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ORIGINAL ARTICLE

Modified Superficial Musculoaponeurotic System Face-Lift: A Review of 327 Consecutive Procedures and a Patient Satisfaction Assessment

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Abstract
Background A conventional superficial musculoaponeurotic system (SMAS) face-lift is well established because it allows the skin envelope to be rotated in a bit more lateral direction than the cephalad redirection of the SMAS flap. This ensures an individualization of the treatment plan according to the needs of the patient and avoids a postoperative stretched look. However, this technique has some limitations with respect to its long-term effects on the sagging tissue, inadequate lifting of the malar fat pad, and flattening of the nasolabial fold.
Methods The procedure described by the authors consisted of a modified approach to conventional SMAS flap dissection for 327 patients with facial aging signs undergoing a face-lift. A pointing tongue-shaped flap of zygomaticotemporal fascia was dissected and preserved in the posterior half of the upper edge of the SMAS flap and anchored to the deep temporal fascia, enhancing the vertical support of the facial soft tissues. Outcomes were determined by case notes, clinical review, and a questionnaire.
Results The study investigated 327 consecutive modified SMAS face-lifting procedures. Few complications were observed. Only two patients experienced small hematomas needing evacuation. Some patients reported bearable pain in the temporal region and tension during mouth opening. Temporary weakness in the branches of the facial nerve experienced by two patients resolved completely within some months. Two patients presented with dehiscence of the scar, and one patient experienced punctual retroauricular skin necrosis, which healed uneventfully with conservative treatment. Two patients reported that the knot in the temporal region was palpable through the skin. One patient experienced retroauricular infection. Only two patients required additional procedures. One mild hypertrophic scar responding to steroid injection over the mastoid area was observed in the entire series. With the reported technique, the authors achieved pleasing, natural, durable results with minimal morbidity and an overall complication rate of 3.9%. All the patients were sent a satisfaction questionnaire or contacted for a telephone interview. A total of 235 patients replied. The patients reported high levels of satisfaction after treatment.
Conclusions The authors believe that the rhytidectomy technique described in this report has several beneficial attributes. High vertical elevation of the SMAS flap delivers a long-lasting benefit and addresses the problem of neck laxity and platysma redundancy, leading to a correction of the neck contouring and jowls. Nasolabial folds appear to be smoothed, and malar flattening is restored by imbrications of the SMAS flap over the cut edge in the malar prominence. This investigation demonstrates that the rhytidectomy technique is safe and produces highly predictable results.

Keywords Face-lift · Modified conventional SMAS face-lift · Patient satisfaction outcomes · Rhytidectomy · SMAS

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In 1968, Skoog [1] was the first to include the platysma of the lower face as facial anatomy to be moved in facial rejuvenative surgery. This deep-layer method together with the description of the superficial musculoaponeurotic system (SMAS) by Mitz and Peyronie [2] in 1976 changed the way many surgeons viewed the surgical face-lift. Since then, the use of rhytidectomy techniques involving the SMAS to rejuvenate sagging facial tissues has withstood the test of time to become a reliable technique for the restoration of facial youth. This evolution has been related directly to the scientific investigation of facial soft tissue anatomy, resulting in a better understanding of the anatomic changes in the soft tissues of the face that occur with the aging process. Although many technical approaches to rhytidectomy exist to date, the question about which face-lift procedure is best still is under debate [3–5].

A commonly used technique is the conventional SMAS face-lift because of its safety and aesthetic versatility [6, 7]. Conventional SMAS dissection is effective for minimizing the jowls and highlighting the mandibular angle. Through two-vector aesthetic control, an individualization of the treatment plan according to the needs of the patient is ensured. Additionally, a tightening of the deep facial structures with no tension on the facial skin is provided, avoiding any postoperative stretched look. Despite its popularity, this procedure is criticized because it does not adequately lift the malar fat pad and flatten the nasolabial fold (NLF). Furthermore, the long-term outcomes seem to be poor [3–5, 7].

However, successful and safe use of the infrazygomatic SMAS has encouraged the authors to make this procedure their mainstay of facial rejuvenation, to rethink the extent of sub-SMAS dissection in the zygomaticotemporal region, and to tailor the SMAS flap to overcome the aforementioned disadvantages. The authors present their personal face-lift technique in this report. They review the case notes (outcomes and complications) and photographic records of 327 patients who have undergone a modified SMAS face-lift over the 5-year period between April 2004 and April 2009.

Patients and Methods

Patients

In the 5-year period between April 2004 and April 2009, 11 men and 316 women underwent surgery. Their mean age was 51.1 years (range, 38–75 years). The follow-up period ranged from 10 to 40 months (average, 22.3 months).

Methods of Treatment

General anesthesia was used in the majority of cases, with 53 patients receiving local anesthesia sedation. In all cases, the face was infiltrated subcutaneously with a solution containing saline, 1:200,000 adrenaline, and lidocaine.

A vertical incision approximately 5 cm long was outlined just above the upper pole of the ear in the temporal region, inside the scalp (3–5 cm posterior to the hairline) or around the sideburn when it was too high. The drawing then was made downward, curving in front of the ear and passing in front or in back of the tragus (the authors preferred a retrotragal direction) and in front of the ear lobe.

Finally, the marking was continued behind the ear, ending upward and posterior as a classic retroauricular face-lift incision. The skin flap was elevated, with care taken to leave some fat intact along the superficial surface of the SMAS, especially in the regions wherein the SMAS was to be elevated because the more substantial the SMAS flap, the better the long-term results that can be obtained in terms of facial contouring. The extent of dissection proceeded up to 1 cm lateral to the lateral orbital rim, across the malar region over the superior border of the zygoma, and along the nasolabial fold to a point 2 cm lateral to the oral commissure. In the temple, the authors used a two-plane technique and preserved the superficial temporal vessels when possible.

The zygomatic arch then was identified, and a transverse incision 2–3 cm long was made in the SMAS just 1 cm inferiorly (to ensure facial nerve branch preservation in this area) and parallel to it. The incision then was angled superiorly and backward toward the temple, intersecting the preauricular SMAS incision to raise a pointing tongue-shaped flap (Fig. 1) in the posterior half of the SMAS flap's upper portion as an extension of the same flap to be fixed to the deep temporal fascia as a firm anchor point. Care was taken to avoid injury to the frontal branch of the facial nerve.

During the sub-SMAS dissection, the deep facial fascia was not violated, thus likely preventing facial nerve injury. The dissection then was performed over the parotid (with the end point of the sub-SMAS dissection just beyond the anterior border of the parotid gland) and masseter muscle medially and inferiorly to the platysma. Attention was paid to preserve branches of the facial nerve by leaving the deep fascia untouched.

A deep plane over the sternocleidomastoid (SCM) muscle fascia was entered to elevate the platysma flap off the SCM muscle. Thus, the greater auricular nerve that lies deep to the superficial layer of the investing deep fascia as it ascends vertically over the SCM muscle was preserved, and the sensory innervation for the skin over both surfaces of the outer ear was respected. Adequate mobilization of the flap could be determined by observing the effect of facial contouring when traction on the SMAS was applied.

The SMAS was raised off the parotid fascia, elevated for some centimeters vertically (at least 3 cm but also 6–7 cm

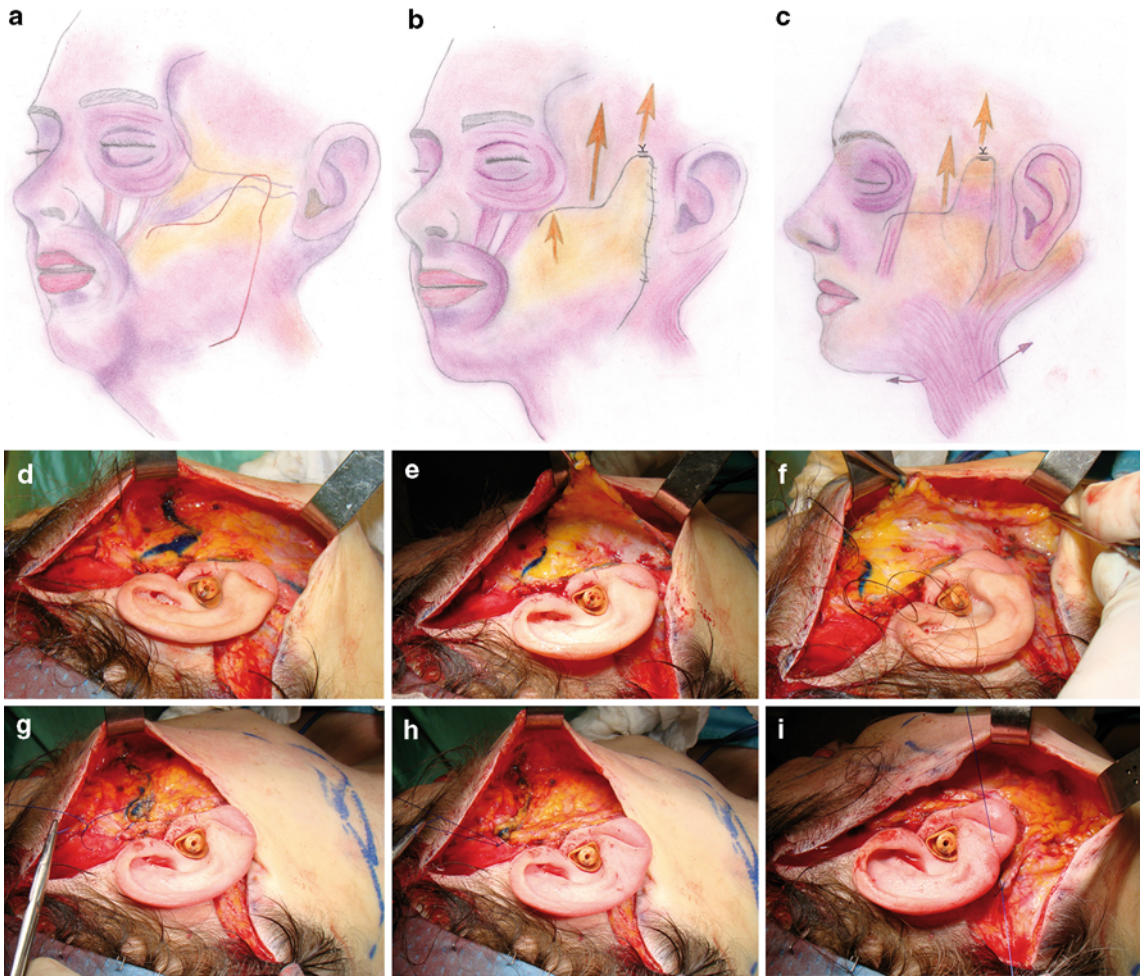

Fig. 1 **a–c** Schematic drawing showing the modified design of the incisions for treatment of the superficial musculoaponeurotic system (SMAS) during the face-lift. **d–i** Intraoperative image. **d–f** A pointing tongue-shaped flap is dissected and preserved in the posterior half of the SMAS flap's upper edge. **g**, **h** The SMAS flap then is elevated for some centimeters vertically and anchored to the deep temporal fascia, enhancing the vertical support of the facial soft tissues. **i** Using the redundant edge of the SMAS as an extension, the SMAS-platysma flap is fixed posteriorly to the mastoid fascia under maximum tension, exerting lateral pull through which neck contour is restored. The flap is transposed under the angle of the mandible to avoid any bulk and to enhance the angle shape

depending on the intraoperatory effect of such a maneuver on the tightening of the deep layers), and securely fixed to the deep temporal fascia with 2/0 nonresorbable suture. The knots were buried in the soft tissue to prevent them from being visible or palpable through the skin. In the neck, the platysmal bands were divided through the face-lift incision, obtaining good results for most patients without creation of a separate submental incision. For severe platysmal bands, a submental incision and midline plication could be necessary.

Using the redundant edge of the SMAS as an extension, the SMAS-platysma flap was fixed posteriorly to the mastoid fascia under maximum tension working as a bowstring and exerting lateral pull through which the neck contour was rebuilt. Provided that the flap was transposed under the angle of the mandible, no bulk was noted, and the angle shape was enhanced. High vertical suspension enabled the SMAS flap to be imbricated over the cut edge in the malar prominence to restore the volumetric loss of the malar eminence. Furthermore, rarely, a varied degree of SMAS plication on an oblique line between the angle of the mandible and lateral canthus parallel to NLF was combined with our technique to achieve further smoothing of the NLF when SMAS was observed to be too thin and tenous.

The skin was carefully redraped without tension in a line directed slightly more posteriorly and obliquely than the vertically directed SMAS suspension. The temple skin was first trimmed and inset without tension, followed by the occipital skin over the mastoid. Then the skin was fixed above and behind the ear without tension. The pretragal skin was adjusted and inset in a retrotragal position without tension. The skin incisions were closed over a closed suction drain (size, 10 Fr), which was removed the next day while the face-lift dressings were changed.

Postal Questionnaire and Telephone Interview

Between May and August 2009, all the patients were sent the following questionnaire to assess their satisfaction and long-term response to the face-lift procedure:

1. On a scale of 0 (disappointed) to 10 (very satisfied), how satisfied are you with the treatment?
2. Are the required effects of the rhytidectomy still maintained?
3. What is your self-impression about the outcomes?
4. How long did it take for you to be socially presentable after the face-lift?
5. Would you recommend this treatment to other patients?

The patients who did not reply were contacted by telephone and interviewed using the same questionnaire.

Results

In our study, 327 patients (11 men and 316 women) underwent a facial rejuvenation procedure consisting of a modified face-lift technique according to the authors' method (Figs. 2, 3, 4, 5, 6) with or without a simultaneous upper and/or lower blepharoplasty, submental liposuction, and lipofilling. Of the 327 patients, 149 underwent only rhytidoplasty, 170 had blepharoplasty, and 8 received fat grafts in the lips.

The complications observed were few, and only two patients returned to the operating theater during the first hours of the postoperative period for evacuation of small hematomas under local anesthesia. All underwent evacuation without noticeable effect on the final cosmetic outcome.

During the first postoperative days, some patients experienced a bearable pain in the temporal region, which was limited to moderate tension during mouth opening due to the traction on the temporal fascia. Temporary weakness in the frontal branch of the facial nerve experienced by one patient resolved completely within 4 months, whereas a similar condition affecting the buccal branches in another patient was restored in 6 months. Two patients presented with dehiscence in a small portion of the scar, and one patient (a smoker) experienced punctual skin necrosis (diameter, <1 cm) in the retroauricular area, which healed uneventfully with conservative treatment. Two patients reported that the knot in the temporal region was palpable through the skin. One patient experienced retroauricular infection, which was resolved with antibiotics.

Only two patients required an additional procedure respectively 9 months and 1 year after the initial surgery because they were disappointed in the lack of improvement in the jowls. They underwent a simple minimal access craniofacial suspension lift on both sides. One mild hypertrophic scar responding to steroid injection over the mastoid area was observed in the entire series. The overall complication rate was very low (Table 1).

In all but two patients, a natural result with improvement of the jowls, mandible, and neck contour was obtained. The authors' approach allowed the subcutaneous tissues in the face to be elevated, alleviating jowling and providing an improvement in neck contour. Smoothing of the NLF was excellently achieved, and malar volume loss was restored by imbrications of the SMAS flap over the cut edge in the malar prominence.

A total of 115 patients (35.1% of all cases) responded to the postal survey (Table 2). An additional 120 patients (36.7%) responded to the telephone interview (Table 2; Figs. 7, 8). Of all these patients, 101 had received their treatment in the preceding 1 year, 41 in the previous 1–2 years, 42 in the preceding 2–3 years, and 51 more than 3 years before. High levels of satisfaction were achieved with the authors' face-lift technique, and 95% of the responders were willing to recommend this procedure to other patients. All the responders stated that the effects of rhytidectomy had been maintained.

Discussion

Facial aging is caused by a multitude of factors: the years of gravitational pull on the soft tissues between the skin and the facial skeleton, loss of skin elasticity caused by intrinsic and extrinsic factors, possible facial deflation caused by fat atrophy [8], and even bony resorption [9]. These different possibilities explain the multitude of therapeutic approaches proposed in the literature [10–17]. Together with the increase in the number of procedures, there also is an increase in the number facialplasty techniques.

A careful selection of rhytidectomy technique and adjuvant procedures should be made to provide the patient with a harmonious result. Since the first description of the SMAS [2], surgical solutions for facial rejuvenation have supplemented external incision. These solutions utilize skin-tightening rhytidectomies with direct procedures involving the SMAS.

The conventional SMAS face-lift is one of the most commonly performed rhytidectomy techniques [3, 7, 18]. Although it produces an adequate tightening of the deep facial structures, with no tension on the facial skin, effects on malar ptosis and on the NLF are demonstrated to be fair [3, 7, 19]. Thus, to improve rejuvenation of the midface, extended SMAS procedures and both deep-plane and composite rhytidectomies have been described [19–22]. As a matter of

Fig. 2 A 62-year-old woman with facial laxity who underwent the modified superficial musculoaponeurotic system (SMAS) face-lift. *Upper panel*: Preoperative view. *Lower panel*: View 8 months postoperatively. Note the improvement in the nasolabial folds and in neck laxity

Fig. 3 *Upper panel*: A 47-year-old patient who underwent face-lift. *Lower panel*: Postoperative result at 1 year. Neck laxity is dramatically improved, and malar volume restoration has been achieved

Fig. 4 Photographs of a 52-year-old patient obtained preoperatively (*upper panel*) and 11 months postoperatively (*lower panel*) after a modified superficial musculoaponeurotic system (SMAS) face-lift

fact, extended SMAS procedures and composite rhytidectomies require more extensive dissection with increased soft tissue reaction and surgical risks such as nerve injury [23], resulting in prolonged postoperative recovery time [20, 21, 24, 25].

Several studies [4, 5, 7] have evaluated differences in face-lifting techniques with respect to duration and satisfaction with results. The findings showed that the clinical outcomes of limited and conventional SMAS face-lifts are similar to those of extended SMAS and composite rhytidectomies [3]. Failure to demonstrate any long-lasting significant superiority of extended procedures over conventional procedures or any appreciable long-term differences among them has made it difficult to justify these aggressive procedures.

The authors began to practice face-lifting in the middle 1990s when it was believed that the more extended the sub-SMAS dissection, the longer-lasting and better the results. Since then, their philosophy has changed and currently focuses on the true need of patients to overcome disappointing consequences linked to high surgical risks and prolonged hospital stays. Morbidity should be minimal. Downtime should be short, and patients should be socially presentable after a few days. Consequently, the increased surgical risks, morbidity, and convalescence associated with more aggressive procedures do not seem to be warranted in routine rhitydectomy cases.

A real balance between patient requests and surgical risks should be found, and realistic expectations should be maintained. Thus, the authors actually perform a conventional SMAS face-lift in which the SMAS flap design and sub-SMAS dissection are modified to follow a personal approach. A zygomaticotemporal fascia flap cephalic to the zygomatic arch is preserved in the posterior half of the SMAS flap's upper edge and anchored to the deep temporal fascia, enhancing the vertical support of the facial soft tissues. A youthful neck contour is restored by splitting the SMAS-platysma flap and pulling the inferior limb in a lateral direction, then fixing it to the mastoid fascia. Once the SMAS has been fixed, the skin is redraped in an oblique direction without tension.

The authors' rhytidoplasty produces safe, reliable results with few untoward effects, as described in the Results section. The prime advantage lies in skin undermining performed separately from SMAS dissection, which allows these two layers to be redraped along vectors independent

Fig. 5 *Upper panel*: A 55-year-old man who underwent the authors' face-lift procedure. *Lower panel*: Postoperative result at 1 year

Fig. 6 A 54-year-old patient before (*upper panel*) and after (*lower panel*) modified superficial musculoaponeurotic system (SMAS) face-lift and upper blepharoplasty. The sagging tissues of the face are still well corrected 3 years after the rhytidectomy

of one another. The direction that facial fat descends in aging varies from patient to patient, and the direction in which this descended fat is reelevated through the redraping of the SMAS dissection should be individualized for the specific aesthetic needs of the patient. In general, the skin envelope is rotated in a direction a bit more lateral

Table 1 Complications among 327 consecutive modified superficial musculoaponeurotic system (SMAS) face-lift procedures

Complications	No. of cases	%
Dehiscence	2	0.6
Haematoma	2	0.6
Nerve weakness	2	0.6
Palpable knot in temporal region	2	0.6
Additional procedure required	2	0.6
Hypertrophic scar	1	0.3
Punctual necrosis	1	0.3
Retroauricular infection	1	0.3

Table 2 Results of patient satisfaction survey

Question	Postal response *n* (%)	Telephone interview response *n* (%)	Total *n* (%)
Satisfaction			
0–3	0 (0)	0 (0)	0 (0)
4–6	4 (3.4)	6 (5)	10 (4.2)
7–9	12 (10.4)	14 (11.6)	26 (11.0)
10	99 (86.2)	100 (83.4)	199 (84.6)
Effects maintained			
Yes	112 (97.4)	115 (95.8)	227 (96.5)
Not sure	3 (2.6)	5 (4.2)	8 (3.4)
No	0 (0)	0 (0)	0 (0)
Self-impression			
Natural	115 (100)	120 (100)	235 (100)
Stretched	0 (0)	0 (0)	0 (0)
Back to social life			
Too long	0 (0)	0 (0)	0 (0)
Long	3 (2.6)	7 (5.8)	10 (4.2)
Sufficient	30 (26)	31 (25.8)	61 (26)
Quick	78 (68)	72 (60)	150 (63.8)
Very quick	4 (3.4)	10 (8.4)	14 (6)
Recommend			
Yes	111 (96.6)	113 (94.1)	224 (95.3)
Not sure	4 (3.4)	7 (5.9)	11 (4.7)
No	0 (0)	0 (0)	0 (0)

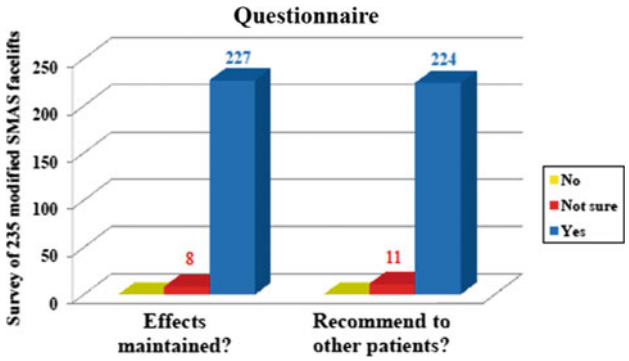

Fig. 7 Survey of the 235 patients who underwent a modified superficial musculoaponeurotic system (SMAS) face-lift and responded to the questionnaire

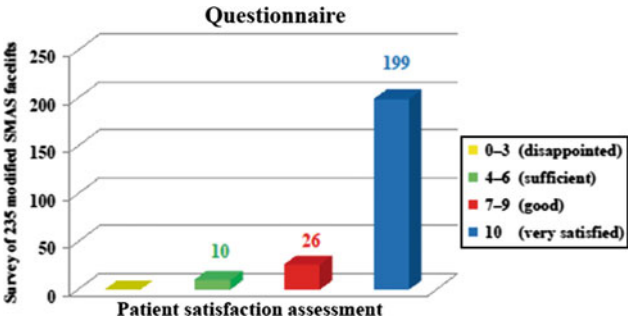

Fig. 8 Satisfaction assessment among the 235 patients who underwent our modified face-lift and responded to the questionnaire

than the cephalad redirection of the SMAS flap. This enhances the overall result because the dissection of the superficial fascia allows the jowls to be re-elevated and the descended malar fat to be moved back upward into the face toward its previous normal anatomic locations. Thus, the typical surgical treatment appearance of the excessive skin-tightening face-lift is avoided. High vertical elevation of the SMAS flap fixed to the deep temporal fascia rather than the cut superior edge of the SMAS delivers a long-lasting benefit and addresses the problem of neck laxity and platysma redundancy, leading to a correction of the neck contouring and jowls. The NLF is smoothed, and malar flattening is overcome by imbrications of the SMAS flap over the cut edge in the malar prominence.

The extension of the modified SMAS flap has the advantage of providing both a sufficient malar augmentation and an effect on the jowls and neck. However, the benefit of the high dissection could be offset somewhat by a less efficient effect on the jowls. The greater distance between the point of fixation and the jowls in the extended technique accounts for this difference. Therefore, in these cases, a rather oblique plication with nonabsorbable stitches is added when the effects on the NLF appear to be poor, especially when the SMAS is thin and tenuous. This technique has provided the authors with excellent results because it offers a more effective rejuvenation of the jowl, jaw line, and deep NLF than the conventional SMAS face-lift.

This study had several limitations because it was retrospective and did not compare authors' face-lift technique with other methods. The authors also have relied on patients' feedback and perception of their treatment's long-term efficacy. The high satisfaction score reported by the patients is, nevertheless, reassuring. Additionally, patient

satisfaction was maintained for a long time after treatment, which provides indirect evidence of the treatment's long-term efficacy.

Conclusions

Facial aging should be evaluated as a global process. The facial fat descent process occurs in every structure of the face in different ways depending on the vector of descent. Thus, facial rejuvenation must address all the structures involved, including the SMAS, platysma, and skin, using different vectors in pursuit of facial harmony restoration.

This report describes the authors' experience performing rhytidectomy with a modified approach. Accordingly, the authors emphasize that when a multivector technique with the SMAS-platysma rotation flap face-lift is used, most of the changes that occur with aging are addressed and corrected in an anatomic fashion, resulting in an aesthetically pleasing result. High levels of satisfaction, high patient acceptability, and maintenance of results long after treatment were achieved with the authors' face-lift treatment.

The authors believe that the rhytidectomy technique described in this report has several beneficial attributes. First, the SMAS suspension appears to deliver a long-lasting benefit, overcoming the disadvantages attributed to conventional SMAS face-lifting. Moreover, the dissection is extended inferiorly to the platysma, which allows for a vertical and lateral pull of the SMAS-platysma complex as well. The result is a tightening of the entire deep musculofascial corset of the face. Second, the rhytidectomy technique never places the skin under more than normal tension and thus avoids a postoperative stretched look. Facial contouring is best restored through deep-layer support instead of tension in skin flap redraping. Third, the two-vector technique is versatile. It can be adapted and individualized to meet specific deformities or patient desires. Fourth, neck laxity and platysma redundancy are improved as well, and the NLF is smoothed. Moreover, SMAS imbrication assures malar projection.

Finally, this investigation demonstrates that when properly performed, the type of rhytidectomy the authors describe is safe, produces highly predictable results, and provides both natural appearances and effective antigravity effects.

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