

Combined Arcus Marginalis Release, Preseptal Orbicularis Muscle Sling, and SOOF Plication for Midfacial Rejuvenation

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Abstract. Improvements have been made throughout the history of medicine, causing physicians to abandon a technique or medications clearly shown to be suboptimal. Unfortunately, this has not happened with rejuvenative surgery. Conventional lower eyelid procedures continue to include removal of orbital fat in most cases, and facelift procedures remain primarily a lateral vector pull. The unfortunate results of these traditional procedures are becoming easy to recognize. Optimal rejuvenation of the lower eyelid complex should be based on the principle that the contour changes characterizing aging involve not only prolapse of orbital fat, but also descent of the cheek tissues, resulting in accentuation of the orbital rim and tear trough groove. Although the necessity of preserving fat and repositioning the soft tissues of the midface has been widely accepted, there still is wide disagreement among authors as to the best approach and surgical technique. This report describes a surgical technique for lower lid midfacial rejuvenation that is a composite of several previously published approaches with some modifications, particularly in the way the Sub-Superficial Musculo Aponeurotic System (SMAS) fat pad is plicated and the midfacial tissues suspended. The technique is simple and safe, resulting in a pleasing natural midface contour.

Key words: Midface rejuvenation—Blepharoplasty—SOOF

As long as our perception of youth and beauty continues to be admired, there will be a demand for aesthetic surgery [27]. Despite the increasing demand, there has been little real change in traditional techniques [18] to improve immediate and long-term re-

sults, or to satisfy the changing request of patients wishing more and more for a “natural” rejuvenation [23]. It is clear now that optimal facial rejuvenation includes excellent skin health, appropriate surgical procedures, and an overall holistic approach to facial surgery [10].

The central third of the face is critical to a youthful appearance and the key to a harmonious rejuvenation [4]. Unfortunately, midfacial rejuvenation has long been a difficult area for surgeons [9]. The midface is an area where definite and consistent improvement still is hard to achieve [4]. Effective methods were developed for the treatment of the nasolabial fold and sagging cheek, but these still were not very effective for the improvement of the V deformity of the eyelid–cheek interface known as the tear-trough deformity [34]. When facial middle third structures are not adequately repositioned, the unopposed tension of lateral vector face-lifts allows the cheek tissues to descend eventually over the tightened jawline [18]. The tissues of the lower eyelid and upper cheek continue to age, creating a “lateral sweep” of the lower face as these malar soft tissues descend at a more rapid rate than the repositioned (SMAS) [15,18].

Appreciation of this problem has recently stimulated the search for better techniques to lift the midface, soften the nasolabial fold, and efface the tear-trough deformity [38]. To obtain the fullness of youth, it is essential to restore the midface volumes [20] and reposition the shifting tissues. By creating a narrower, more shallow orbit, the surgeon can create a truly youthful eyelid–cheek complex [3].

Aging usually shows first on the anterior mobile area of facial expression [21]. With age, there is an overall decrease in thickness of the skin, with a significant decrease in the area of the cheek. Laxity is noticed, with folds and wrinkles at various retaining points or areas of repeated muscle activity [41]. Skin

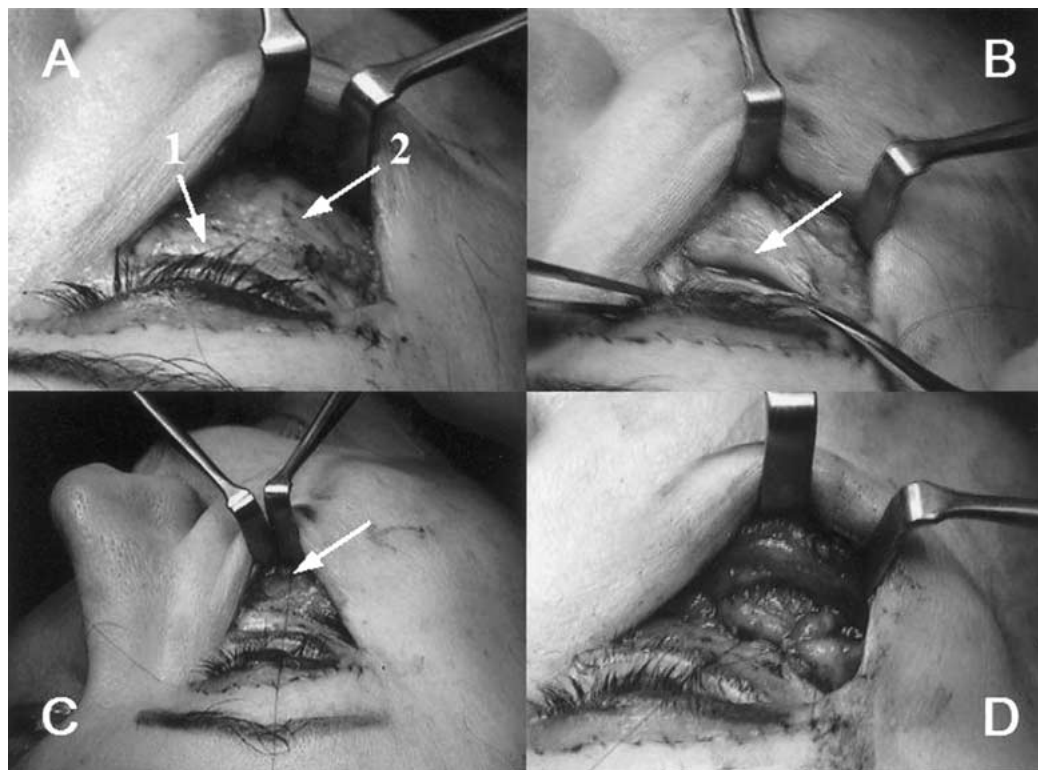


Fig. 1. (A) Subciliary incision with a submuscular-SMASplane of dissection exposing orbital fat (1) and sub-SMAS fat pad (SOOF) (2). (B) Limited inferior orbital floor periosteal flap elevation. Periosteum incised along the orbital rim. (C) Plication suture placed at the caudal extension of the fat pad close to the nasolabial fold (arrow). (D) Fat pad plicated and anchored to the inferior orbital periosteal flap.

texture changes, loss of elasticity, formation of wrinkles, enophthalmos, anterior displacement of fat with lower eyelid orbital fat prolapse, and progressive exposure of underlying skeletal anatomy characterize the aging process of the lids [3,15]. By the third decade of life, the suborbital orbicularis oculi fat begins to descend. In association with the orbital septum weakness and forward bowing with subsequent protrusion or pseudoherniation of intraorbital fat, the classic “double convexity deformity” is formed [12,13,31,39].

In addition to this, and contrary to the findings of previous work, the craniofacial skeleton remodels throughout adulthood, moving the orbital rim posteriorly relative to the anterior cornea. There is a tendency for the cheek mass to move posteriorly as well [32]. It seems, therefore, that changes in the skeletal architecture impart their effects to the overlying soft tissues. Thus, facial aging is a summation of both hard and soft tissue changes [32].

Conventional lower eyelid procedures continue to include removal of orbital fat in most cases [15,18]. The unfortunate results of these traditional procedures are becoming easy to recognize [18]. The lower eyelid contour becomes deeper, and often a hollow appearance develops [18]. Removal of eyelid fat simply converts the “double-convexity deformity” to a “concavity-convexity deformity” [12]. This com-

bined with the lateral vector facelift techniques produces the pulled “operated” appearance [15,18]. Overresection of orbital fat during lower blepharoplasty accentuates also the proptotic appearance of the eye that occurs naturally with age as a result of orbital remodeling [32].

Throughout the history of medicine, improvements have led physicians to abandon a technique or medications clearly shown to be suboptimal. Unfortunately, this has not happened with rejuvenative surgery [17]. Currently, eyelid rejuvenation surgery finally is shifting slowly from pure fat removal to preservation and repositioning of periorbital fat to [38] recreate a youthful shallow and narrow lower eyelid contour [4,15,34]. By the preservation of periorbital fat, the hollowed-out orbit, often seen after traditional blepharoplasty, can be avoided [7,12,25,38]. Overall satisfaction with the fat-preserving techniques has led some authors to abandon the conventional type of fat resection blepharoplasty completely [11,15,18].

Surgical Technique

Through a regular subciliary incision, a musculocutaneous flap is developed. Dissection in the preseptal

suborbicularis plane is extended to the level of the inferior orbital margin. The firm attachments of the SMAS to the orbital bony rim are then incised, and the suborbicularis/sub-SMAS dissection is carried beyond the orbital margin anterior to the suborbicularis oculi fat (SOOF) pad and its inferior malar extension to the level of the nasolabial fold. The periosteum then is incised just distal to the insertion of the orbital septum along the inferior orbital rim, and subperiosteal dissection performed cephalad for 3 to 5 mm over the orbital floor. Fine nonabsorbable sutures then are placed between the exposed caudal part of the fat pad and the cephalad periosteal flap folding the fat on itself.

In some patients with very deep nasolabial folds, this plication technique may accentuate the fold even further. In such situations, the suspension sutures are placed in the SMAS layer overlying the distal fat pad. Usually three sutures are necessary to achieve a complete plication and lifting from medial to lateral (Fig. 1). At this stage, arcus marginalis release is performed, and the periorbital fat is redraped over and beyond the inferior orbital area superficial to the plication sutures. Limited fat resection may be required in some cases. Finally, the preseptal orbicularis oculi muscle is pulled laterally and superiorly and sutured to the periosteum of the lateral orbital rim in a position superior to the lateral canthus attachment. Excess muscle and skin are excised conservatively as required.

Discussion

The objective of facial rejuvenative surgery is to restore a youthful contour [13]. Midfacial vertical vector lift is essential to the achievement of this goal. Debate about how this may be effected, however, continues to create much confusion, raising many controversies. Accurate and detailed knowledge concerning the anatomy of the midface must be the base of reference in dealing with this important area of the face [1,41]. Contrary to what Mitz and Peyronie [29] have described, the subcutaneous fascial-fatty layer is a separate layer and superficial to the SMAS [41]. This layer in the anterior midface thickens and creates the cheek or malar fat pad, which is adherent densely to the overlying skin [41]. This malar fat pad must not be confused with other fat deposits located deeper to the inferior extension of the orbicularis oculi [4,41,42]. At the lid-cheek junction, the SMAS merges with the orbicularis oculi muscle deep to most of the cheek mass so that the two entities may be considered as one layer [41]. The suborbicularis oculi fat SOOF, consisting of the suprapariosteal submuscular fat excess situated over the zygoma [13], probably should be more appropriately referred to as the sub-SMAS malar fat pad. Below the inferior orbital rim also are dense ligamentous attachments distinct from the arcus mar-



Fig. 2. Midfacial rejuvenation.

ginalis, which have firm attachments with the overlying SMAS and soft tissues [41]. These attachments must be incised to expose the sub-SMAS fat pad.

Various lower blepharoplasty techniques have been described in the literature. However, very often, the value and appropriate indication for each individual technique have not been sufficiently delineated [14]. Traditional surgical approaches to the aging lower eyelid use either the transconjunctival or the subciliary approach with a skin or a skin-muscle flap, which consists mainly of fat, skin, and muscle resection. None of these procedures address the multiple problems of the aging eyelid [28]. Deformities secondary to the widespread and almost universal use of the conventional face-lift and blepharoplasty techniques seem to be growing by epidemic numbers. The unfortunate appearance after surgery is the fault of neither the surgeon nor the patient, but frequently both get blamed. Unwanted and unattractive results are rather the natural byproducts of the techniques used [17,18]. Transblepharoplasty cheek lifting, innovative canthoplasty, and canthopexy techniques developed lately have paved the way for a safe return to subciliary blepharoplasty surgery at the expense of the transconjunctival approach [38].

Multiple approaches, including the endoscopic approach, are available for rejuvenation of the aging midface [24,33,35]. Numerous techniques also are available for increasing the central volumes [23]. Orbital fat preservation as a primary procedure cre-

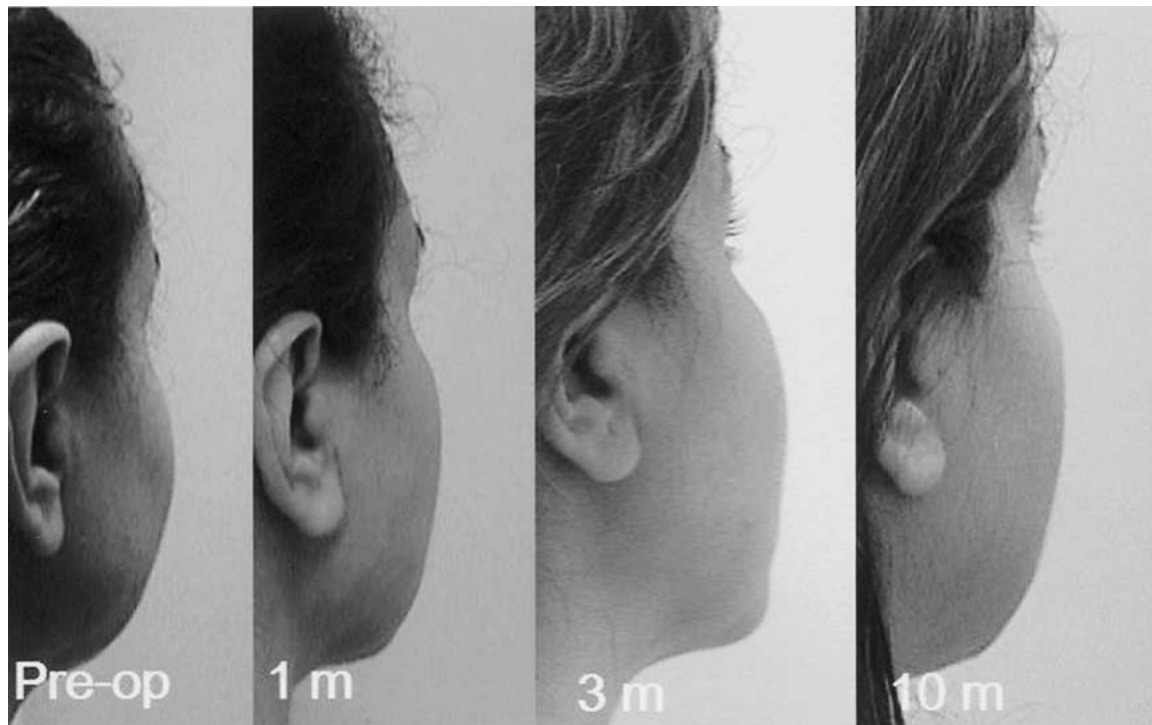


Fig. 3. Improvement in cheek contour.

ates a harmonious facial rejuvenation, avoiding hollow eyes while creating a youthful eyelid–cheek complex contour [17,40]. The new concepts that give a large place to lipostructure also have achieved great successes [23]. Nevertheless, vertical elevation and suspension of tissues still constitute the essence of midfacial rejuvenation. The level of undermining, the transection of the retaining ligaments, the vector of tissue elevation, and, in particular, the stabilization of the superficial musculoaponeurotic system recently have been the subject of extensive debate. Although authors agree on the necessity of repositioning the soft tissues of the midface, they disagree as to the best approach and surgical technique.

Rejuvenation of the lower eyelid complex should be based on the principle that the contour changes characteristic of aging involve not only prolapse of orbital fat, but also descent of the cheek tissues, resulting in accentuation of the orbital rim and tear-trough groove [11]. The supraperiosteal submuscular fat excess situated over the zygoma contributes largely to the aesthetic deformity of the lower lids [2]. Once the etiology of the deformity and the associated periorbital anatomy are recognized, local assessment, careful preoperative planning of surgical treatment, and conservative tissue resections can help to minimize complications and optimize results [20]. Lateral sweep and hollow eyes can therefore be easily avoided by addressing these issues with fat redistribution/repositioning and superior vector midfacial lift [7,11,15,17,18]. The negative vector, a sign of generalized maxillary hypoplasia common with advancing

age, is a further warning sign against conventional lower periorbital fat resection [32]. The technique described in this report is a composite of several previously published approaches with some modifications particularly in the way the SOOF (sub-SMAS fat pad) is plicated and the midfacial tissues are suspended.

Dissection of the midfacial structures may be accomplished through subperiosteal, preperiosteal, submusculocutaneous, or subcutaneous planes. The vertical subperiosteal approach to the midface was described by Tessier in 1979, and the vertical preperiosteal midface approach by Hinderer in 1985, followed by de la Plaza in 1988 [5,21]. Subperiosteal dissection by means of lower eyelid incisions with good aesthetic results have been described, but at the expense of increased morbidity and complications [34]. When performed in the subperiosteal plane, distal incision of the periosteum, usually by an intraoral upper sulcus approach, is required. Otherwise, the relatively rigid and inelastic periosteum will fail to displace superiorly. It must be noted that gravitational forces have a greater impact on the fat pads and soft tissues overlying the periosteum to which they are loosely attached. The effects of gravity in the midface become more pronounced the more superficial the facial layer [4]. To reverse the ptosis of aging by tightening a deeper layer requires extraordinary tension on the tissues and overcorrection [4,16,19,22]. The superficial layers, however, tend paradoxically to slide over in a downward direction, thus minimizing the net visible lift. Moreover, the deeper the plane of

dissection, the greater the swelling, and the longer it will last [4].

The midface also may be approached endoscopically by means of a combined temporal slit incision and upper oral sulcus incision. No eyelid access is needed [34]. The vertical lifting of the cheek however, produces, recruitment of excess skin on the lower eyelid that can be treated with either carbon dioxide laser resurfacing or a “skin-only” blepharoplasty without incisions in the lower eyelid orbicularis oculi muscle [34]. Although periorbital fat pseudoherniation still may be corrected with this approach, the benefits of preserving the orbicularis oculi muscle intact still need to be fully proved to justify this complex and difficult surgical exposure. As long as a subciliary skin incision still may be required, it seems rather strange not to approach the midface directly.

On the other hand, SOOF lift blepharoplasty, consisting of primary vertical suture suspension of the fat pad, has been described as a safe and simple component of global facial rejuvenation [6,9,38]. However, when the fat pad is dissected in a preperiosteal plane, fatty tissues do not provide a stable grip for suspension and will invariably stretch with time and sag. When the anterior surface of the fat pad is exposed, the fat will not displace superiorly in a satisfactory manner unless its deep surface also is liberated preperiosteally. When this is done, the fatty layer usually becomes attenuated and is not adequate for rigid suspension. Subcutaneous suspension of the superficial malar fat pad also has been described. However, this technique requires a preauricular face-lift incision, with extensive subcutaneous dissection [4].

Sustaining an exaggerated elevation requires placement of the suspension sutures in tissue strong enough to hold the suture and fixation to an immobile anchoring point [36]. Stabilization of the vertically elevated soft tissues remains, however, a constant problem and limits long-term results. Animation of the upper lip mimetic muscles, tissue friability about the sutures, and gravitational forces tend to mar the long-term results of the suspension techniques [4]. Sub SMAS fat pad (SOOF) plication, as described in this report, is an alternative to vertical pulling. It results in the desired midface elevation and malar augmentation with minimal vertical vector pull. Caudal placement of the plication sutures simulates the cheek imbrication described by Ramirez [34]. Arcus marginalis release and preseptal orbicularis sling suspension are other surgical techniques described for lower lid rejuvenation [15,18,26,30]. When these are combined with sub-SMAS plication, as reported, a natural midface rejuvenation appearance with a highly pleasant profile is produced (Figs. 2 and 3). The technique is simple and safe, and does not require extensive dissection nor sophisticated equipment. It can be considered as an integral part of blepharoplasty and is perfectly suitable for patients refusing the idea of more extensive lifting

procedures but willing to accept a relatively inconspicuous subciliary incision.

References

1. Accioli de Vasconcellos JJ, Brotto JA, Henin D, Vacher C: The fascial planes of the temple and face: an en bloc anatomical study and a plea for consistency. *Brit J Plast Surg* **56**:623–629, 2003
2. Aiache AE, Ramirez OH: The suborbicularis oculi fat pads: An anatomic and clinical study. *Plast Reconstr Surg* **95**:37–42, 1995
3. Baylis HI, Goldberg RA, Kerivan KM, Jacobs JL: Blepharoplasty and periorbital surgery. *Dermatol Clin* **15**:635–647, 1997
4. De Cordier B, de la Torre JI, Al-Hakeem MS, Rosenberg LZ, Costa-Ferreira A, Gardner PM, Fix RJ, Vasconez LO: Rejuvenation of the midface by elevating the malar fat pad: Review of technique, cases, and complications. *Plast Reconstr Surg* **110**:1526–1536, 2002
5. de la Torre JI, Rosenberg LZ, De Cordier BC, Gardner PM, Fix RJ, Vasconez LO: Clinical analysis of malar fat pad relevation. *Ann Plast Surg* **50**:244–248, 2003
6. De La Plaza R, Valentine E, Arroyo JM: Supraperiosteal lifting of the upper two-thirds of the face. *Br J Plast Surg* **44**:325–332, 1991
7. Eder H: Importance of fat conservation in lower blepharoplasty. *Aesth Plast Surg* **21**:168–174, 1997
8. Fayman MS, Potgieter E: Zygomaticus major advancement as an adjunct to lower blepharoplasty. *Aesth Plast Surg* **26**:26–30, 2002
9. Freeman MS: Rejuvenation of the midface. *Facial Plast Surg* **19**:223–236, 2003
10. Giambrone H: The ultimate in facial rejuvenation: The mid-face-lift. *Plast Surg Nurs* **21**:147–150, 2001
11. Goldberg RA: Transconjunctival orbital fat repositioning: Transposition of orbital fat pedicles into a subperiosteal pocket. *Plast Reconstr Surg* **105**:743–748, 2000
12. Goldberg RA, Edelstein C, Balch K, Shorr N: Fat repositioning in lower eyelid blepharoplasty. *Semin Ophthalmol* **13**:103–106, 1998
13. Goldberg RA, Edelstein C, Shorr N: Fat repositioning in lower blepharoplasty to maintain infraorbital rim contour. *Facial Plast Surg* **15**:225–229, 1999
14. Gubisch W: The value of various techniques for esthetic correction of the lower eyelid. *Handchir Mikrochir Plast Chir* **31**:113–120, 1999
15. Hamra ST: Arcus marginalis release and orbital fat preservation in midface rejuvenation. *Plast Reconstr Surg* **96**:354–362, 1995
16. Hamra ST: Composite rhytidectomy. *Plast Reconstr Surg* **90**:1–13, 1992
17. Hamra ST: Correcting the unfavorable outcomes following face-lift surgery. *Clin Plast Surg* **28**:621–638, 2001
18. Hamra ST: Prevention and correction of the “face-lifted” appearance. *Facial Plast Surg* **16**:215–229, 2000
19. Hamra ST: The deep-plane rhytidectomy. *Plast Reconstr Surg* **86**:53–61, 1990
20. Hamra ST: The role of orbital fat preservation in facial aesthetic surgery: A new concept. *Clin Plast Surg* **23**:17–28, 1996

21. Hinderer UT: Vertical preperiosteal rejuvenation of the frame of the eyelids and midface. *Plast Reconstr Surg* **104**:1482–1499, 1999
22. Ivy EJ, Lorenc ZP, Aston SJ: Is there a difference? A prospective study comparing lateral and standard SMAS face lifts with extended SMAS and composite rhytidectomies. *Plast Reconstr Surg* **98**:1135–1143, 1996
23. Jauffret JL, Magalon G: Volume and facial rejuvenation. *Ann Chir Plast Aesthet* **48**:332–338, 2003
24. LaFerriere KA, Kilpatrick JK: Transblepharoplasty: Subperiosteal approach to rejuvenation of the aging midface. *Facial Plast Surg* **19**:157–170, 2003
25. Li S, Liu Y, Li Y: Lower lid blepharoplasty by using the principles of plastic surgery and the technique of orbital fat release. *Zhonghua Zheng Xing Wai Ke Za Zhi* **16**:171–173, 2000
26. Maillard GF: Arcus marginalis release. *Plast Reconstr Surg* **98**:910–911, 1996
27. Matarasso A: Facialplasty. *Dermatol Clin* **15**:649–658, 1997
28. Millman AL, Williams JD, Romo T III, Taggart N: Septal-myocutaneous flap technique for lower lid blepharoplasty. *Ophthal Plast Reconstr Surg* **13**:84–89, 1997
29. Mitz V, Peyronie M: The musculoaponeurotic system (SMAS) in the parotid and cheek area. *Plast Reconstr Surg* **58**:80–88, 1976
30. Mladick RA: The muscle-suspension lower blepharoplasty. *Plast Reconstr Surg* **64**:171–175, 1979
31. Muhlbauer W, Holm C: Orbital septorhaphy for the correction of baggy upper and lower eyelids. *Aesth Plast Surg* **24**:418–423, 2000
32. Pessa JE, Desvigne LD, Lambros VS, Nimerick J, Sugunan B, Zadoo VP: Changes in ocular globe-to-orbital rim position with age: Implications for aesthetic blepharoplasty of the lower eyelids. *Aesth Plast Surg* **23**:337–342, 1999
33. Ramirez OM: High tech face-lift. *Aesth Plast Surg* **22**:318–328, 1998
34. Ramirez OM: Three-dimensional endoscopic midface enhancement: A personal quest for the ideal cheek rejuvenation. *Plast Reconstr Surg* **109**:329–340, 2002
35. Ramirez OM, Pozner JN: Subperiosteal minimally invasive laser endoscopic rhytidectomy: The SMILE facelift. *Aesth Plast Surg* **20**:463–470, 1996
36. Tebbetts JB: SMAS fixation to the facial skeleton: Rationale and results [discussion]. *Plast Reconstr Surg* **100**:1834, 1997
37. Tessier P: New face lifts: preface. *Ann Chir Plast Esthet* **20**:463–470, 1989
38. Turk JB, Goldman A: SOOF lift and lateral reticular canthoplasty. *Facial Plast Surg* **17**:37–48, 2001
39. Wang J, Jia Z, Lu W: Orbicularis oculi muscle suspension and orbital septum fixation in blepharoplasty. *Zhonghua Zheng Xing Shao Shang Wai Ke Za Zhi* **15**:265–266, 1999
40. Xing X, Ouyang T, Sun L: Orbital fat preservation and orbicularis muscle flap suspension for lower eyelid pouches. *Zhonghua Zheng Xing Shao Shang Wai Ke Za Zhi* **15**:135–137, 1999
41. Yousif NJ, Mendelson BC: Anatomy of the midface. *Clin Plast Surg* **22**:227–240, 1995
42. Yousif NJ, Sonderman P, Dzwierzynsky WW, Larson DL: Anatomic considerations in transconjunctival blepharoplasty. *Plast Reconstr Surg* **96**:1271–1276, 1995