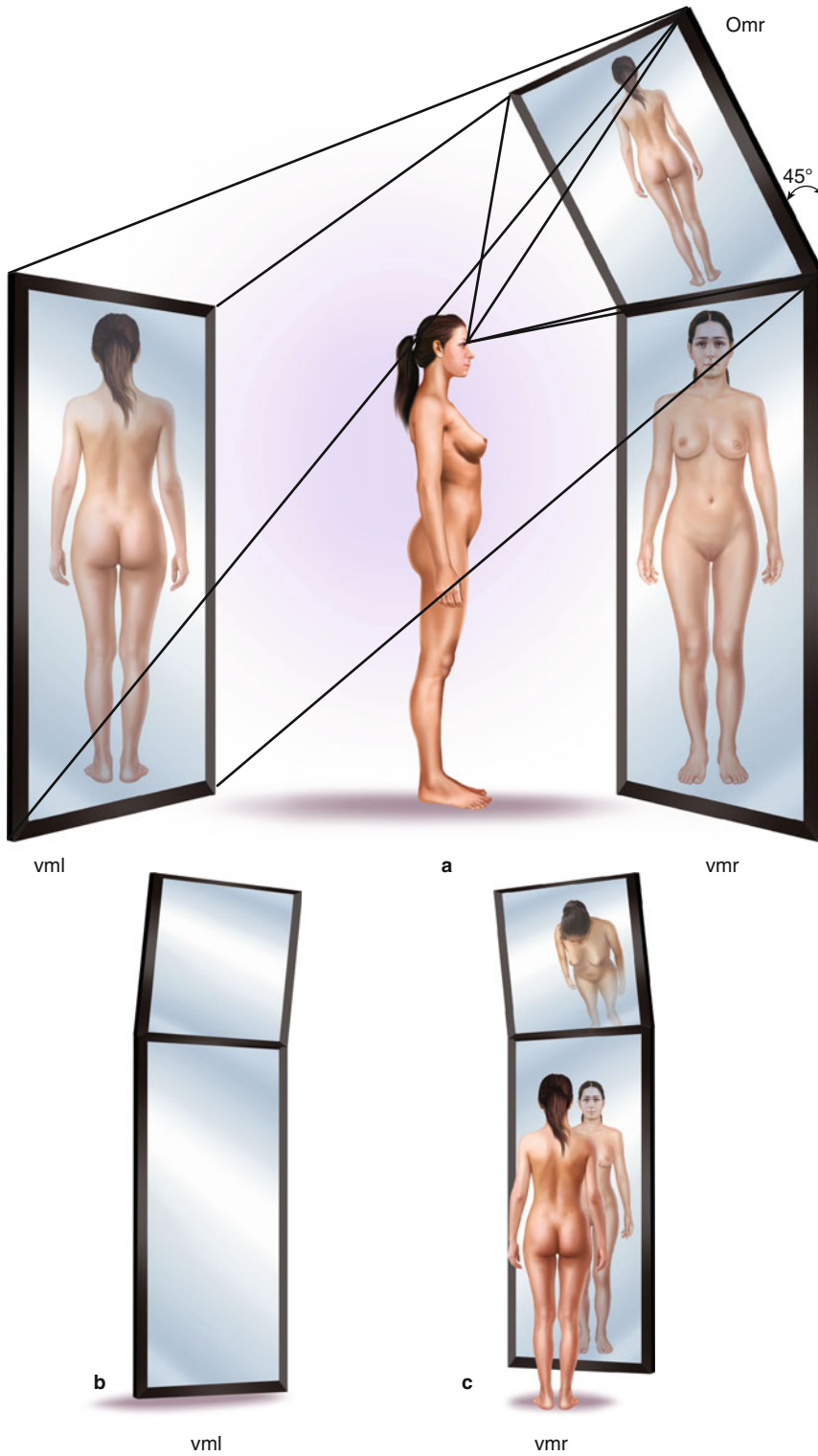


Fig. 17.7 Examination room with mirrors. (a) A female patient is in a standing position between the two vertical mirrors, vml and vmr. She can see herself from the front on the vmr and simultaneously she can see her back on the vml

through the omr. (b) Vertical mirror on the left (vml). (c) Vertical mirror on the right (vmr) with a female patient in the standing position. She can see herself in front and from the back through the oblique mirror on the right (omr)

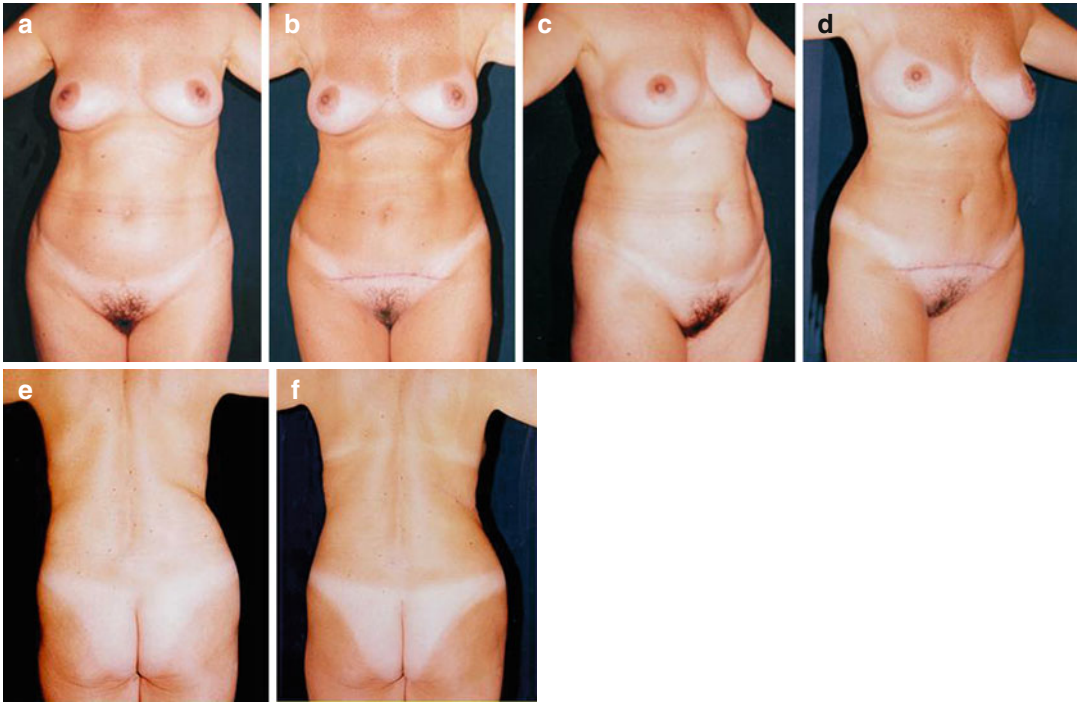


Fig. 17.8 Lower lipoabdominoplasty combined with torsoplasty to repair body asymmetry. (a–e) Preoperative 48-year-old female patient. (b, d, f) After lower lipoab-

dominoplasty in conjunction with torsoplasty following the same surgical principle, which is preservation of the perforator vessels

When this maneuver is done with patient in the standing position, he or she may follow the examination on the vertical mirror strategically placed in front and at the back (Fig. 17.7). On the other hand, when the patient is supine on the bed, she or he follows the surgeon's hands on the horizontal mirror placed on top. Patients may take pictures of their abdomen with the camera, which is a document that demonstrates that he or she understands the abdominal deformities in addition to the indication for operation (Fig. 17.10). This assessment indicates the feasibility of bringing the periumbilical skin down to the suprapubic skin where the incision will be made. Flexion of the hips further aids evaluation as it simulates the desired patient position for closure of the abdominal wall incision at the right point during surgery.

17.3.1.2 Selection of Patients

This is an important step prior to performing any procedure on the abdominal wall. Before a patient comes to the surgeon's office, he or she

has already selected his or her surgeon. In the same way each surgeon should also choose his or her patients. Therefore, after physical examination, each surgeon has enough time to evaluate if a patient is physically and psychologically healthy before planning the operation. In the case of patients who are psychologically unstable, complain too much about the results and scars, demonstrate unrealistic expectations of postoperative results, in addition to many other undesirable circumstances, it is the right time to cancel the operation [11, 12]. Also, patients presenting overweight should not be selected for abdominoplasty or liposuction, since such problems cannot be solved adequately through surgery.

A good understanding between the surgeon and the patient is mandatory before surgery. Even when patients seem to understand all about the proposed operation, they may have some sort of problem in accepting the surgical result or complications that sometimes occur despite all the care and attention postoperatively.

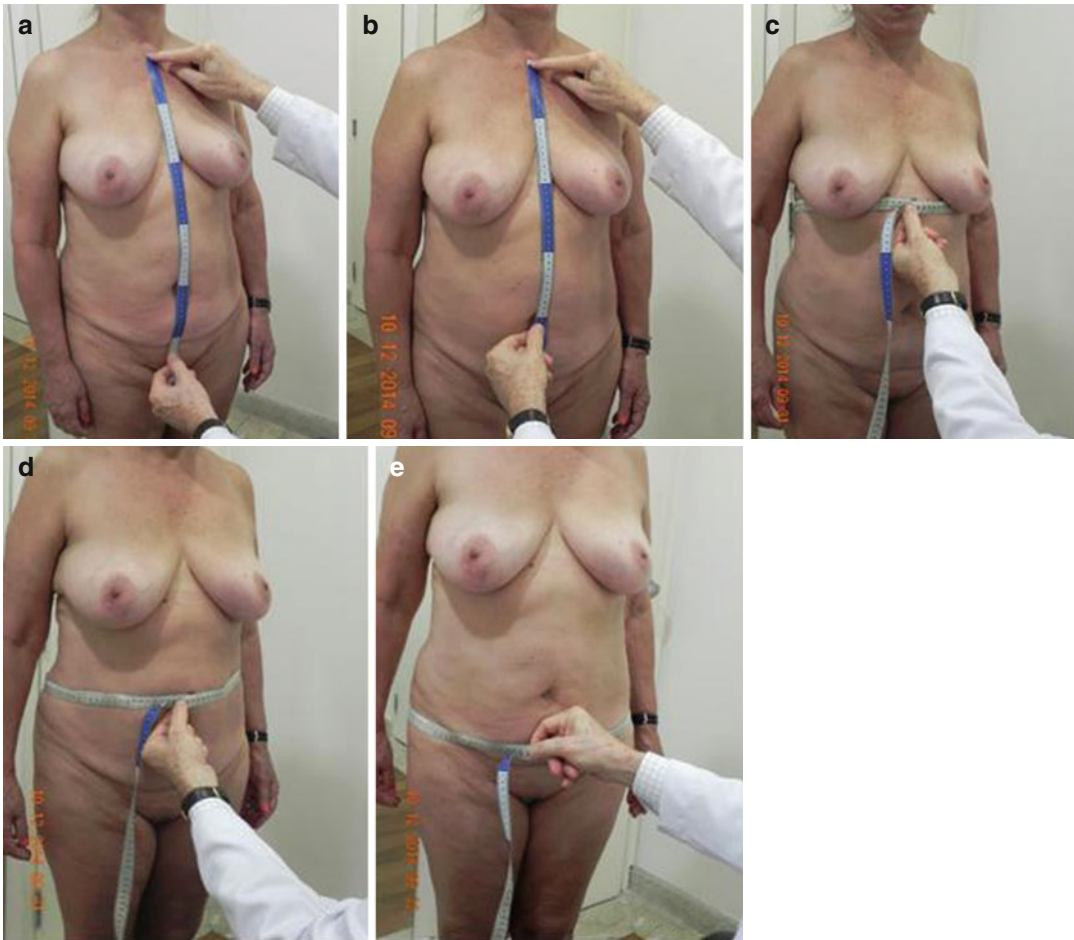


Fig. 17.9 Preoperative measurement of a patient in the standing position during consultation, (a) Vertical distance from the external furcula to the pubic bone; (b) vertical distance from the external furcula to the umbilicus;

(c) horizontal circumference at the hypochondriac level; (d) circumference at the umbilical level; (e) circumference at the iliac crest level

Excess adipose tissue on the abdominal wall, muscular flaccidity, diastasis of the rectus abdominalis, hernia, cutaneous striae, and unaesthetic scars on the abdomen give an unpleasant appearance to the body, requiring appropriate surgical treatment of damaged structures, which are good indications for abdominoplasty. However, when a patient presents only localized adiposity in the subcutaneous layers of the abdominal wall without any other anatomical disorder, liposuction is the best technique for treatment. It may occur in female and male patients of several age groups.

17.3.1.3 Surgical Planning

According to clinical evaluation and the selection of patients, the surgical planning of lipoabdominoplasty without panniculus undermining may be classified into four types of operation: lower lipoabdominoplasty, upper lipoabdominoplasty, upper and lower lipoabdominoplasty, and full lipoabdominoplasty.

Type 1: Lower Lipoabdominoplasty Lower lipoabdominoplasty is a procedure comprising skin resection combined with liposuction for the repair of abnormalities on the lower segment of

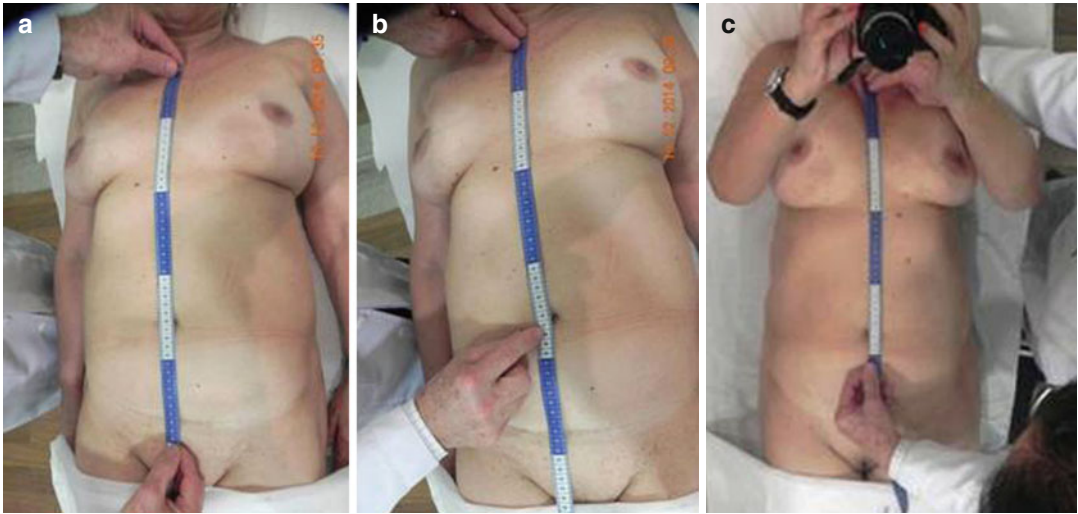


Fig. 17.10 Measurement of a patient in supine position on a bed during a consultation. (a) vertical distance from the sternal notch to the pubic bone. (b) Vertical distance from the sternal notch to the umbilicus. (c) Patient taking

a picture of herself while supine on bed through the top horizontal mirror (thm), while the surgeon measures her vertical distance

the abdomen, which is located below the umbilical area, specifically the suprapubic region. The main surgical principle is the preservation of perforator vessels, which work as multiple pedicles as the remaining panniculus is not undermined. Very often, gynecological surgeries or other operations on the infraumbilical area may also leave unaesthetic scars, sometimes retractile cicatricial tissue, or several other undesirable circumstances. With this approach, the umbilicus is not transposed owing to the very high implantation, as there is quite a long distance between the navel and the pubis. When patients present localized adiposities on the supraumbilical segment, even on the lateral and posterior regions of the torso, these must be treated simultaneously, popularized as mini-abdominoplasty [55, 56].

Type 2: Upper Lipoabdominoplasty Upper lipoabdominoplasty is an operation comprising half-moon incisions with skin resection associated with liposuction of the submammary folds without damaging the perforator vessels, which work as multiple pedicles to the panniculus. Its indication is limited to the treatment of some

deformities of the upper abdomen. When the abnormalities are restricted to localized adiposity, specifically the epigastric and hypochondriac regions, it is possible to achieve good aesthetic results during isolated fat suction. However, when there is redundant panniculus, it is not possible to reach adequate surgical results without performing skin resection. Unfavorable aesthetic results after superficial liposuction of the superior abdomen may also be adequately repaired. The first description regarding panniculus resection of the upper abdomen was reported by Thorek (1923) [50], and later Rebello and Franco (1972) [51] published on abdominoplasty through a submammary incision. This approach leaves a long scar on the anterior aspect of the chest, which is the main reason why it did not become popular among plastic surgeons.

Nevertheless, there are peculiar circumstances in which female patients present excess accumulated fat and flabby skin on the upper abdomen (epigastric and lateral regions), which is the main deformity indicating the need for upper lipoabdominoplasty. For this reason, this type of lipoabdominoplasty will be covered in this section, but

it is useful to mention other information regarding the subject before a technical description of the surgery.

Type 3: Lower and Upper Lipoabdominoplasty

Lower and upper lipoabdominoplasty is a new approach with double treatment of the lower and upper abdomen in association with skin excision plus liposuction without transposition of the umbilicus [17]. Although two cutaneous incisions are made, the perforator vessels are not incised which is the fundamental surgical principle for providing normal vascularization to the remaining panniculus. In fact, the abdomen may be improved from the aesthetic point of view once the physical deformities are corrected and treated adequately. The surgical planning requires careful evaluation preoperatively when the high location of the umbilicus is the main anatomical reference point. Also, it is indicated in patients presenting inelegant and unaesthetic aspects of the abdomen due to unfavorable results of superficial liposuction.

Type 4: Full Lipoabdominoplasty Full lipoabdominoplasty is a modality of operation through which all skin above the suprapubic region and below the umbilicus must be resected. In fact, the whole abdominal wall is treated, but the perforator vessels are not cut as the remaining panniculus is not undermined according to my original description [15, 22]. This is the main difference between my technique in comparison with conventional abdominoplasty when wide undermining is performed and all perforator vessels are cut. Once again, it is important to emphasize the importance of preoperative evaluation before planning the operation, particularly the measurement of the anatomical points regarding the location of the umbilicus. The surgeon must hold the panniculus below the umbilicus and be sure that it is possible to resect. The skin of the periumbilical area can be approximated to the suprapubic incision, which means that the upper abdomen can be pulled downward.

17.3.1.4 The Operation

After the previous steps described above the surgeon might have enough information to choose

an adequate procedure for performing abdominoplasty. In all types of operation, all patients must present a normal blood test in essential examinations in addition to fundamental clinical evaluation performed by the physician, in which ECG and other specific examinations are carried out when necessary. A complete series of photos of the regions to be treated must already have been obtained.

The author performs all operations at the hospital under epidural or general anesthesia, where patients stay for at least 24 h. I prefer to demarcate the patient's body the day before the operation. I consider it more convenient as I can see the patient's deformities once more and explain to him or her all the details. The patient must remain in a standing position in front of the mirror, as is described on the section "Surgical Evaluation" so as to follow my drawing on his or her body. After careful analysis, all deformities are drawn. Two areas must be well demarcated: (1) The area for full-thickness skin resection where liposuction will be performed on the full thickness of the panniculus, and also to point out the location of the final scars. (2) The areas for deep liposuction (below the fascia superficialis) on the abdominal wall and in the lateral and posterior regions.

Selection and Classification of the Procedures

Type 1: Lower Lipoabdominoplasty

Lower lipoabdominoplasty is indicated when the patient presents moderate flaccidity of the panniculus and excess skin associated with localized adiposity in other regions of the torso. During surgical planning, it is mandatory to evaluate the amount of cutaneous resection to be done and the volume of fat to be removed by suction.

(a) Surgical demarcation

The excess skin forms an elliptical area in the suprapubic region below the umbilicus. The umbilicus is not transposed. The areas presenting localized adiposity are marked on the abdomen and other regions of the torso as well (Fig. 17.11).

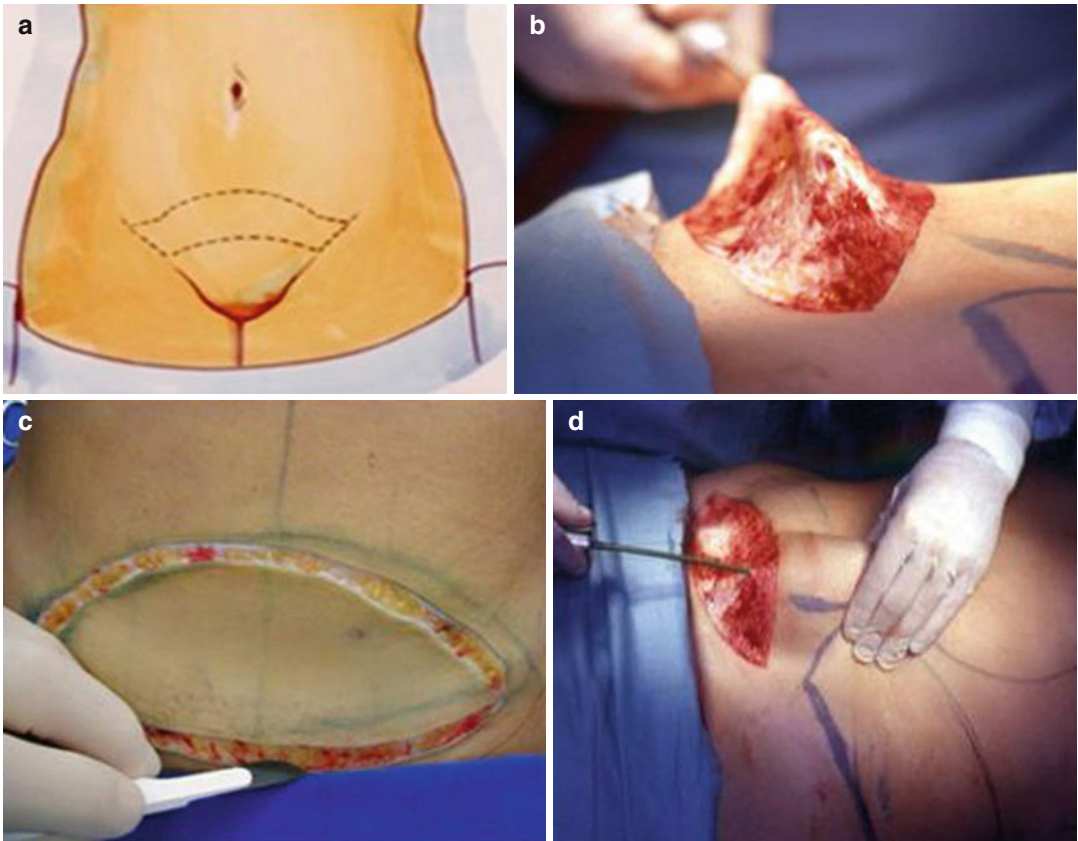


Fig. 17.11 Lower lipoabdominoplasty technique. (a) Demarcation for skin resection in the suprapubic area. (b) Liposuction procedure on the full thickness of the panniculus. (c) Skin resection is carried out. (d) Deep lipo-

suction is performed below the fascia superficialis with preservation of the perforator vessels, which work as multiple pedicles providing a normal blood supply to the remaining abdominal panniculus

(b) Liposuction procedure

Two types of liposuction are performed: full thickness of the panniculus and deep liposuction. First, liposuction is performed on the full thickness of the panniculus where skin resection is to be done. After this procedure, there is no fat tissue underneath the skin as the areolar and lamellar layers are aspirated, leaving only connective tissue, empty vessels, and lymphatics. Afterward, deep liposuction is carried out in all regions of the abdominal wall presenting localized adiposity. It is performed on the lamellar layer (below the fascia superficialis) to maintain a regular and harmonious thickness of the areolar layer (Fig. 17.11). It is useful to emphasize that when the areolar layer is damaged, the surface of the abdomen may have an unaesthetic wave-like

appearance, which is difficult to remedy afterward. My previous publication [15] described the anatomy of the panniculus and its importance in preserving the perforator vessels on the lamellar layer.

After the liposuction procedure, the cutaneous and subcutaneous panniculus above the raw area slides easily over the musculoaponeurotic wall as there is no fat tissue below the fascia superficialis. The perforator vessels do not disturb the movement of the upper abdominal flap from top to bottom.

(c) Full-thickness skin resection

The incisions are made according to the previous demarcations and are followed by full-thickness skin resection. This is preferably

performed by using a knife, because if scissors are used at this stage, they may damage the vascular network of the subdermal layer, causing bleeding. After skin excision, it is possible to see that the perforator vessels were preserved during the previous liposuction procedure, as the panniculus is not undermined.

(d) Plication of the musculoaponeurotic wall

When diastasis is evident, plication of the musculoaponeurotic wall may be performed in the midline. The perforator vessels indicate the location of the rectus abdominalis, which is

helpful in identifying and suturing the internal borders of the muscles and the aponeurosis.

Before the liposuction technique, Callia (1965) [40] proposed sectioning the umbilical pedicle after panniculus undermining of the infraumbilical segment so as to be able to perform plication of the musculoaponeurotic wall in the midline (Fig. 17.12). Afterward, the umbilical pedicle is reimplanted at the muscular level. This situation demonstrates once again the importance of careful evaluation preoperatively, including measurement of the distances from the external furcula to the umbilicus, and from the umbilicus to the pubis. The author performs

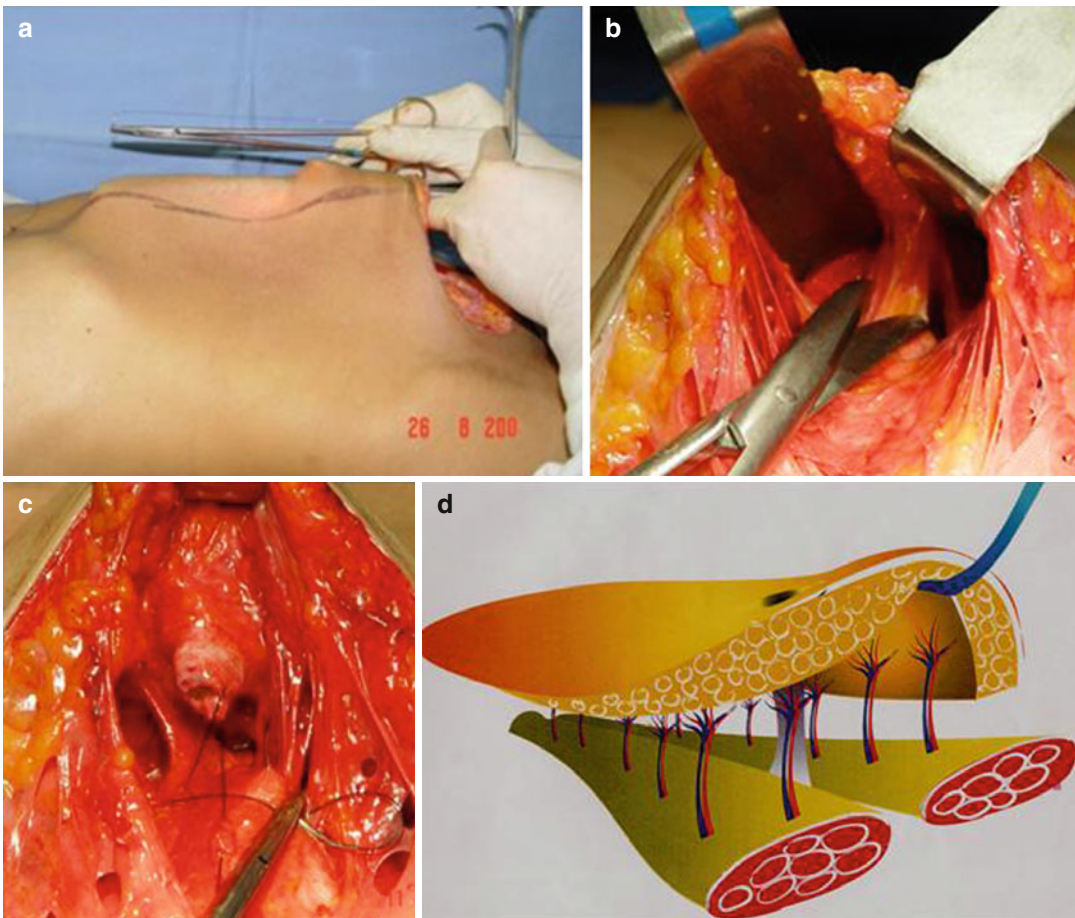


Fig. 17.12 Reinforcement of the musculoaponeurotic wall during lower lipoabdominoplasty without transposition of the umbilicus. (a) Abdominal panniculus is pulled upward after full-thickness liposuction and skin resection were performed in the suprapubic area. (b) Scissor sectioning of the umbilical pedicle according to Callia's procedure through

which it is possible to suture the rectus abdominalis in the midline from the upper abdomen to the pubis. (c) After plication of the muscles the pedicle of the umbilicus is sutured to it. (d) The remaining abdominal panniculus with the umbilicus pulled upward and the perforator vessels going from the rectus abdominalis to the panniculus

Callia's procedure combined with liposuction without any undermining of the panniculus, which means that all perforator vessels are preserved. The plication of the muscular aponeurotic wall is performed from the level of the rib margin to the pubic area.

(e) Traction of the remaining panniculus and final suture

Following the operation, the remaining panniculus is pulled downward and the wound is sutured at three levels. As described above, in the raw area there are only connective tissue, fascia superficialis, and empty perforator vessels, as after suctioning of the fat tissue they naturally collapse. In all perforator vessels the artery, veins, lymphatics surrounding them, and also a thin layer of subdermal tissue are present. The first level of suturing is the fascia superficialis, to

approximate the border of the upper flap to the lower border, which avoids any scar depression after surgery. Afterward, the subdermal layer is folded over itself and sutured, and finally an intradermal running suture is applied to close the incision.

(f) Postoperative dressing

Adhesive tapes are used to cover the cutaneous suture to maintain the borders at a good level. A thick layer of cotton is applied over the abdominal wall and a garment holds the torso as a final bandage, which is retained for 1 week. After this time, the patient comes to the clinic to have the bandaging removed.

After changing the first bandages, it is advisable to use a garment for a month, removing it only once a day for bathing (Figs. 17.13, 17.14, and 17.15).

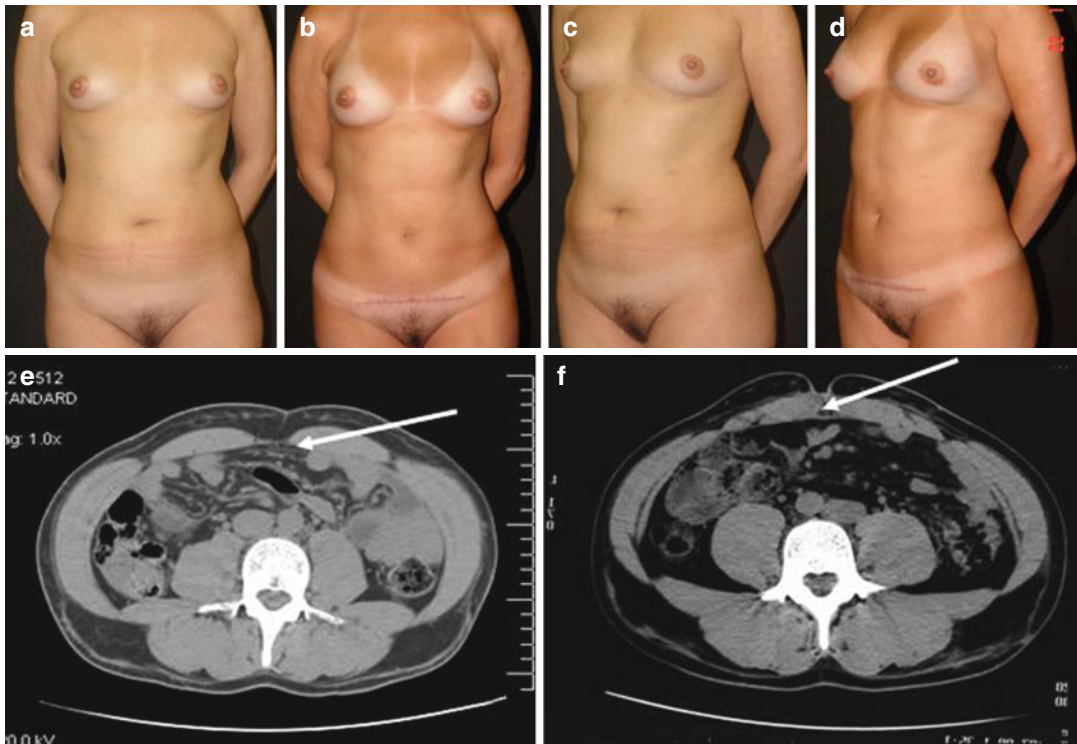


Fig. 17.13 A 33-year-old female patient presented with diastasis of the rectus abdominalis and hypomastia. (a, c) Preoperatively. (b, d) After lower lipoabdominoplasty with plication of the rectus abdominalis associated with

augmentation mastopasty. (e) CT sectioning the abdomen at the level of the umbilicus. The arrow indicates the diastasis before surgery. (f) After the operation. The arrow shows the correction of the diastasis of the rectus abdominalis

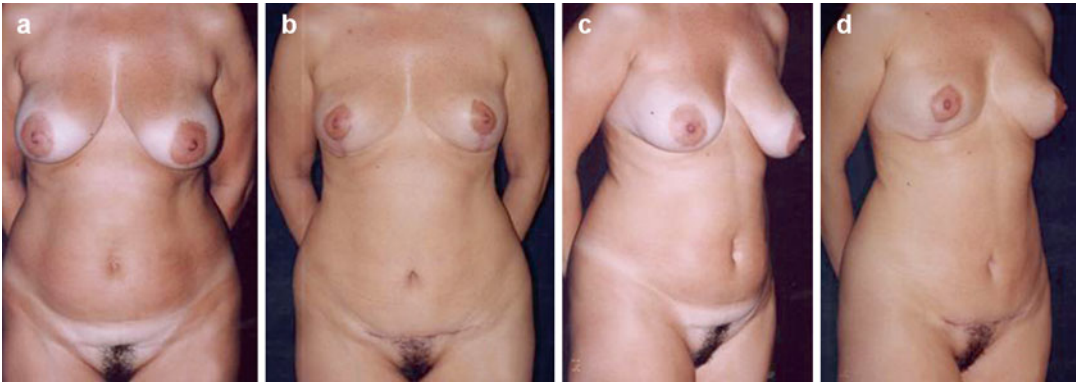


Fig. 17.14 A 38-year-old female patient presented asymmetric breasts with localized adiposity on the abdomen and a minor degree of flaccidity. (a, c) Preoperatively. (b, d) Postoperatively after lower lipoabdominoplasty in conjunction with reduction mastoplastic

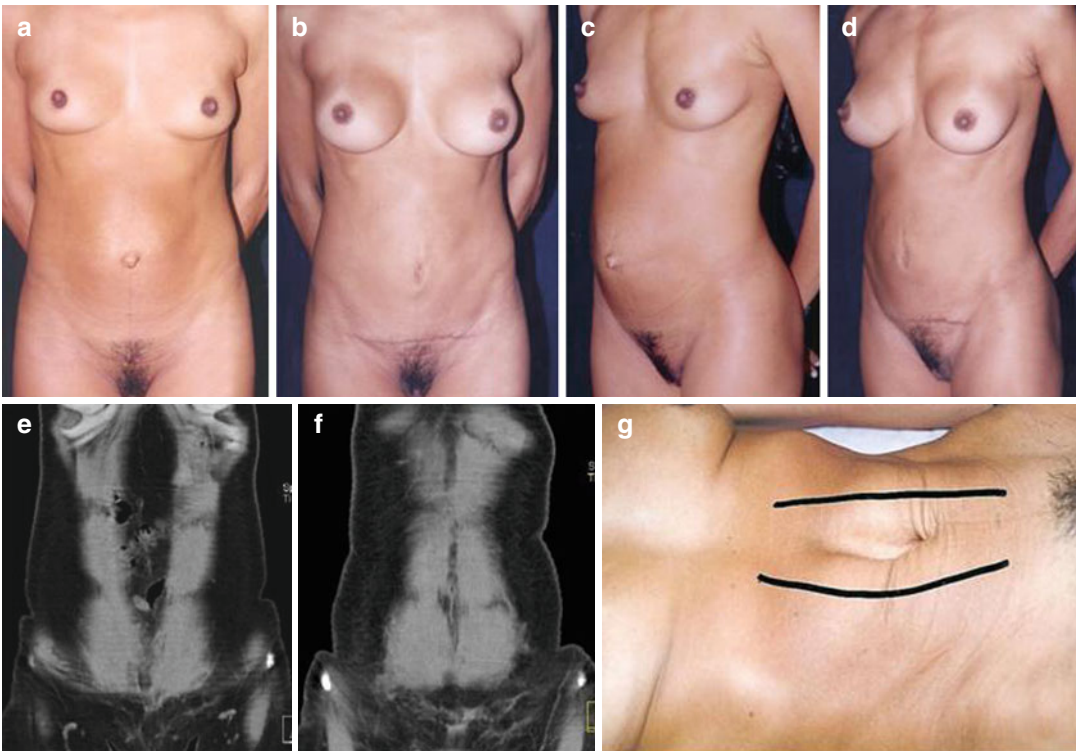


Fig. 17.15 A 36-yearold female patient presented with severe diastasis, umbilical hernia, and hypomastia. (a, c) Preoperatively. (b, d) After lower lipoabdominoplasty with reinforcement of the rectus abdominalis combined with augmentation mastoplastic. (e) CT showing the diastasis before surgery. (f) CT after operation. (g) The patient is supine tensing the abdominal muscles and showing the severe diastasis of the rectus abdominis

Type 2: Upper Lipoabdominoplasty

Upper lipoabdominoplasty is indicated when a patient complains about excess adiposity and laxity of the skin in the supraumbilical area and

laterally in the hypochondriac regions. Quite often, patients refer to the unaesthetic alterations under the breasts expecting mastoplastic to improve that region of her body or even after

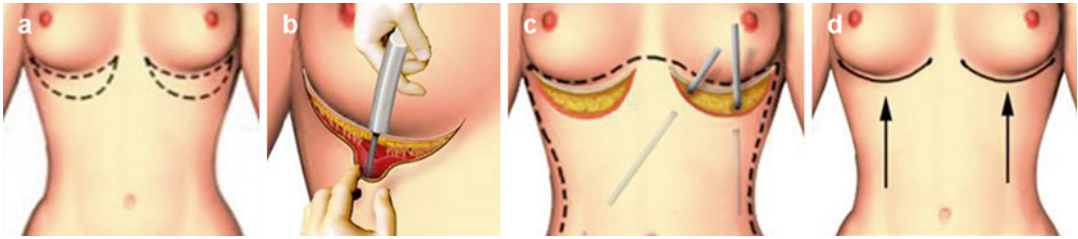


Fig. 17.16 Upper lipoabdominoplasty technique. (a) Half-moon-shaped incisions are made in the submammary fold on each side. (b, c) Liposuction of the upper

abdominal wall must be carried out below the fascia superficialis. (d) Final aspect of the operation

abdominoplasty. However, the anatomy of the panniculus presents a specific constitution so that downward traction of the abdominal flap or pulling upward through mastoplasty does not usually improve the anatomical alterations in that region. Therefore, adequate and careful evaluation and surgical planning preoperatively are very important to achieve a good result. The subcutaneous panniculus in these areas presents some connective tissue, making multiple “bridges” from the aponeurosis to the subdermal layer, which is a specific anatomical peculiarity.

(a) Surgical demarcation

This type of surgery is indicated for female patients. It is very important to demarcate a half-moon-shaped area below the submammary sulcus (Fig. 17.16). It is emphasized that the superior incision should be located 2 mm below the sulcus to avoid any damage to the subdermal structures. The sulcus presents a peculiar anatomical constitution with intense connective tissue from the subdermis to the aponeurosis, which must be preserved. The surgeon may hold the panniculus with fingers to evaluate the amount of area for cutaneous resection. As mentioned above, the patient must remain in the standing position in front of a vertical mirror with her arms in downward position along the body. Another line is drawn to delimit the area for liposuction. Also, the circumference of the torso and the vertical distance from the sternal notch to the pubis must be measured.

(b) Liposuction procedure

Isolated upper lipoabdominoplasty is performed under local anesthesia combined with intravenous sedation. However, most of the operations are carried out in combination with other procedures; thus, general anesthesia is a good choice. A solution of serum with epinephrine (1/500,000) is locally infiltrated in both areas at different levels. In the area for skin and panniculus resection, the infiltration is made at the subdermal level, but in the area for liposuction, it is made deeply into the lamellar layer. Afterward, liposuction is performed at two different levels according to each area:

1. Full thickness of the panniculus in the submammary regions, creating a smooth mesh composed of perforator vessels, lymphatics, and connective tissue.
2. Deep liposuction (below the fascia superficialis) is performed in all regions presenting localized adiposity. Afterward, the remaining panniculus slides easily over the muscular level in the hypochondriac regions on each side and in the epigastric region as well.

Using this method, the vascularization of the subdermal layer and below the fascia superficialis is preserved; thus, there is no bleeding during the operation or afterwards. Therefore, none of the perforator vessels are damaged, and they work as multiple pedicles to maintain a normal blood supply to the remaining panniculus flap.

(c) Full-thickness skin resection

After liposuction, there is natural depression in the half-moon-shaped area where full-thickness skin is excised. The remaining panniculus then slides easily upward.

(d) Traction of the remaining panniculus and suture

The panniculus is pulled from upward in a V-shaped direction of traction (Fig. 17.16). The final step of the operation is to close the wound in three levels of sutures.

1. Suture of the fascia superficialis of the remaining panniculus flap to the aponeurosis on the projection of the previous submammary sulcus. This works like plication of the remnant subcutaneous tissues. I use at least eight sutures on each side to achieve firm fixation of the panniculus to the musculoaponeurotic structures of the chest. Therefore, the main structures of the panniculus are reinforced.
2. Next, the subdermal structure is sutured and folded over itself to approximate the cutaneous border of the surgical wound and to avoid scar depression and retraction.
3. Finally, a running suture is applied to the dermis with absorbent material (Fig. 17.17).

(e) Postoperative dressing

Adhesive tapes are placed on the scars crossing each other, and finally strong elastic tape strips are applied over the entire region to pull the panniculus upward. A garment is worn on top of them, covering all the regions of the torso, providing gentle compression over the panniculus, and is retained for 1 week. After this time, the patient comes to my clinic for the bandaging to be removed. A new bandage is put on, covering the scars, which is changed every 2 days and maintained for 2 or 3 months, to avoid traction on the scars. During this period, the patient should not do any physical exercise in which the arms are elevated.

Type 3: Lower and Upper Lipoabdominoplasty

The purpose of this double operation is to employ the lower and upper lipoabdominoplasty procedures following the same surgical principles and preserving the perforator vessels coming from the rectus abdominalis to the abdominal panniculus that work as multiple pedicles. It is a new approach through which the superior and inferior segments of the abdominal wall may be treated simultaneously without transposition of the umbilicus (Fig. 17.18). However, it is not a full lipoabdominoplasty. The main anatomical point of reference is the high implantation of the umbilicus, which means that the upper segment of the abdomen is

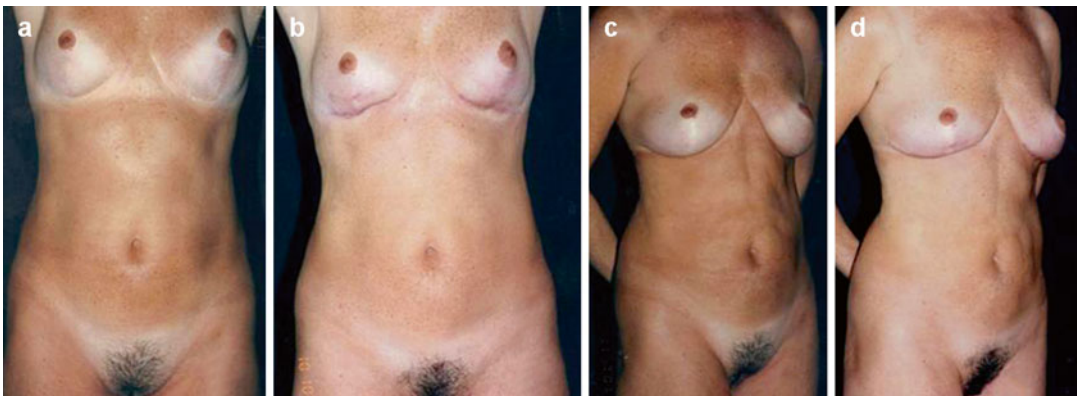


Fig. 17.17 A 51-year-old patient who underwent a previous mastoplasty and liposuction of the abdomen and presenting the remaining flaccidity in the upper abdomen. (a,

c) Preoperatively, showing the skin excess in the superior abdomen. (b, d) Postoperatively with the final scars located on the submammary sulcus on each side

quite short and consequently does not present enough cutaneous covering to be pulled downward to replace the inferior segment.

(a) Indications

1. When the abdomen presents unaesthetic abnormalities on its superior and inferior segments that require a direct approach.
2. In patients with an indication for both procedures, it means that each individual region shows local abnormalities, which may be treated separately (Fig. 17.5).
3. Patients presenting unfavorable results on the surface of the abdomen with severe irregularities and an inelegant appearance secondary to superficial liposuction are also good candidates for this procedure (Fig. 17.19).

4. When a patient presents transverse or horizontal surgical scars on the abdomen, this can jeopardize performing a full lipoabdominoplasty as the vascularization of the panniculus is severely damaged by previous operations. During the operation the surgeon makes an incision into the skin, through the subcutaneous panniculus until the abdominal aponeurosis is reached, which breaks the communication between vessels and thus is an interruption of the vessels from one border to the other.

(b) The operation

The operation follows the same steps as those described above for lower lipoabdominoplasty and upper lipoabdominoplasty. Therefore,

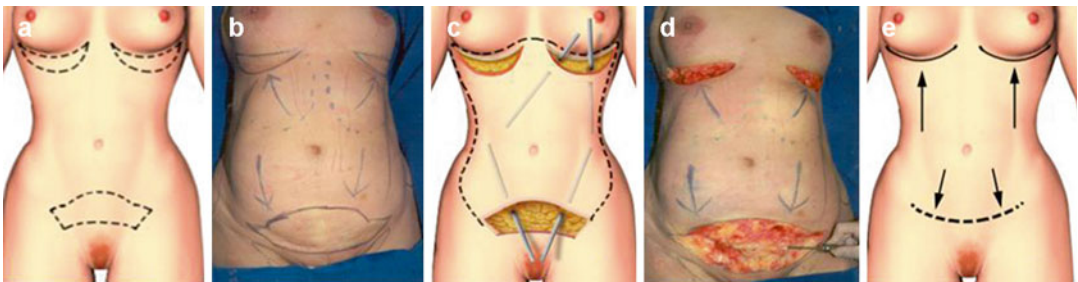


Fig. 17.18 Technique of lower and upper lipoabdominoplasty. (a, b) Surgical demarcations. (c, d) Liposuction and skin resections without transposition of the umbilicus. (e) Final aspect of lower and upper lipoabdominoplasty

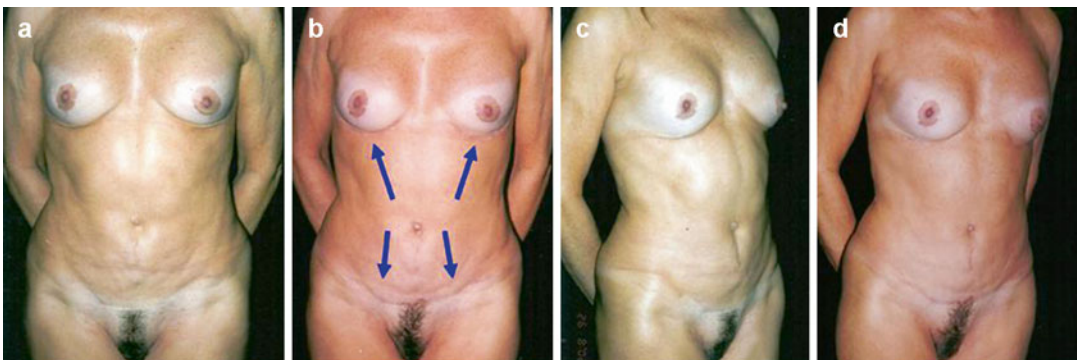


Fig. 17.19 A 58-year-old patient who had previously been operated on with conventional abdominoplasty and liposuction of the abdomen twice. Owing to the unsatisfactory result of superficial liposuction of the abdomen, lower and upper lipoabdominoplasty was performed. The

abdominal panniculus was pulled up and downward (direction of traction is indicated by arrows), with some improvement of the abdomen. (a, c) Preoperatively. (b, d) After the operation

surgical demarcations, liposuction procedures, full-thickness skin resection, traction of the remaining panniculus, suture, and postoperative dressing are similar to each individual technique already described.

In fact, the areolar layer of the abdominal wall should be preserved when liposuction is performed. I have described the anatomy of the abdominal panniculus to demonstrate that the areolar layer gives the abdominal wall a smooth and harmonious surface [8]. Because of these anatomical characteristics, the areolar layer should not be damaged.

Type 4: Full Lipoabdominoplasty

Full lipoabdominoplasty is the most frequently performed procedure in abdominoplasty combined with liposuction and skin resection of all suprapubic regions to repair abnormalities of the abdominal wall. In this modality of lipoabdominoplasty, the umbilicus is transposed and a new umbilical area is created. Once again, the selection of patients before surgery is a fundamental step during which the surgeon may evaluate the real possibility of removal of all skin of the suprapubic region, and the cutaneous area above the umbilicus may be pulled downward to be sutured to the inferior border of the surgical incision.

(a) Surgical demarcation

Two areas must be well demarcated for adequate orientation during surgery:

1. The area for skin resection corresponding to the whole segment in the suprapubic region that is below the umbilicus. My preference for drawing is similar to Callia's technique [40]. Therefore, the final scar will be as low as possible, with the lateral segment placed on the inguinal folds on each side and a convex line on the pubic area (Fig. 17.20).
2. The area for liposuction on the abdominal wall above the umbilicus and on the lateral and posterior aspects of the torso. Therefore, all deformities (localized adiposities and skin excess) must be drawn on the day before surgery.

(b) Liposuction procedure

All operations take place at a hospital with the support of an anesthesiologist. Blood tests and clinical evaluation have previously been carried out by a cardiologist under normal conditions. Premedication is a routine prescribed by the anesthesiologist when once again a clinical evaluation is carried out before surgery.

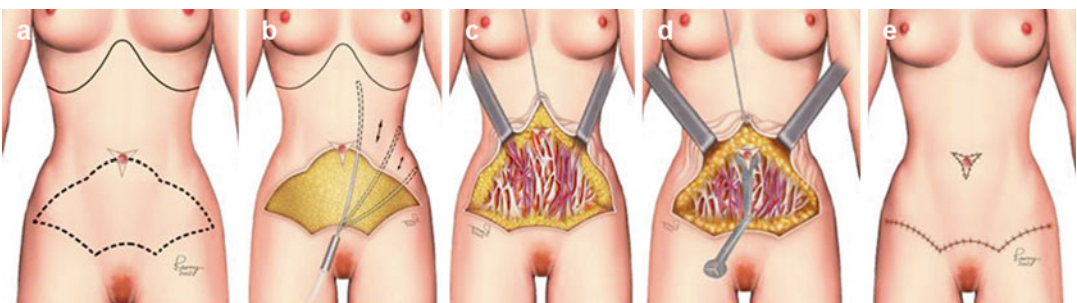


Fig. 17.20 Technique of full lipoabdominoplasty. (a) Demarcation of the technique. The entire area below the umbilicus is resected after full-thickness liposuction. (b) Deep liposuction of the remaining abdominal panniculus is performed. (c) After full-thickness liposuction and resection of the skin below the umbilicus. (d) The perforator vessels and the connective tissue. The lower seg-

ment of the personal umbilical marker instrument is placed on the umbilicus with a three star-shaped surface. The upper segment determines the new umbilical region. (e) Final full lipoabdominoplasty surgery. The new umbilical region is created according to the Avelar technique

The patient in the operating room is in the supine position, and after anesthesia the abdomen and lateral aspects of the torso are adequately prepared. Before starting the liposuction procedure, local infiltration with a special solution is carried out in accordance with surgical planning. A solution of serum 1,000 mL plus 2 mg of epinephrine (2:1,000,000) is used. With this volume, it is usually possible to infiltrate the abdomen and lateral sides of the torso as well. The infiltration is performed at two levels in two areas:

1. In all the regions for liposuction it is carried out in the deep layer, under the panniculus (below the fascia superficialis);
2. In area for skin resection that is in the suprapubic region, the infiltration must be carried out underneath the skin and the full thickness of the panniculus (in the areolar and lamellar layers).

After infiltration it is useful to wait at least 15 min before starting the liposuction procedure, which is performed at two different levels in the two areas previously demarcated.

- A. Full-thickness liposuction is carried out in all areas of the suprapubic region and below the umbilicus. Afterward the perforator vessels and connective tissue are preserved, and this area becomes deep owing to the absence of fat tissue.
- B. Deep liposuction (below the fascia superficialis) is performed in all regions where the abdominal panniculus remains with its normal cutaneous covering. Therefore, all fat tissue of the lamellar layer is aspirated (Fig. 17.20) [15]. Liposuction must be performed in one half of the abdominal wall until the ideal thickness is reached. The other side is treated only after the procedure is concluded on the first side. Thus, the surgeon is able to evaluate and compare the thickness of both sides [4].

After deep liposuction, the abdominal subcutaneous panniculus slides easily over the musculoaponeurotic wall, retaining all perforator vessels as multiple pedicles (Fig. 17.20). This situation is similar to that in a child's panniculus because they do not have adiposity in the lamellar layer in all the regions of the abdominal panniculus [8]. The areolar layer must be preserved to achieve regular thickness of the remaining panniculus, giving a harmonious result and good balance to the body contour. Nevertheless, in some cases, superficial liposuction may be performed on the upper panniculus flap to reduce its thickness.

(c) Full-thickness skin resection

After performing fat suction, the first step is to incise the umbilicus according to my procedure [1, 3], in which a star-shaped incisions is made inside the umbilical region. In order to facilitate umbilical incisions and to avoid accidental perforation of the deep structures of the abdominal cavity, a double half-circular instrument was created (Fig. 17.21). It is introduced with one part on each side of the umbilicus, which joins around the umbilical pedicle and is pulled upward [4]. Cutaneous incisions are made in the umbilical cavity with a # 11 knife, followed by anatomical dissection of the umbilical pedicle.

Further cutaneous incisions are made with the knife all around the previous demarcations (Fig. 17.21), followed by skin resection. The subdermal structures and the perforator vessels underneath preserved during liposuction can be seen in all regions. After full-thickness skin resection has been performed, the vessels of the panniculus are not damaged, showing that they are empty of blood and there is no bleeding during or after skin resection (Fig. 17.22).

Finally, in the area of skin resection, a fundamental aspect of the method is that after liposuction of the full-thickness of the panniculus, the only anatomical structures that remain are the connective tissue and all the vessels (arterial, venous, and lymphatic), in addition to the nerves.

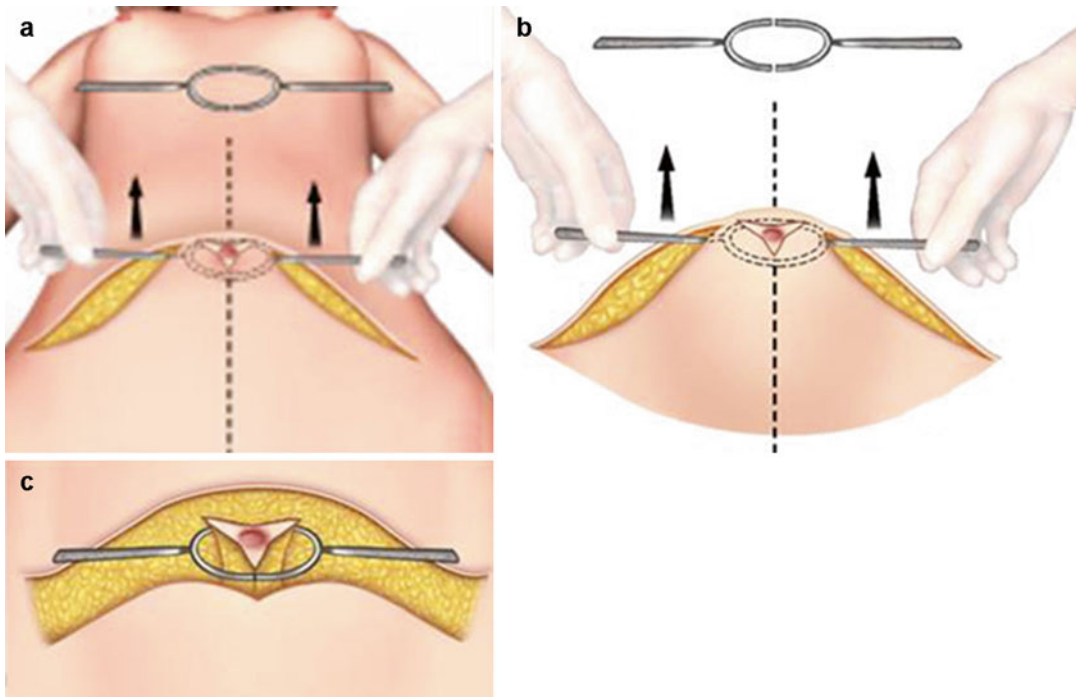


Fig. 17.21 The technique of creation of the umbilicus during lipoabdominoplasty. (a) Demarcation of the technique. The dotted line shows the midline of the abdominal wall. The area below the umbilicus will be resected after liposuction. (b) The new umbilical region is created

according to the Avelar technique. A special instrument is introduced around the umbilicus and pulled upward to perform cutaneous incisions avoiding accidental perforation of the internal organs of the abdominal cavity. (c) The umbilicus has been incised with the instrument around it

Afterward, the surgeon's assistant pulls the remaining panniculus upward with strong hooks, showing the perforator vessels and connective tissue coming from the muscular level to the panniculus, as the lamellar layer was previously aspirated (Figs. 17.21 and 17.22). I created special dissectors to be introduced in the midline above the umbilicus up to the xiphoid process where there are no perforator vessels, according to my previous descriptions [8, 11]. Therefore, only connective tissues are dissected when the instruments are introduced in backward and forward movements, without any lateral motion (Fig. 17.23). Afterward, the perforator vessels can be seen on each side of the tunnel created by dissectors in the superior segments of the rectus abdominalis. In fact, they indicate the location of the muscles during reinforcement suture (Fig. 17.24). When conventional abdominoplasty is performed, a wide undermined area is made, which used to be a

constant risk (Fig. 17.24). One can see many signs of cauterization in the black dots.

(d) Creation of the new umbilical region during full lipoabdominoplasty

The first abdominoplasty was performed by Kelly in 1899 [38] through elliptical horizontal skin resection including the navel. This procedure was performed until 1957 when an important contribution was introduced by Vernon [57] with transposition of the umbilicus after panniculus undermining of the superior abdomen. He made a circular incision around the umbilicus to separate it from the abdominal panniculus flap, which was a great improvement compared with abdominoplasty (Fig. 17.25).

Following Vernon's procedure, several authors published other approaches, but the final scar around the transposed umbilicus is always a circular one. According to a survey by

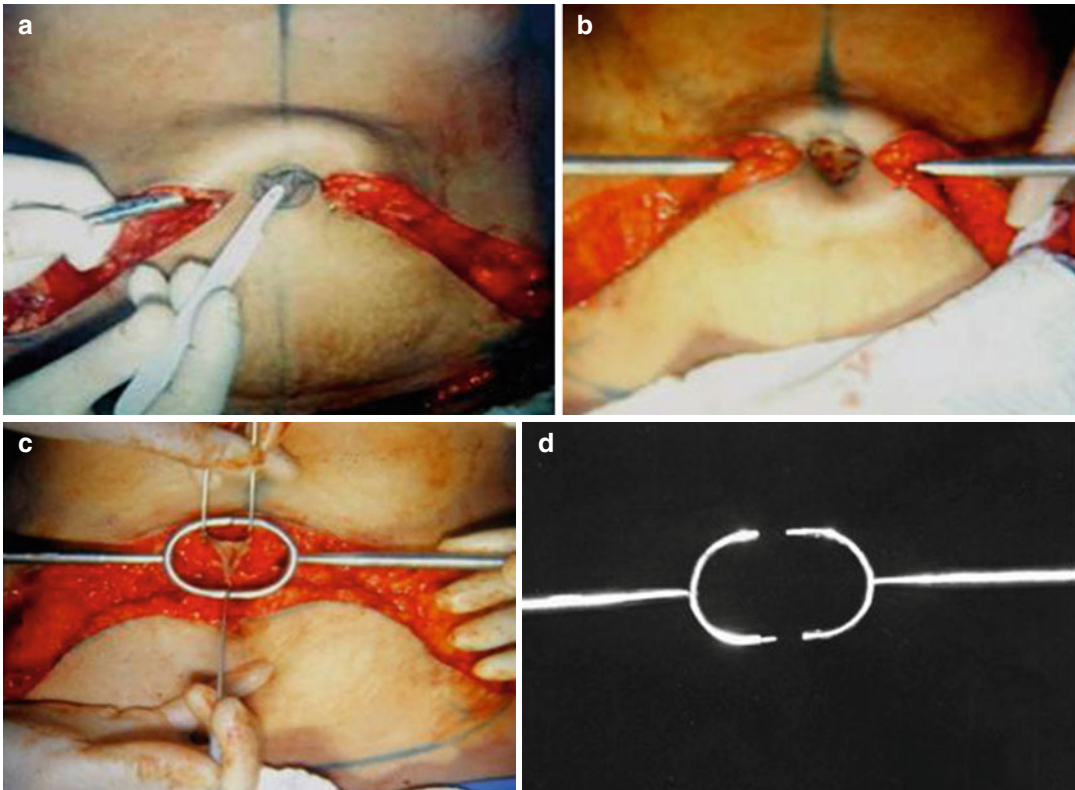


Fig. 17.22 The use of the double “U” shaped instrument for cutaneous incisions in the umbilicus. (a) After cutaneous incisions on each side of the umbilicus, the “U” shaped instrument is introduced on each side where they join to lift the whole region. Incisions are made with a knife. (b) Triangular incisions are made into the umbili-

cus, with the panniculus flap lifted to avoid any accidental damage to the intra-abdominal organs. (c) After a cutaneous incision, the umbilicus is isolated, and can be seen inside the articulated U-shaped instrument. (d) The double U-shaped instrument

Grazer and Goldwyn (1977) [58] regarding 10,540 abdominoplasties carried out by plastic surgeons from the USA and other countries, the umbilical scar presented with scar contraction and retraction occurred in 45 % of the surgeries. Since my original publication [1], the final scar around the new umbilicus, instead of being a circular one around the umbilicus, has been a “broken” line, like an atypical Z-plasty (Fig. 17.25).

In fact, the triangular-shaped scar is a geometric figure that is the “opposite” of a circle, avoiding problems regarding retraction and even contraction. Following my approach, three triangular flaps are created on the skin surface of the umbilicus, and another three small cutaneous flaps are created inside of a 2-cm circle

demarcated on the surface of the abdominal flap. This means that each skin flap created on the cutaneous abdominal wall measures 1 cm on each side. Therefore, if more flaps are created on the abdominal flap there will be more scars around the umbilicus with more tendencies toward retraction and contraction. If four skin flaps are created on the abdominal wall, this is not a new technique, as it represents the same surgical principles as mine. In my technique, one triangular flap of the umbilicus is directed downward and the other two are directed obliquely to the right and to the left, creating a natural depression in the new umbilical cavity (Fig. 17.25).

Another important surgical principle of my method is to push the skin of the abdominal wall

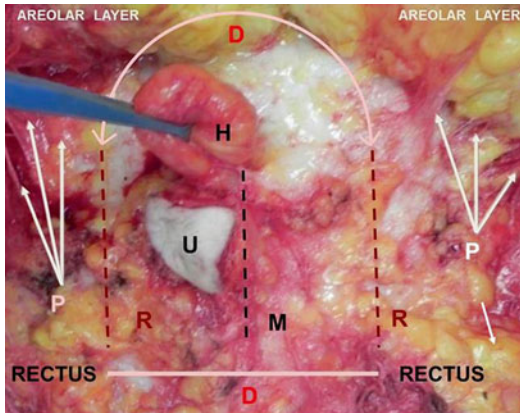


Fig. 17.23 Anatomy of the abdomen during full lipoabdominoplasty. (Top) Areolar layer. *P* perforator vessels on the right and left side, *H* hernia in midline, *U* triangular cutaneous surface of the umbilicus. *Black dotted line* shows the midline of the abdomen with the asymmetric umbilicus. *Brown dotted lines* show the border of the rectus abdominis. It is important to note that there are few points of cauterization as there is no bleeding because the perforator vessels are not cut

to the deep structures of the musculoaponeurosis. In other methods, the umbilicus is pulled from the depth to the surface of the abdominal wall, leaving a circular scar that may cause retraction and contraction as well.

(e) Reinforcement of the musculoaponeurotic abdominal wall

The treatment represented by reinforcement of the musculoaponeurotic abdominal wall is not a routine procedure during conventional abdominoplasty [4]. It is a useful surgical step when the patient presents moderate or severe muscular flaccidity, diastasis of the rectus abdominis, or herniation of the abdominal wall, as mentioned by Pontes (1966) [41] and emphasized and popularized by Pitanguy [43, 44].

Although the abdominal panniculus is not undermined during full lipoabdominoplasty, it is possible to perform plication of the abdominal aponeurotic structures in the midline and laterally as well, to reinforce the muscular wall and to

treat the diastasis of the rectus abdominis. This surgical step was not described in the original publication [15] because in the first 22 patients, there was no indication for it. In fact, they were selected to avoid such a surgical procedure. Afterward, there were good indications for plication in some of the patients who underwent lipoabdominoplasty without panniculus undermining, as they presented diastasis of the rectus abdominis, from the xiphoid process to the suprapubic region (Fig. 17.24). Although I identify the diastasis and also umbilical hernia, I always ask patient to undergo computed tomography (CT) to demonstrate the abnormality, which is useful for patients to obtain good support from the Private Health Assistance. Measuring the distance between the rectus abdominis from the xiphoid process to the pubic bone, and the presence of herniation of the umbilicus and on the area of diastasis are required (Fig. 17.26), as is measurement on CT of the thickness of the abdominal panniculus and the muscles.

Thus, in these patients the reinforcement by plication of the musculoaponeurotic abdominal wall is performed simultaneously with my new lipoabdominoplasty procedure. As there is a wide distance between the rectus abdominis because of the diastasis there is also a wide distance from the perforator vessels from one side to the other (Fig. 17.24). Undermining is not performed in the midline because, using the special dissector, it is possible to identify the inner border of the muscles on each side. It is important to emphasize that as the greater the width of the diastasis of the rectus abdominis, the less chance there is of the presence of perforator vessels. Therefore, the plication is made from 5 to 6 cm from the xiphoid process to the umbilical region using isolated stitches. The pedicle of the umbilicus is not shortened routinely, except in patients after massive weight loss who present with a very long segment of the pedicle. Afterward, muscular plication in the infraumbilical area is carried out via an open view without dissection.

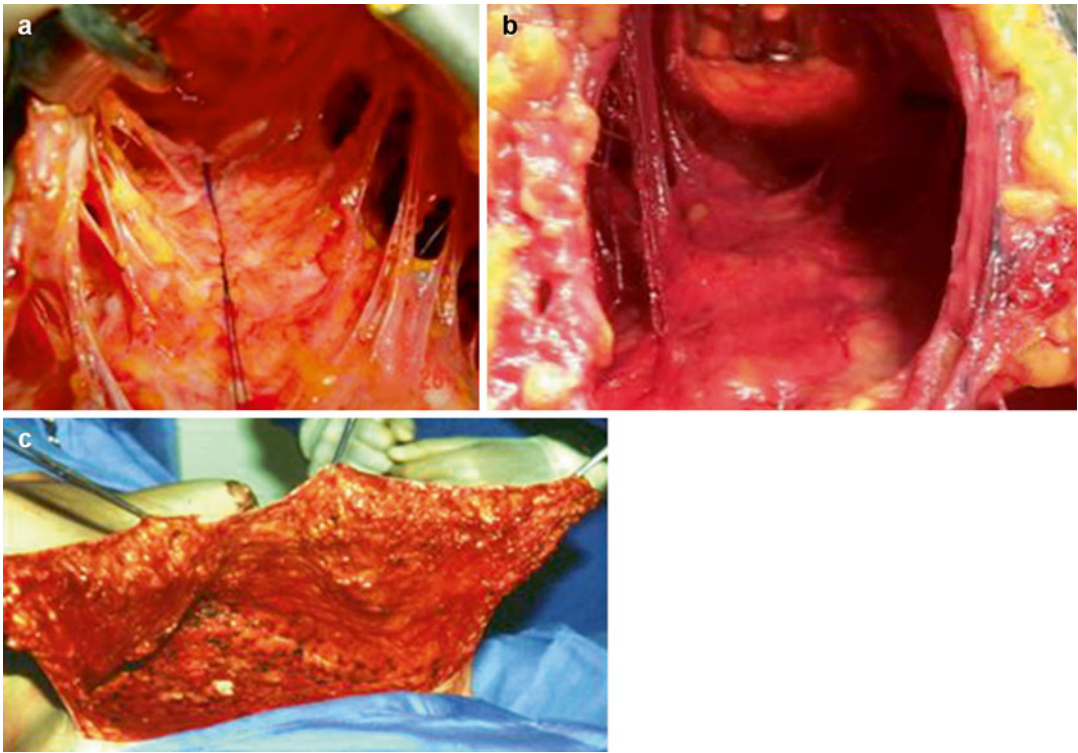
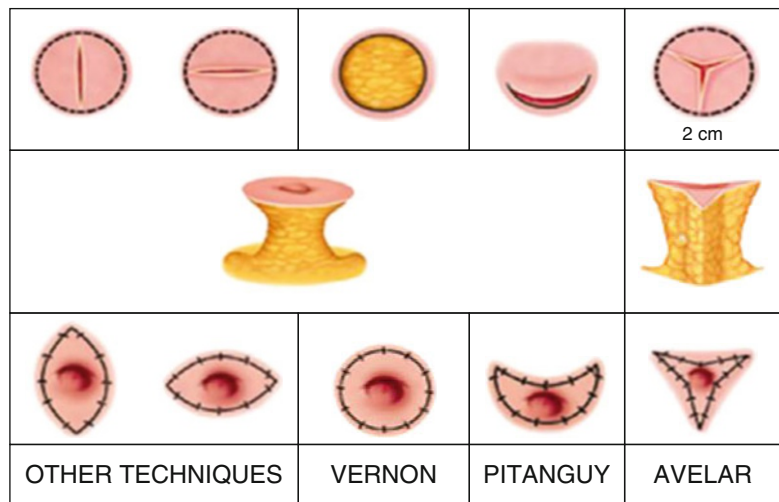


Fig. 17.24 The difference between the new concepts of full lipoabdominoplasty, in which preservation of the perforator vessels is the main surgical principle, and the conventional abdominoplasty. (a, b) Note the presence of the perforator vessels on each side of the rectus abdominalis in the supraumbilical area taken from inside the tunnel created by cannulas and that there is no sign of the use of

electrocoagulation. Each perforator vessel works as a pedicle to the remaining panniculus. The cannula does not damage the perforator vessels. (c) Wide undermining of the abdominal flap where the multiple black dots can be seen owing to the use of an electrocoagulator. The umbilicus, with a triangular surface, is located in the center of the raw area

Fig. 17.25 Creation of the new umbilicus during full lipoabdominoplasty. (Top) Different cutaneous incisions in the abdominal flap: vertical, horizontal, circular excised skin (Vernor), semicircular incision (Pitanguy). Triangular incisions inside a 2-cm circle (Avelar). (Bottom) All types of circular or semicircular surgical incisions become a circular scar after implantation of the umbilicus onto the abdominal flap according to other techniques. The final scar in the use of the Avelar technique becomes triangular inside the umbilical cavity



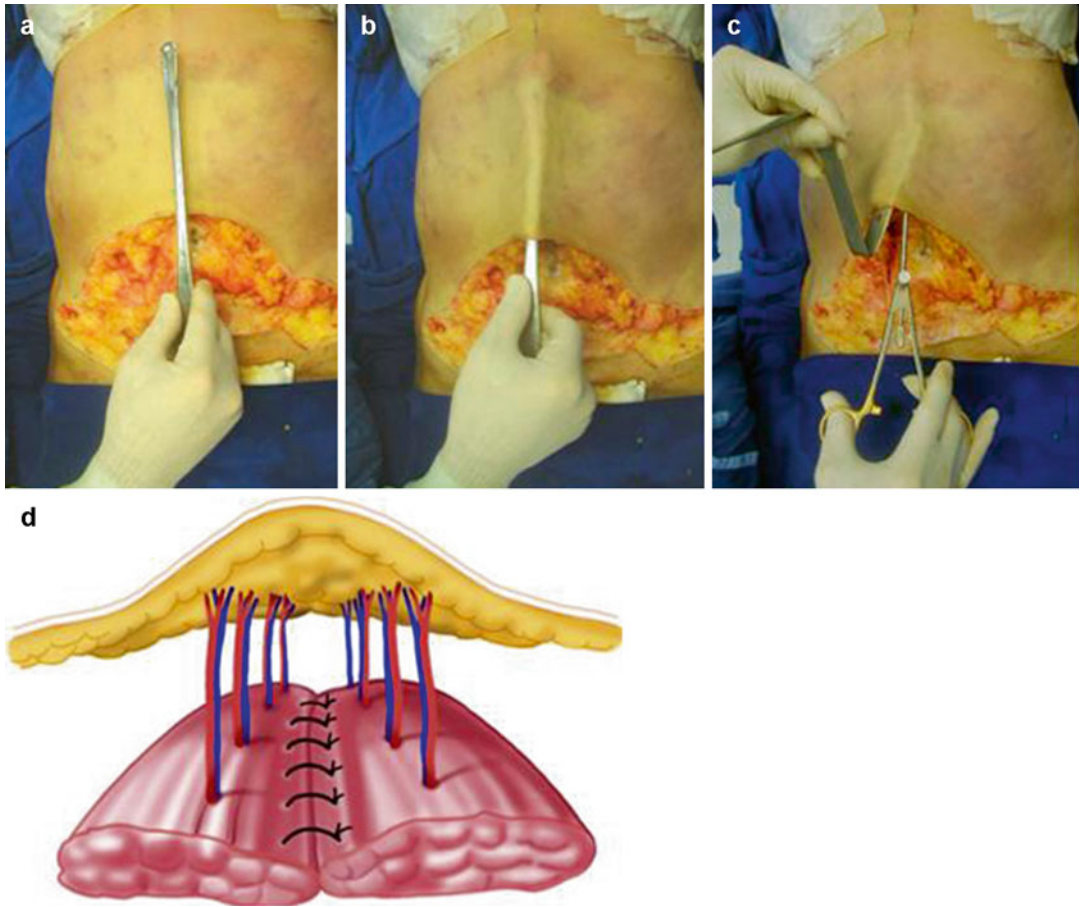


Fig. 17.26 Plication of the musculoaponeurotic wall during full liposuction. (a–c) After full-thickness liposuction of the infraumbilical area and deep liposuction (below the fascia superficialis) in the supraumbilical region. Creation of a tunnel below the remaining panniculus. (a) Blunt undermining instrument on the cutaneous

flap. (b) With the instrument through a tunnel created by tunnelization in the midline without cutting the perforator. (c) Plication suture of the borders of the rectus abdominis. (d) Reinforcement already done in the midline with preservation of the perforator vessels passing from the muscles to the areolar layer of the remaining panniculus

(f) Traction of the remaining panniculus and demarcation of the new umbilical area

After reinforcement of the musculoaponeurotic wall the operating table is bent. The upper abdominal flap is pulled downward over the infraumbilical area until it reaches the lower incision (Fig. 17.27). A temporary suture is applied in the midline and another one each side of the first. Afterward, the table returns to the straight position and the abdominal flap show its normal position to demarcate the

future umbilical area. I created a new surgical instrument to establish the new umbilical area [4]. The instrument has two segments like a forceps (Fig. 17.27). One segment is introduced through the inferior border of the abdominal flap and placed on the umbilicus close to the muscles in the midline. The other segment of the instrument lies on the abdominal flap to determine the natural projection of the umbilicus. The upper segment is 1 cm shorter than the inferior segment to mark the new umbilical area 1 cm lower than the

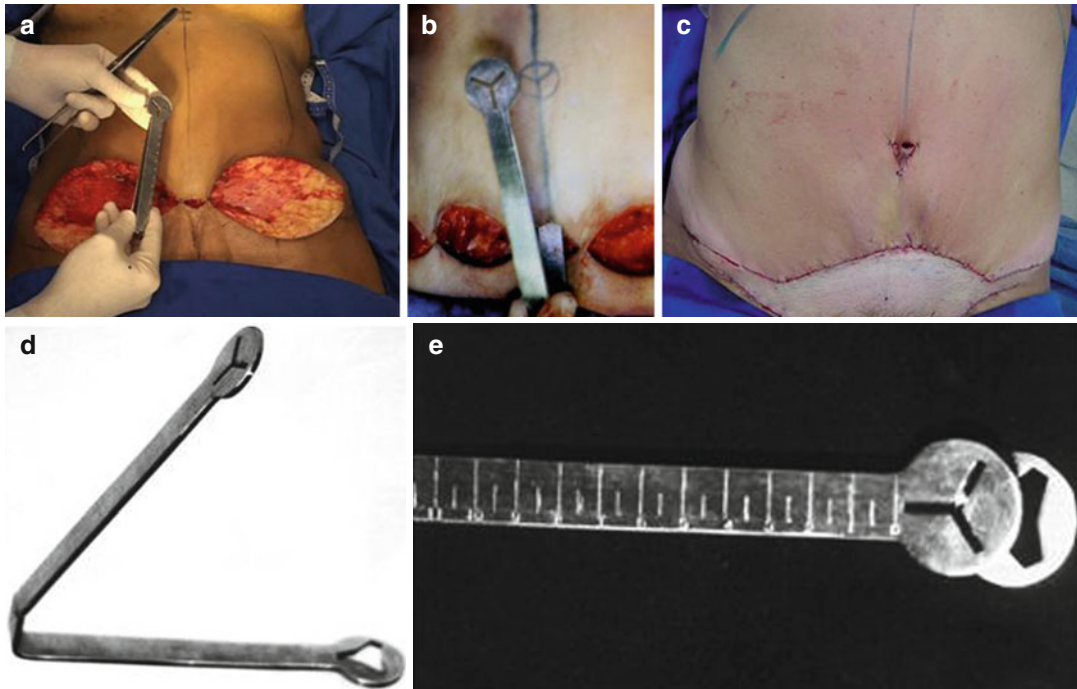


Fig. 17.27 Demarcation of the new umbilical region during full lipoabdominoplasty surgery, (a) After the remaining abdominal cutaneous flap is pulled down and the temporary sutures are applied in the midline. (b) The new area is already demarcated. The lower segment of the Avelar umbilical marker is placed on the umbilicus

and the upper segment on the abdominal flap. (c) The new umbilical region is created and sutured in the midline of the abdominal flap. (d, e) The Avelar instrument showing that the upper segment is 1 cm shorter than the lower segment to create the new umbilicus lower than it seems to be

projection of the umbilicus in the middle of the abdominal flap (Fig. 17.28).

After demarcation of the new umbilical area a circle of 2 cm in diameter is drawn, which is divided into three equal skin flaps [1]. One of them is superior and the other two are inferior on the left and right and they are stitched alternately with the other three flaps of the umbilicus. A dry piece of gauze is placed inside the umbilicus and is retained for 1 week, when the patient returns to the office for the first post-operative follow-up. Afterward, a new piece of gauze is placed inside the umbilicus and is changed every 10–15 days for 2 months after surgery. The final aspect of the new umbilicus is a natural depression with the triangular skin flaps on the side of the cavity (Fig. 17.29).

(g) Closure of the surgical wound and final suture

The final step of the operation is the suturing of the wound, which is performed using absorbent material with isolated sutures in three or four layers. According to the description above, the raw area preserves the connective tissue, the fascia superficialis, and all the perforator vessels. It is important to suture the fascia superficialis from the border of the upper flap of the panniculus to the fascia superficialis on the lower border where liposuction is not performed.

Afterward, the subdermal layer is also sutured using separate stitches and finally a running intradermal suture is applied using absorbent material. On top of it, adhesive tapes are used to cover the surgical wound.

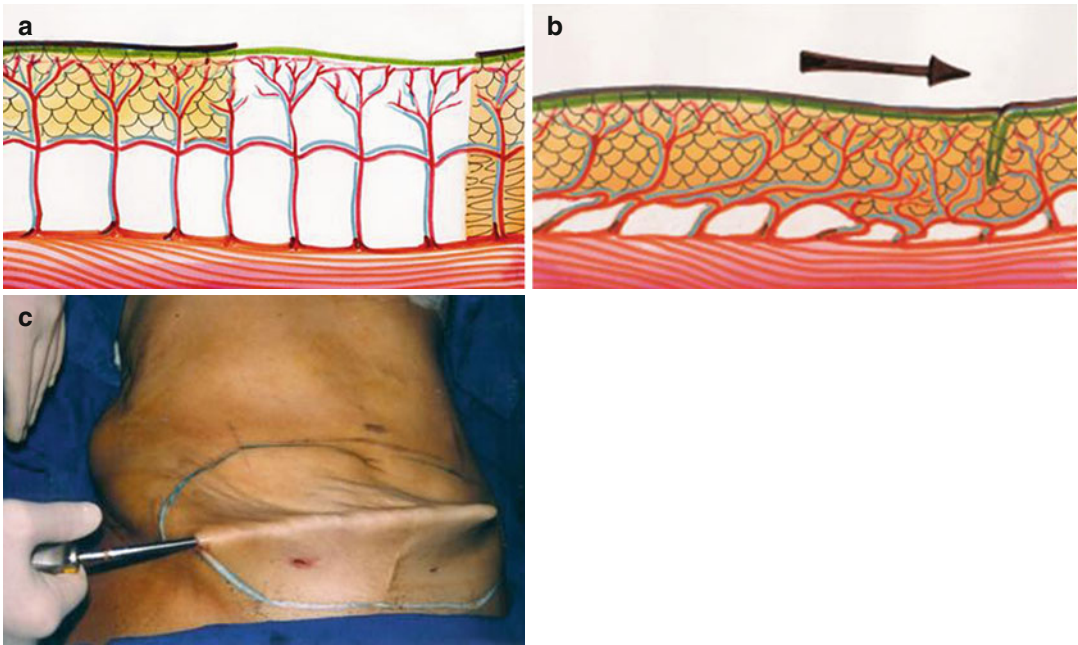


Fig. 17.28 Full-thickness liposuction of the panniculus where skin resection is performed, (a) Area after liposuction. The perforator vessels are empty in the full thickness of the panniculus and the absence of adipose tissue owing to a fat-suction procedure. Below the remaining panniculus the areolar layer is preserved where deep liposuction was performed. One can see the perforator vessels going

from the muscles to the remaining panniculus. (b) The remaining panniculus is pulled downward and sutured. One can see that the perforator vessels are preserved, which will function as multiple pedicles. (c) Full lipoabdominoplasty showing the cannula performing liposuction on the full thickness of the panniculus below the skin. Cutaneous resection will be carried out afterward

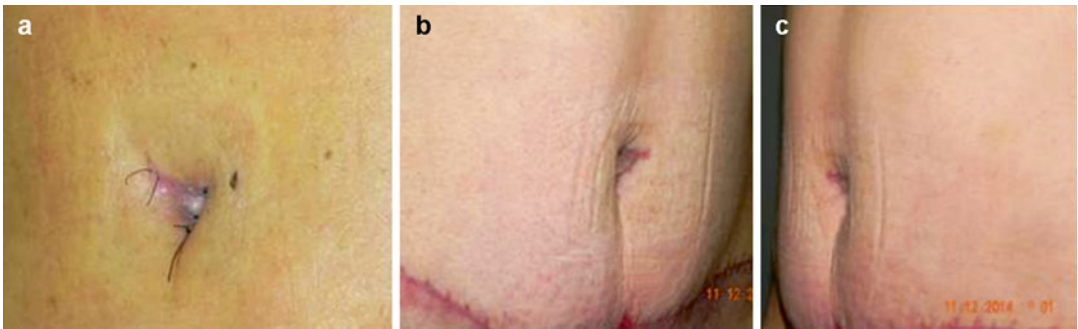


Fig. 17.29 Umbilicus after full lipoabdominoplasty. (a) The umbilicus 2 weeks after surgery with the sutures remaining. (b, c) Two months after operation show a natural depression of the umbilical region

(h) Bandaging

No drainage is used after lipoabdominoplasty as there is no damage to the perforator vessels peri-operatively nor is there any bleeding during or after the operation. A thick layer of cotton is placed on the patient's abdomen and a

comfortable garment is put on as a final bandaging. The patient may leave the hospital the next day retaining the bandaging for 1 week when they return to the office for the first post-operative visit. The final result after full lipoabdominoplasty takes about 6 months (Figs. 17.30 and 17.31).

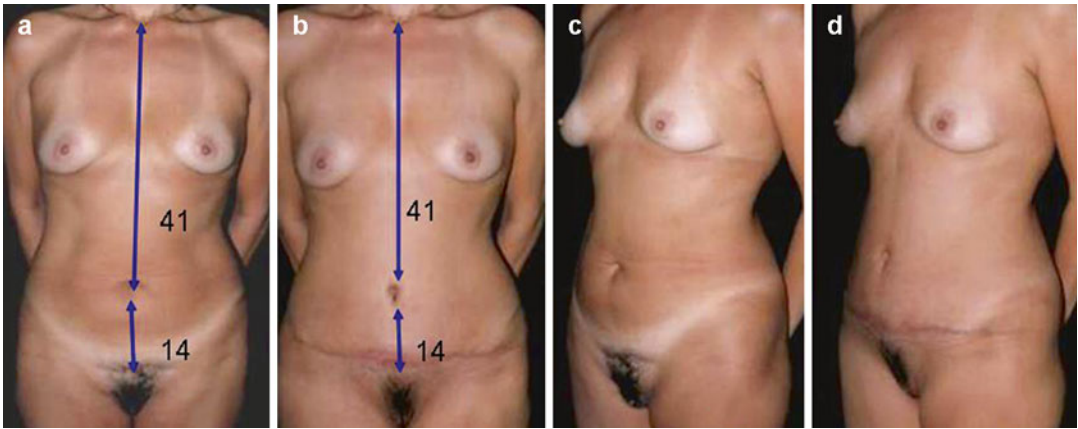


Fig. 17.30 A 53-year-old patient underwent full lipoabdominoplasty as an example of the importance of measurement of the distance from the sternal notch to the umbilicus and from the sternal notch to the pubis. **(a, c)** Before surgery. **(b, d)** Postoperatively, showing the result and the position of the new umbilical area

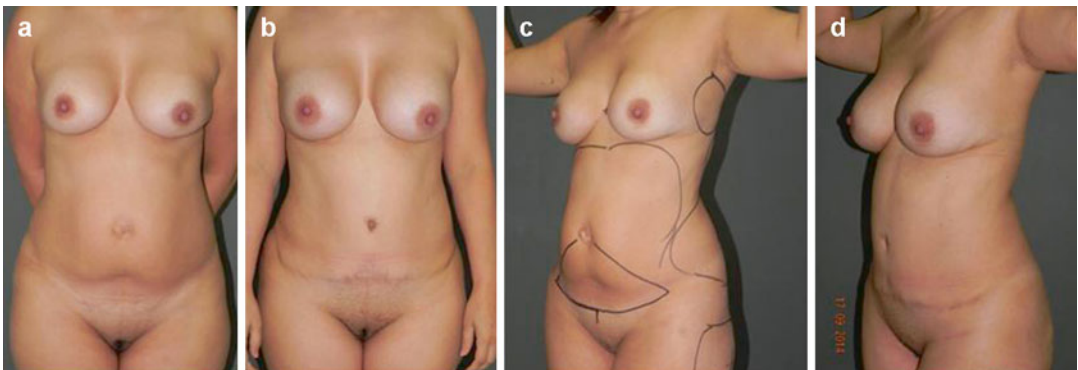


Fig. 17.31 A 49-year-old patient who presented with severe diastasis of the rectus abdominalis and umbilical hernia underwent a full lipoabdominoplasty. **(a)** Preoperatively. **(c)** Preoperatively, showing the demarcations of the full lipoabdominoplasty and areas of liposuction. **(b, d)** Postoperatively, showing the surgical result of the correction of the umbilical hernia

17.4 Discussion

The abdominal wall is so important for the harmony of the body contour that it can only be treated by the use of techniques that approach the problem from aesthetic, reconstructive, and functional points of view. For this reason the selection of patients, the correct indication, and the choice of an adequate surgical technique are essential steps to be taken before surgery. Therefore, prior to any aesthetic procedure on the abdomen, the patients must be well evaluated to analyze all abnormalities according to the surgeon's scientific knowledge and sense of beauty.

All layers covering the abdominal wall: skin, subcutaneous tissues, aponeurosis, and muscles may be damaged, resulting in inelegant abnormalities that require surgical repair. These deformities may be caused by repeated pregnancies, cutaneous flaccidity, striae, retracted scars secondary to previous operations, severe local trauma, hernia, diastasis of the rectus abdominalis, localized adiposities, weight loss, etc. (Figs. 17.32 and 17.33).

It is well known that Kelly in 1899 [38] performed the first operation for treatment to reinstate the aesthetic of the abdomen. Nevertheless, since then, so much attention has paid to finding



Fig. 17.32 Surgical result after full lipoabdominoplasty with midline and lateral plication in a 51-year-old female patient. (a, e, g) Preoperatively. (b, f, h) After full lipoab-

dominoplasty. (c, i) *CT* preoperatively showing wide diastasis in the midline and laterally on the right and left sides. (d, j) *CT* after full lipoabdominoplasty

a procedure by which good results could be achieved. However, a very high incidence of complications was a severe problem in performing abdominoplasty as the perforator vessels are cut to achieve wide undermining. Local and systemic complications have been reported by many authors [58–61].

I have been greatly concerned about abdominoplasty with regard to the improvement in the

body contour. Also, to create a new umbilicus during surgery was so important and deserved meticulous attention. The creation of the new umbilical region during abdominoplasty was a constant task and quite often presented unaesthetic results, scar retractions, and even the absence of the umbilicus after surgery was mentioned by Grazer in a survey, occurring in 45 % of abdominoplasties [58]. Because of such an

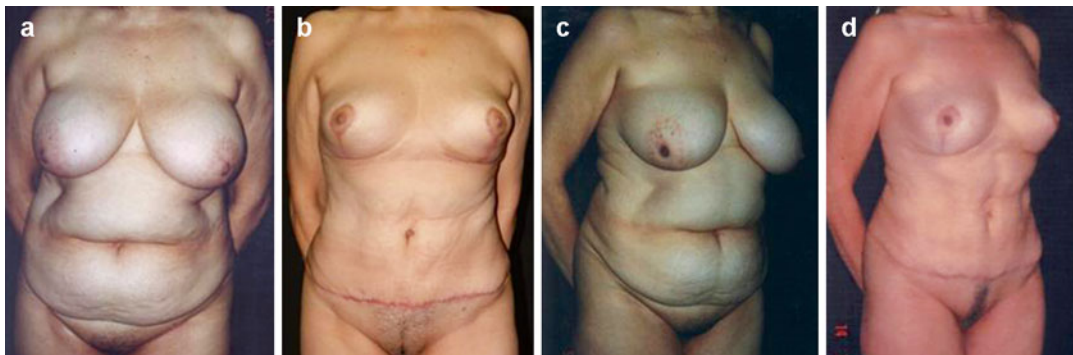


Fig. 17.33 A 62-year-old female patient before and 6 months after full lipoabdominoplasty combined with breast reduction. (a, c) Preoperatively. (b, d) Postoperatively, full lipoabdominoplasty

observation in the use of my new approach it is possible to create a natural umbilical cavity [1]. I used to perform abdominoplasty according to the traditional techniques, particularly the technique learned from Pitanguy.

When the liposuction technique was developed and popularized worldwide by Illouz [3, 54, 62], a new way was found to improve the surgical results, performing it in association with traditional abdominoplasty. However, there was concern about the high rate of complications such as: skin slough, cutaneous infection, panniculus necrosis, pulmonary thromboembolism, seroma formation, and even death.

All these circumstances discouraged me from performing this operation during a period from 1988 until 1998. Nevertheless, I returned to study of the anatomy and to analyze all aspects of those complications, looking for an adequate method. Previous anatomical research in cadavers was a useful support in the study of anatomy of the panniculus. Afterward, it was concluded that when the liposuction procedure is well performed the perforator vessels may not be damaged. Even the abdominal panniculus may be resected as long as it is not undermined and the perforator vessels are also preserved. Consequentially, both procedures could be performed simultaneously without cutting the perforator vessels and this was published by Avelar [15] and presented several times at Brazilian and International Congresses of Plastic Surgery.

Therefore, lipoabdominoplasty is a new approach due to a combination of two techniques: fat-suction and abdominoplasty as the perforating vessels coming from the rectus abdominalis are not transected without the panniculus being undermined and resected. Consequently, the arterial, venous, and lymphatic circulations are preserved and work as multiple pedicles providing a normal blood supply to the abdominal wall, which is the main surgical principle. Marriage abdominoplasty combined with liposuction was reported by Shestak (1999) [63] while trying to perform both procedures to improve results.

Lipoabdominoplasty has insignificant complications following the new technique owing to the non-traumatic method of abdominoplasty and it shows very rewarding aesthetic results without any major problems. It is a safe procedure, with minimal morbidity as none of the perforating vessels is damaged. This is the main surgical principle of the method, which is fundamentally opposed to other techniques through which wide undermining and resection of the panniculus are carried out.

According to preoperative evaluation there are four types of lipoabdominoplasty: lower, upper, combined lower and upper, and full lipoabdominoplasty.

Basically, in all types of surgery full-thickness liposuction is carried out in the area of skin resection and deep liposuction (below the fascia

superficialis) is performed on the remaining abdominal panniculus.

Type 1 – lower lipoabdominoplasty is indicated when the abnormalities are located in the suprapubic area and the skin resection does not reach the umbilicus; therefore, it is not transposed. Plication of the musculoaponeurotic wall may be performed on the infraumbilical area and above the umbilicus as well. Reinforcement of the musculoaponeurotic wall may also be performed using an endoscopic procedure [64].

Type 2 – upper lipoabdominoplasty may be performed when the patient complains about excess adiposity and laxity of the skin in the supraumbilical area and laterally in the hypochondriac regions. This is not a reverse abdominoplasty as a half-moon-shaped area of skin is resected below the submammary fold bilaterally. The remaining panniculus is pulled upward obliquely to the right and left in a “V” shape.

Type 3 – lower and upper lipoabdominoplasty is indicated to treat deformities of the superior and inferior segments of the abdomen.

Type 4 – full lipoabdominoplasty is performed when the skin in the infraumbilical area is resected. Reinforcement of the musculoaponeurotic wall may be performed, although the abdominal panniculus is not undermined. The perforator vessels are preserved during the operation, which indicates the correct location of the rectus abdominalis.

Ten Surgical Principles of the Procedure:

1. The operation is performed as a closed vascular system, which represents a new concept for improving body contour. Consequently, the vascular network is not damaged; the perforator vessels supply the remaining abdominal panniculus.
2. The cutaneous excess is treated by full-thickness skin resection of the suprapubic region and/or the sub-mammary regions.
3. Deep liposuction is performed in all abdominal regions that present localized adiposity.

4. Full-thickness liposuction is always performed in the area of skin resection.
5. The connective tissue and all vessels of the skin in the resected areas are also preserved. This prevents the destruction of perforator vessels and small vessels coursing perpendicularly from the communicating network vessels situated in the fascia superficialis provided by the subdermal vascularization.
6. All perforating vessels below the remaining panniculus work as multiple pedicles.
7. The perforator vessels of the area of full-thickness liposuction become empty as blood does not pass owing to the removal of local fat tissue.
8. The lymphatic vessels, which surround the arteries and veins, are preserved, as the perforator vessels are not cut. Therefore, the lymph coming from the abdominal panniculus maintains its normal circulation after surgery, avoiding seroma formation.
9. The sensitive nerves passing together with the perforator vessels are also preserved, which provide good sensitivity after the operation.
10. As a consequence of the preservation of the sensitive nerves patients must be recommended to keep the thigh flexed 45° over the abdomen for 1 week to avoid excessive extension that may pull the abdominal panniculus too much.

In all types of lipoabdominoplasty CT must be performed preoperatively. When diastasis of the muscles is evident the thickness of the aponeurosis is quite thin and there is distance between the muscles.

No drainage is used postoperatively as the vessels (arterial, venous, and lymphatic) are not damaged during surgery and there is no bleeding during or after the operation. For these reasons lipoabdominoplasty has been performed in a closed vascular system since my original publications [15, 20, 21].

Patients may walk and be able go home on the day after surgery. The bandaging is a layer of cotton on the abdomen and a garment on top around the body which cannot be removed until they

return to the office 7 days later. After that, the garment is maintained for an additional 30–60 days, and can be removed only once a day to take a shower before putting it back on again.

It has not been necessary to perform blood transfusion in all patients since I started to employ the technique in 1998, because there is no bleeding during or after the operation owing to the preservation of the perforator vessels as the main surgical principle of lipoabdominoplasty. On the other hand, blood transfusion used to be done regularly in most cases of conventional abdominoplasty combined with liposuction owing to hemorrhage during surgery and hematoma and seroma formation postoperatively [65].

Among the last 100 patients who underwent lipoabdominoplasty, only minor complications have occurred in the form of suprapubic scars in 7 cases: scar revisions were carried out in 2 patients, extrusion of the superficial sutures in the dermis occurred in 4 patients. A patient presented a deep reaction to a stitch, with granule formation and white secretion for 6 weeks, which had to be removed under local anesthesia. Regarding the scar around the new umbilicus after full lipoabdominoplasty, it is suitable to remain inside the cavity, with excellent cicatrization after the use of the Avelar procedure [1, 3].

Major complications such as skin or panniculus necrosis, severe infections, and even systemic complications have not occurred in my last group of patients. As the perforator vessels are preserved they work as multiple pedicles, providing normal blood supply to the remaining abdominal panniculus.

Regarding the diastasis of the rectus abdominis and umbilical hernia CT is routinely carried out preoperatively to evaluate the real distance between the muscles. When diastasis is present the abdominal wall may be reinforced along the midline, but does not extend above the limit of the rib margin because there is a significant distance (about 6–8 cm) between the insertions of the muscles on the costal arch on each side of the xiphoid process. If suturing is applied to the muscles near their insertions the sutures may damage the muscular fibers with consequential bleeding. When the panniculus in the supraumbilical area

shows some sort of retraction after plication, it is secondarily caused by traction of the muscles. To solve the problem it is useful to use a thin cannula with suitable backward and forward movements without suctioning.

It is part of routine to measure the vertical and horizontal dimensions of the abdomen preoperatively. I used to measure the vertical distance from the xiphoid process to the umbilicus and to the pubis. However, during the last 6 years it was found that the panniculus of the supraumbilical area moves by sliding downward during the operation according to the traction of the abdominal flap. Therefore, that reference distance is modified during abdominoplasty when demarcation of the new umbilical area is carried out. For this reason the measurement of the vertical dimensions is more precise when it is performed from the sternal notch to the umbilicus and to the pubic bone. These distances are more stable than those taken from the xiphoid process because the surgical table returns to the horizontal position after temporary stitches are applied in the midline. Similar measurement is made postoperatively, showing almost the same distance from the sternal notch to the umbilicus, unless patients after massive weight loss present with severe ptosis of the umbilicus, which must be pulled upward during plication. This means that the location of the new umbilicus should be placed in the midline of the abdomen and at a normal level to achieve a good aesthetic position.

In addition to the vertical measurement, another three circumferences are measured – on the hypochondriac, umbilical, and iliac crest as well. Whatever the physical condition of the patients, these reference points change greatly owing to reinforcement of the musculoaponeurotic wall and/or the great improvement in the liposuction procedure.

Although reinforcement of the rectus abdominis is not a routine procedure during abdominoplasty, it is a useful step that improves the body contouring, as referred to by Nahas (2001) [66]. In a useful publication, Pontes (1966) [41] has given much attention to reconstruction of the abdominal wall, which was emphasized by Pitanguy (1967) [43].

A liposuction procedure created by Illouz (1980) [53] is performed using a cannula connected to a machine, which produces low pressure, but it may also be carried out using a syringe, as preferred by Toledo, who achieved great improvement in body contouring [67].

17.5 Informed Consent

It is part of routine to explain to patients all details during consultation, and when surgical demarcations are made in front of mirrors, in addition to showing the location of the final scars. Again, the patient is well informed with regard to the position on the bed after the operation, the risks, the limitations of the results, and above all, it is written in clear terms so as to provide sufficient information about the planned procedure. The possibility of a change in shape and character of the umbilicus should be pointed out, although when my personal procedure is carried out the final result is an aesthetic one. I do not show to patients before surgery any preoperative and postoperative photographs of previous patients, even those with similar deformities. Nevertheless, when patients ask to see some of the surgical results I allow my nurses to show them some photos from my published books.

As may happen during and after any operation, minor complications may occur following lipoabdominoplasty and general terms, including infection, skin slough, and hematoma, should be mentioned, although these are quite rare when the technique is adequately performed.

Physiotherapy assistance provides very useful support from the first day after the operation when the patient is still at the hospital, and good instructions to improve adequate circulation in the lower extremities. Fifteen days postoperatively lymphatic drainage performed two or three times a week for two months is very useful.

Conclusions

Since 1999 abdominoplasty has shown significant technical improvement because it became possible to perform it in combination with a liposuction technique through which preservation of the perforator vessels is the

main surgical principle of lipoabdominoplasty. As long as the perforator vessels are not cut during the operation the blood supply to the remaining abdominal panniculus is maintained and this works as multiple pedicles. This is the major surgical contribution with a minor rate of complications because the operation can be carried out without panniculus undermining and resection.

These surgical principles are essential for the lipoabdominoplasty procedure to improve body contouring and to employ them in several other regions, according to my original descriptions for flankplasty, torsoplasty, medial thigh lifting, and aesthetic surgery of the axillary regions.

I also employ similar surgical principles to perform face-lifting, ear reconstruction, reverse lower blepharoplasty, and other segments of the human body. Such a combined approach is so important in plastic surgery because of the suitable and physiological surgical principles in which the arterial, venous, and lymphatic structures are not cut, providing smooth and aesthetic results.

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