Anatomicohistologic Study of the Retaining Ligaments of the Face and Use in Face Lift: Retaining Ligament Correction and SMAS Plication

Ragip Özdemir, M.D., Hidir Kilinç, M.D., R. Erkin Ünlü, M.D., A. Çağri Uysal, M.D., Ömer Şensöz, M.D., and C. Nazmi Baran, M.D.

Ankara, Turkey

Plastic surgeons have sought to improve nasolabial folds, jowls, jaw lines, and cervical contour with face-lifting procedures that are abundant in the literature. The retaining ligaments of the face support facial soft tissue in normal anatomic position, resisting gravitational change. As this ligamentous system attenuates, facial fat descends into the plane between the superficial and deep facial fascia, and the stigmata of facial age develop. In this study, surgical correction of the retaining ligaments and plication of the superficial musculoaponeurotic system (SMAS) to reposition the structures that have descended with gravitation are discussed. The anatomy of the facial retaining ligaments was studied in 22 half-faces of 11 fresh cadavers, and the localization, extension, and width of the ligaments were examined macroscopically and histologically. Surgical correction of the retaining ligaments and plication of the SMAS have been accomplished in 27 face-lift patients with this anatomicohistologic study taken into consideration. There was hematoma in one patient at the cheek region and a permanent dimple caused by postoperative edema in two patients, with a localization of one zygomatic and two parotidomasseteric ligaments. In one patient, hypesthesia in the mandibular nerve region was seen, which remitted at 14 weeks. There were no other complications, and with a follow-up of 24 months, excellent aesthetic results and a high level of patient satisfaction were encountered. (*Plast. Reconstr. Surg.* 110: 1134, 2002.)

The retaining ligaments of the face support facial soft tissue in normal anatomic position, resisting gravitational change. As this ligamentous system attenuates, facial fat descends into the plane between the superficial and deep facial fascia, and the stigmata of facial age develop. A loss of zygomatic ligament support allows for inferior descent of the malar pad, influencing nasolabial fold prominence, whereas a loss of masseteric ligament support allows for the inferior descent of facial fat to the mandibular border, leading to the formation of facial jowling. Repositioning of the descended fat pads culminates in a young face. There is both a quantitative and a qualitative change that occurs in facial fat with aging. The anatomic location of the facial fat in youth determines facial shape. Typically, the youthful face is full of well-supported fat, overlying the malar region, and overlying the parotid and masseter in the lateral cheek, secondary to the intact intrinsic support of the retaining ligament system. This is associated with a concavity or depression overlying the buccal recess, just anterior to the masseter. The combination of fullness in the malar region and the lateral cheek and concavity overlying the buccal recess accounts for the angular appearance of the youthful face. As the human face ages, facial fat descends and facial shape changes. In the older face, fat situates anteriorly and inferiorly, producing a facial contour that is square in configuration, with little difference between malar highlight and midfacial fat on the frontal view. As facial fat situates inferiorly in the face, the face also appears longer.[1]

The definition of the retaining ligaments of

From the Department of Plastic and Reconstructive Surgery, Ankara Numune Hospital. Received for publication June 25, 2001; revised January 28, 2002.

DOI: 10.1097/01.PRS.0000021442.30272.0E

the face was first described by McGregor with the zygomatic cutaneous ligament (McGregor's patch), and Furnas, Mendelson, and Stuzin et al. have reported their clinical experience and anatomic study and results to date.[1–7] More recently, fixation at the midcheek level has been advocated by Stuzin et al. and Mendelson, who stated that the skeletal attachments of the soft tissues of the cheek are in the shape of an inverted L. At the angle of the L is the main zygomatic ligament just lateral to the zygomaticus major. The horizontal limb extends medially across the zygoma and maxilla in relation to the origins of the zygomatic muscle and levator labii superioris. The vertical limb of the L is formed by the masseteric cutaneous ligaments of the masseter fascia. Both the horizontal and vertical attachments are stronger nearer to the angle of the L.[1,3,4,6]

The anatomy of the facial retaining ligaments was studied in 22 half-faces of 11 fresh cadavers (Fig. 1), and the localization, width, and extension of the ligaments were examined macroscopically and histologically (Fig. 2). Surgical correction of the retaining ligaments and plication of the superficial musculoaponeurotic system (SMAS) was accomplished in 27 facelift patients, with this anatomicohistologic study taken into consideration.

Anatomicohistopathologic Study

The anatomy of the retaining ligaments was studied in 22 half-faces of 11 fresh cadavers, six men and five women, with ages ranging between 28 and 87 years. The localization, extent, and width of the ligaments were investigated. The length of the ligament was taken as the distance between its origin and its end at the dermis. The histology of the extent of these ligaments was examined by multiple full-thickness biopsy specimens obtained during dissection that was held under 4× loupe magnification. The histologic specimens were stained with Masson trichrome.

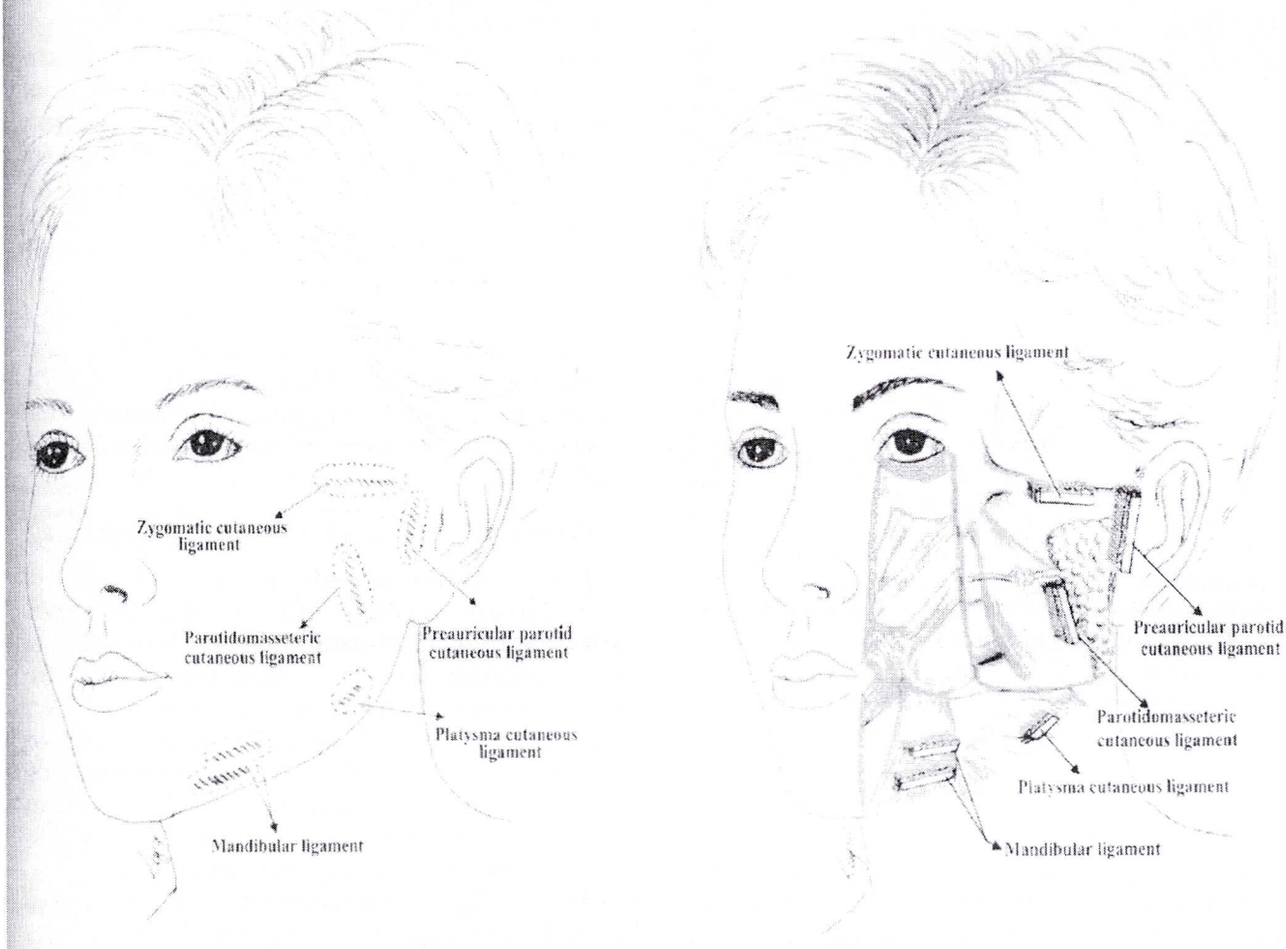

Fig. 1. The localizations (*left*) and extent (*right*) of the retaining ligaments of the face.

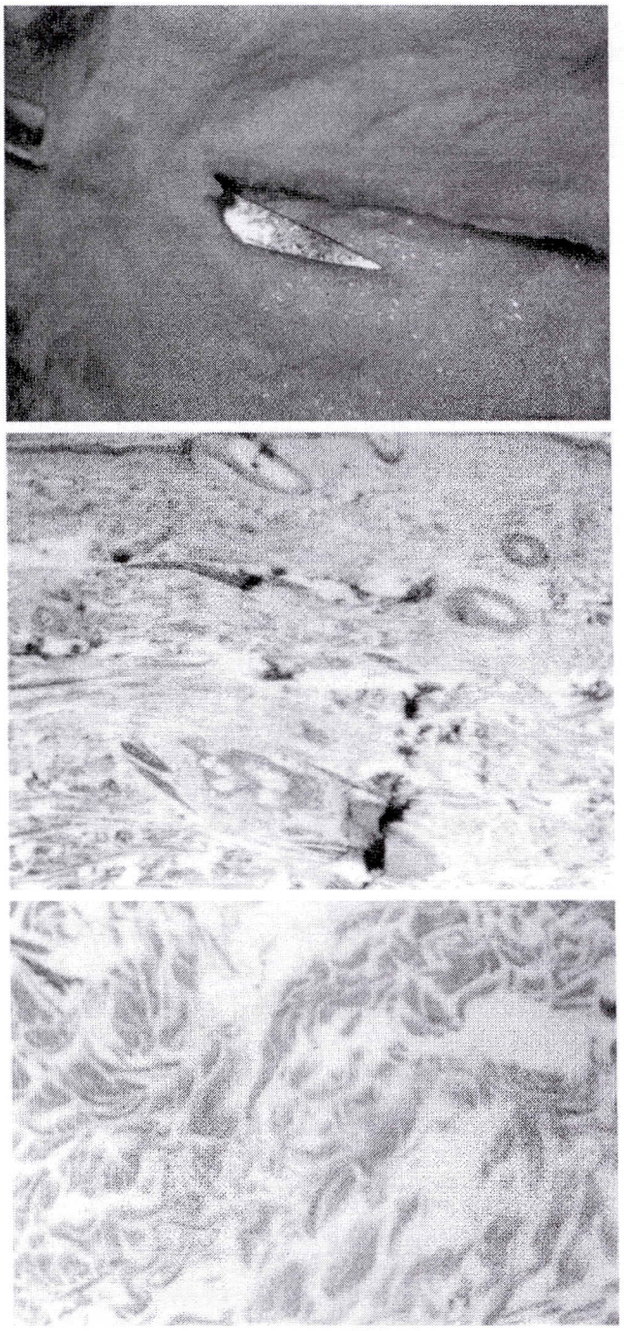

FIG. 2. (*Above*) View of the zygomatic cutaneous ligament in a cadaver dissection. From the dermis (*center*), extending to the periosteum (*below*), significant collagenized connective tissue formation (Masson trichrome: ×10).

ZYGOMATIC CUTANEOUS LIGAMENT (MCGREGOR'S PATCH)

Furnas has described the zygomatic ligaments as the stout fibers that originate at or near the inferior border of the anterior zygomatic arch, behind the insertion of the zygomaticus minor muscle, and they insert in the skin serving as an anchoring point. A typical grouping is a bundle of white, firm fibers 3 mm in width and 0.5 cm in thickness located 4.5 cm in front of the tragus. Anterior to this first bundle may be a second bundle, similar in width and half as thick; interspersed around these two bundles will be several smaller bundles. Typically, an artery and a sensory nerve course to the skin in the company of these bundles. The ligaments are approximately 6 to 8 mm in length, traveling directly from the zygomatic bone to the dermis.[2,5]

Owsley stated that in the region of the anterior border of the masseter, there was a vertical septum that extended between the investing masseteric fascia and the overlying SMAS, and the septum varied in density and strength, being strongest superiorly in the region of the junction between the zygomatic arch and the body of the zygoma.[8] Greenberg noted the presence of a small buccal branch of the facial nerve and a branch of the transverse facial artery in the midportion of this patch.[9] McGregor described the ligament as the area of fibrous attachment between the anterior edge of the parotid fascia and the dermis of the skin of the cheek.

In our study, the zygomatic cutaneous ligament is located 5 to 9 mm posterior to the zygomaticus minor muscle and inferior to the zygomatic arch, 4.2 to 4.8 cm in front of the tragus, with a length of 1.8 to 3.4 cm and a width of 2.9 to 3.4 mm in men. It is 3.9 to 4.5 cm in front of the tragus, with a length of 1.6 to 3.0 cm and a width of 2.7 to 3.3 mm in women. A small branch of the zygomatic branch of the facial nerve and a branch of the transverse facial artery were identified traveling in the company of the middle portions of the ligament. The extent of the ligament ranged from 7 to 10 mm (Fig. 3, *left*) between skin and zygoma, which was identified by using Masson trichrome stain (Fig. 3, *right*).

PREAURICULAR PAROTID CUTANEOUS LIGAMENT

Furnas stated that the posterior border of the platysma receded into an intricate fascial condensation that often attached intimately to the overlying skin, providing firm anchorage between the platysma and the dermis of the inferior auricular region, and some cutaneous branches of the great auricular nerve were often seen on the surface of the ligament or interwoven with the fibers to supply the sensation underlying the parotid fascia.[2,5]

The preauricular parotid cutaneous ligament is localized in the anteroinferior auricular region, vertical preauricularly, with a length

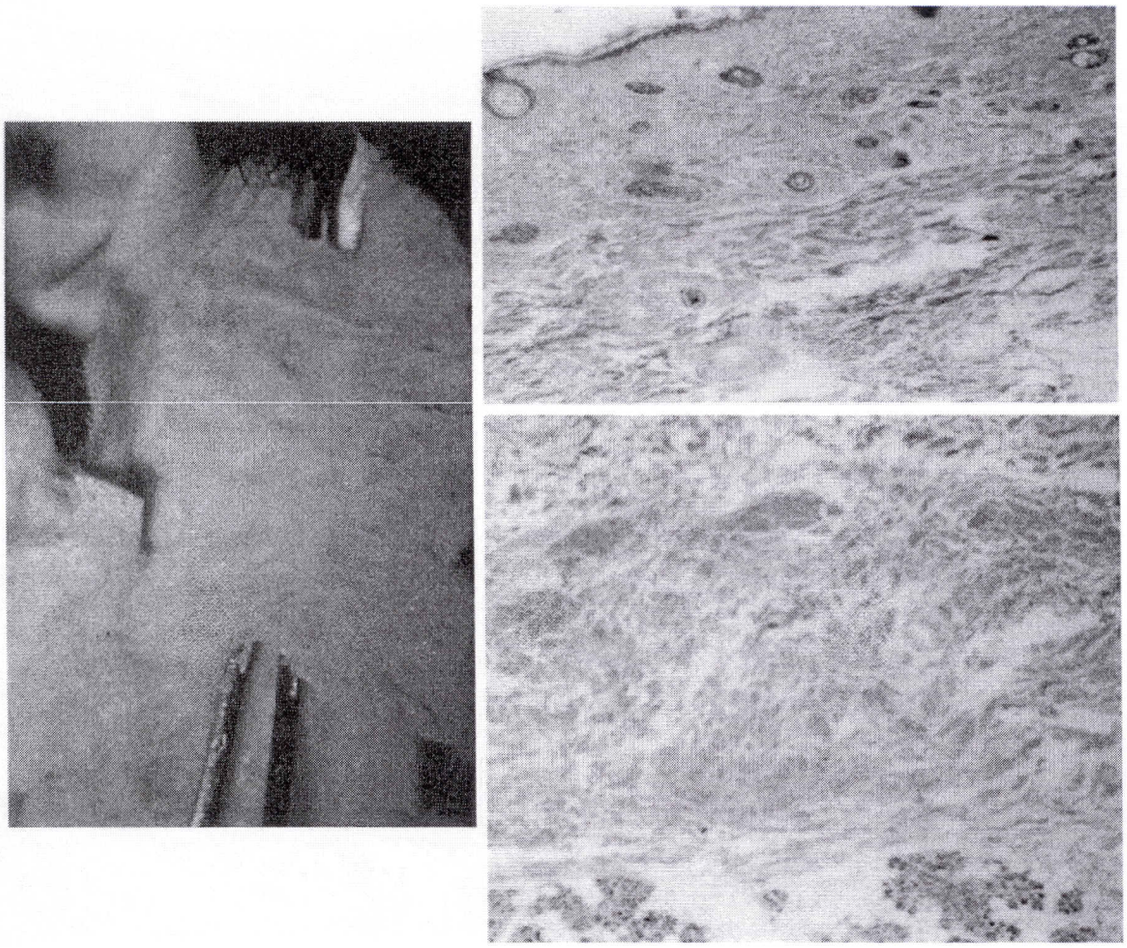

FIG. 3. (*Left*) View of the preauricular parotid cutaneous ligament in the cadaver dissection. (*Right*) From the dermis (*above*), extending to the salivary gland (*below*), significant collagenized connective tissue formation (Masson trichrome: ×10).

of 2.7 to 3.1 cm and a width of 2.3 to 2.8 mm in men and with a length of 2.4 to 2.8 cm and a width of 1.9 to 2.5 mm in women. During the dissections, a cutaneous nerve was identified in the ligament (Fig. 4, *left*). The presence of the ligament extending between skin and parotid fascia macroscopically was supported by histologic examination using Masson trichrome stain (Fig. 4, *right*).

PAROTIDOMASSETERIC CUTANEOUS LIGAMENT

Stuzin et al. emphasized the fibrous structure extending between masseter and skin, with a vertical orientation and neighboring with the zygomatic branch of the facial nerve, and stressed the necessity of caution in this region of dissection.[1,3] Mendelson explained the inverted L orientation of the cheek ligaments and noted the parotidomasseteric ligament extending between the masseteric fascia and the skin.[4,6]

The direction of the ligament is not completely vertical but is somewhat oblique, with localization in the distal portion of the parotid gland and the middle of the masseter muscle, indicating variations not only in cadavers but also in patients. The zygomatic branch of the facial nerve is observed in close proximity to the ligament, in which neither an artery nor a nerve was identified. The length of the ligament is 1.8 to 2.7 cm and the width is 1.2 to 1.8 mm in men and 1.6 to 2.4 cm and 1.1 to 1.5 mm in women, respectively (Fig. 5, *above*). The extension of the ligament between skin and parotidomasseteric fascia is determined with Masson trichrome staining of the histologic specimens (Fig. 5, *center* and *below*).

PLATYSMA CUTANEOUS LIGAMENT

Furnas observed that the aponeurotic connections were sometimes seen between the anterior platysma and the skin of the middle and anterior cheek, which were the bands of condensed connective tissue that pass obliquely

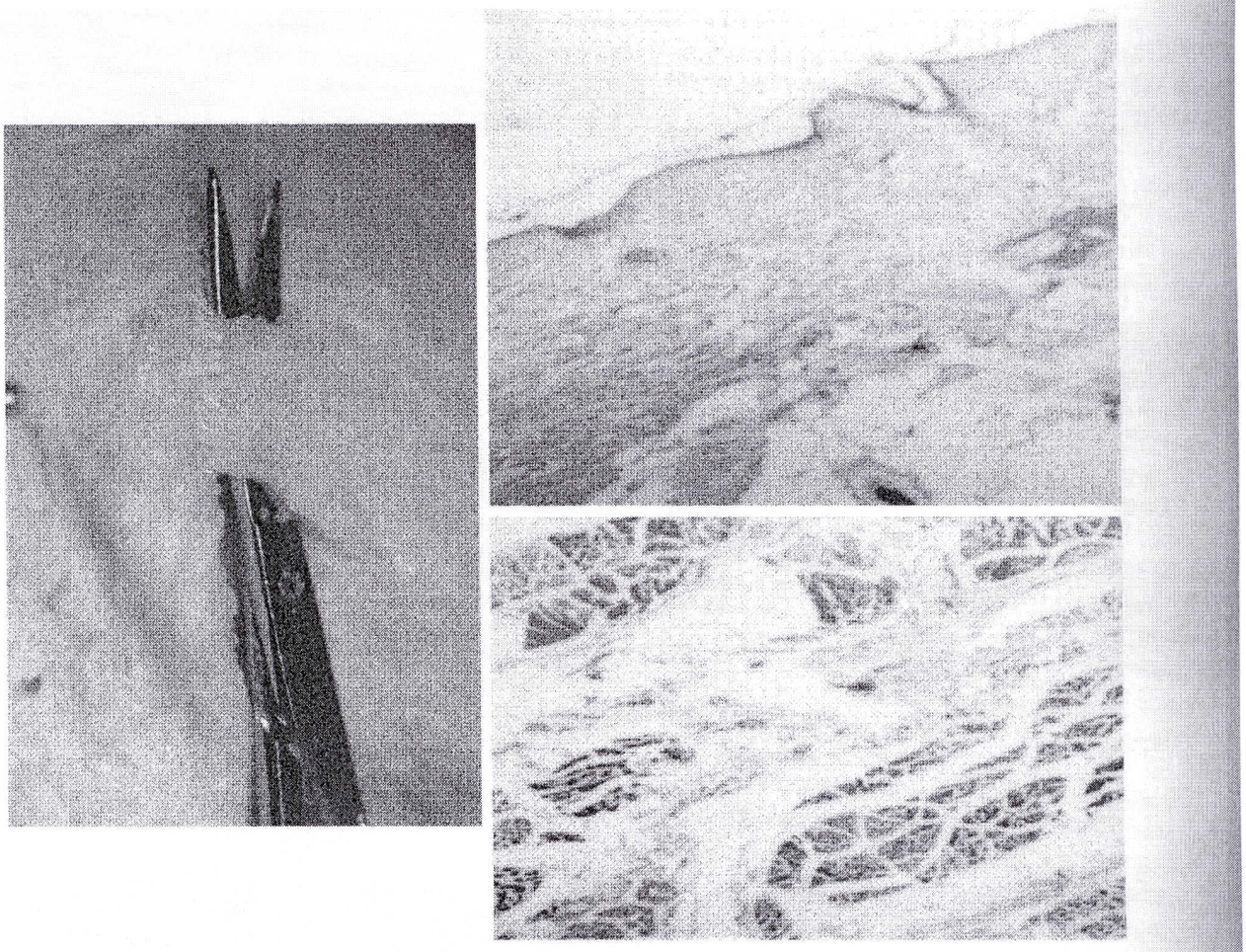

FIG. 4. (*Left*) View of the parotidomasseteric cutaneous ligament in the cadaver dissection. (*Right*) From the dermis (*above*), extending to the parotidomasseteric fascia (*below*), significant connective tissue formation (Masson trichrome: ×10).

forward from the platysma to the dermis.[2,5] The ligament was encountered in only eight of the cadavers, and in many of the cadavers and the patients, the ligament was observed to be in a septal form rather than in a significant ligamentous form (Fig. 6, *left*). The observed connections are localized between the mandibular body and angle superiorly, and the extension between skin and parotid fascia is supported by histologic examination using Masson trichrome stain (Fig. 6, *right*).

MANDIBULAR LIGAMENT

Furnas reported that the mandibular ligaments originated from bone along a line that was about 1 cm above the mandibular border and that extended along the anterior third of the mandibular body, and that these ligaments usually appeared as a linear series of parallel fibers. It was noted that, typically, a second tier of fibers was aligned 2 to 3 mm above and parallel to the first tier, and these fibrous bundles interdigitated among the muscle fibers of the platysma and triangularis along their line of attachment. The ligaments were said to be taking a path perpendicular to the skin and were about 4 to 5 mm long, usually accompanied by a sensory nerve and a cutaneous artery. It was stated that the posterior limit of the mandibular ligament was usually palpable as a firm, sharp border, the position of which coincided with the anterior margin of the jowl area.[2,5]

The ligament is observed superiorly along the mandibular body and parasymphysis, between skin and bone, and two distinct fibrous structures are obviously dissected. A cutaneous sensory nerve and an artery in between two fibers are identified. The length is 2.4 to 3.2 cm in men and 2.2 to 3.1 cm in women. The width is 2.8 to 3.4 mm in men and 2.5 to 3.4 mm in women (Fig. 7). The histologic examination confirmed the presence of the extension of the ligament in between skin and the periosteum of the mandible (Fig. 7, *right*).

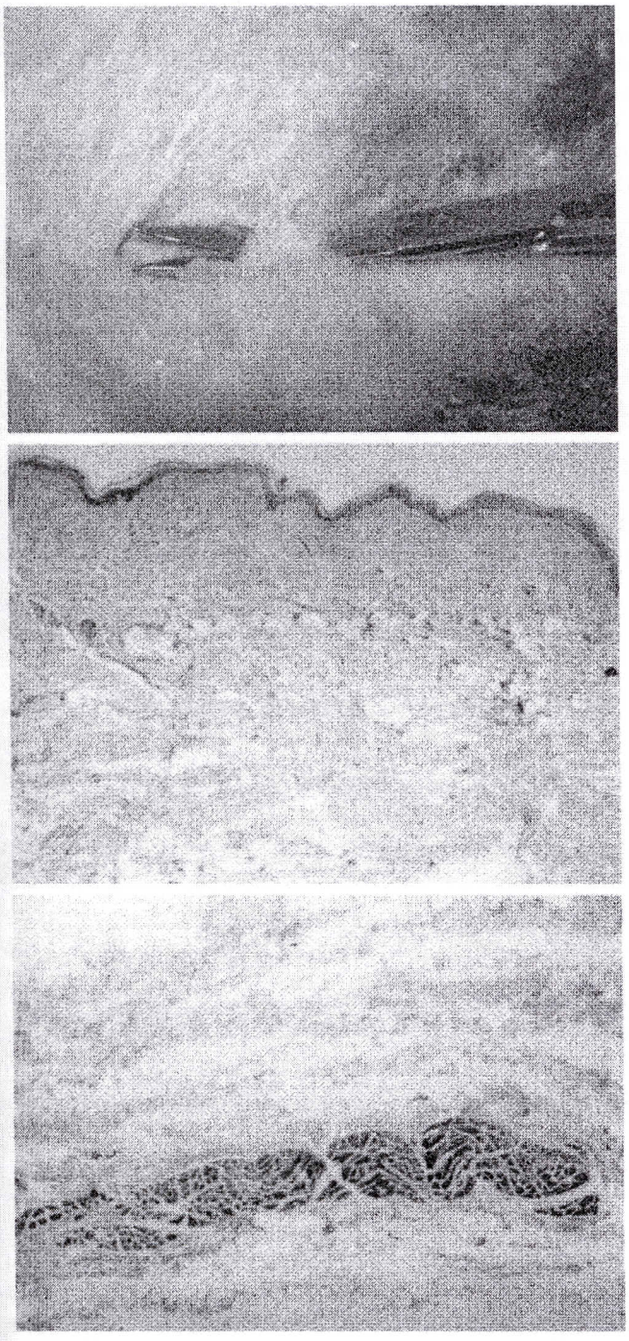

FIG. 5. (*Above*) View of the platysma cutaneous ligament in a cadaver dissection. From the dermis (*center*), extending to muscle tissue (*below*), significant connective tissue formation (Masson trichrome: ×10).

CLINICAL APPLICATION

Correction of the retaining ligaments and plication of the SMAS in between the retaining ligaments were accomplished in 27 face-lift patients, with the anatomicohistologic study and the literature to date taken into consideration. The age of the patients ranged between 37 and 67 years. There were eight men and 19 women. Twenty-one of the patients were primary face-lift patients and six were secondary face-lift patients. Meanwhile, six of the patients underwent blepharoplasty.

SURGICAL TECHNIQUE

The presumptive localization of the retaining ligaments and the incision plan of the face lift were designed, and 6 ml of local anesthetic solution containing 2% lidocaine hydrochloride and 0.025% adrenaline was diluted with 6 ml of saline solution and applied to one-half of the face and, in the patients who underwent blepharoplasty, to the eyelids. After 5 to 10 minutes of vasoconstriction, first of all, according to the septo-orbitoperiosteoplasty technique, blepharoplasty was accomplished in six patients.[10]

The skin incisions are planned as oblique posterior vertical incisions in the temporal region, appropriate to the preauricular skin crease in front of the tragus, and to the crease between the ear lobule and skin, through the postauricular crease and to the occipital area. The skin flap is elevated superior to the superficial temporal fascia and hair follicles in the temporal region according to the supra-SMAS face-lift technique. Under 4× loupe magnification, the zygomatic ligament is dissected in the zygomatic region. If the artery and the nerve are identified, these are preserved to avoid disturbing the nourishment and sensation of the skin, and the attachment of the ligament to the subcutaneous tissue is dissected sharply. The dissection is continued toward the preauricular region, marking the ligament with a suture. In the preauricular region under 4× loupe magnification, the parotid cutaneous ligament is dissected and separated sharply from

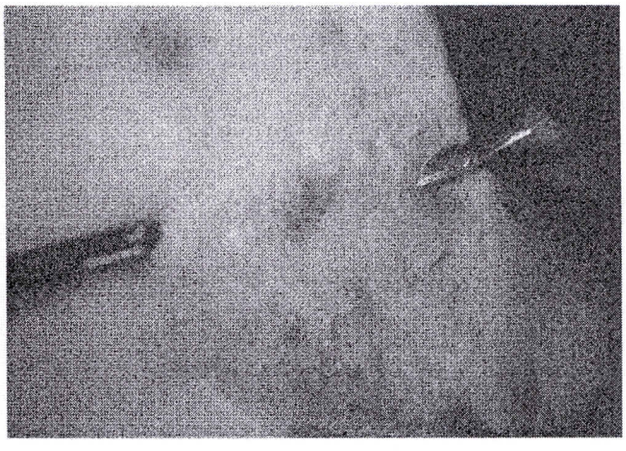

FIG. 6. View of the mandibular cutaneous ligament in a cadaver dissection.

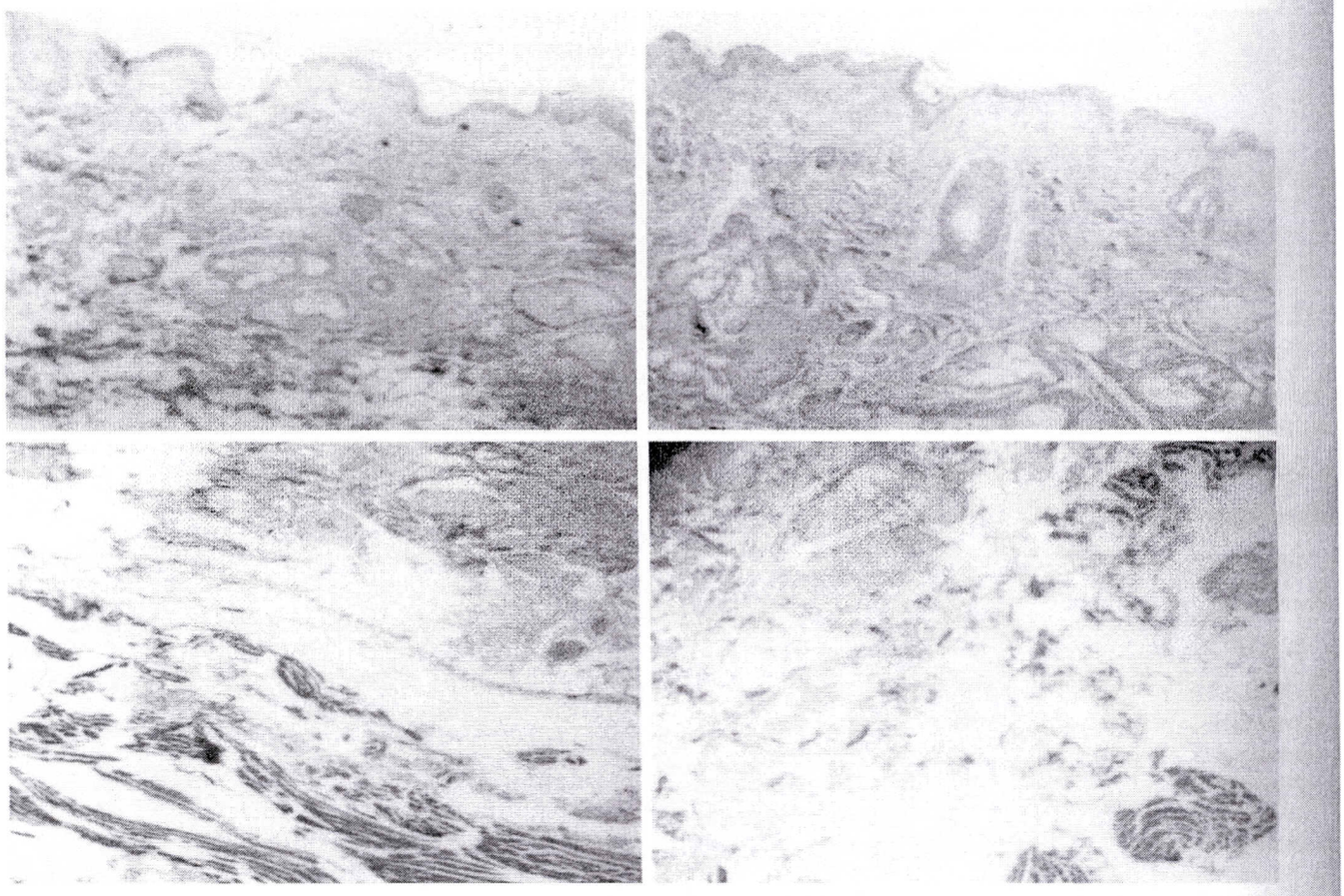

FIG. 7. Histologic view of the mandibular cutaneous ligament in a cadaver dissection. From the dermis (*above, left*), extending to the periosteum (*above, right*), significant connective tissue formation (Masson trichrome: ×10). From the dermis (*below, left*), extending to the periosteum (*below, right*), significant connective tissue formation (Masson trichrome: ×10).

the skin; meanwhile, the identified cutaneous nerve is preserved and the ligament marked with a suture. The dissection is held anteriorly and inferiorly, reaching the parotidomasseteric and anterior platysma cutaneous ligaments; the attachments are separated and the ligaments are marked. The anterior masseteric border is attained with careful dissection, with the disadvantage of the negative effect on skin flap circulation. A better visualization can be obtained with a headlamp directed toward the mandibular ligament. When the cutaneous artery and the nerve are identified, the attachments of the ligament to skin flap are separated, leaving more subcutaneous tissue on the skin flap to avoid dimpling during the anatomic correction of the ligaments (Fig. 8). After hemostasis, SMAS plications of 0.5 to 1 cm with three to six 5-0 nonabsorbable, colorless propylene sutures are accomplished in the cheek region and with two to three sutures in the parotid region, the knots localized inferiorly (Fig. 9). The branches of the facial nerve should be cared for, especially in the middle cheek region. The SMAS tension and resistance is increased with SMAS plication. The gravitationally descended facial fat is replaced to the anatomic position. While the skin flap is dispersed over the SMAS, avoiding excessive stretching, the new localizations of the mandibular, parotidomasseteric, zygomatic, anterior platysmal, and preauricular parotid ligaments are pointed out on the skin flap. Suturing of the ligaments to the new localizations is accomplished with colorless 5-0 nonabsorbable propylene using either continuous or figure-of-eight sutures every 5 to 10 mm, depending on the size of the ligament, avoiding stretching and dimpling (Fig. 8). After correction of the ligaments, the excess skin flap is excised, preventing the sideburn line displacement and avoiding tension between the incision lines. The ear lobule and the skin flap should be sutured so that the distinct shape of the ear lobule is preserved. An Axiom silicone drain (Axiom Medical, Inc., Rancho Dominguez, Calif.) could help to prevent hematoma and control the hemostasis. The incision line is

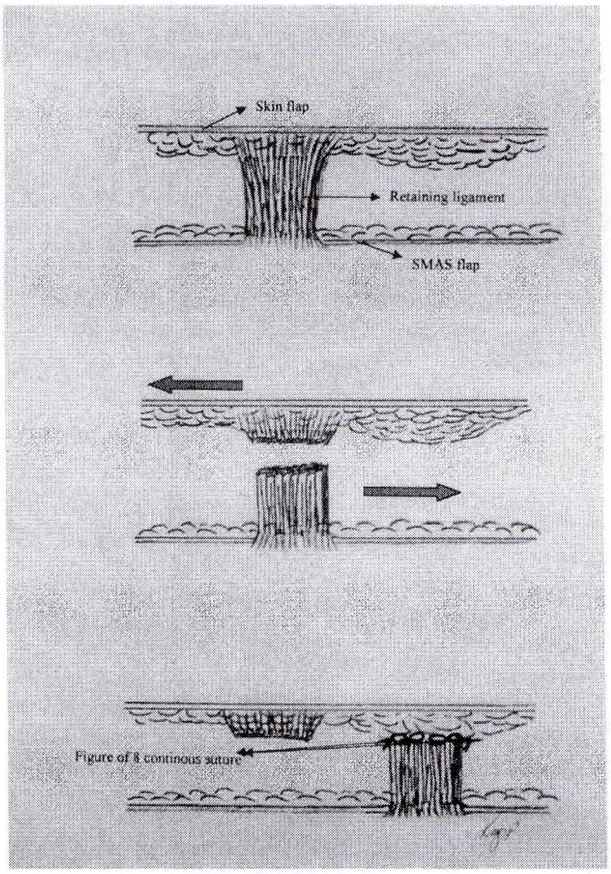

FIG. 8. Dissection and suturing design in the anteroinferior portion of the ligament to prevent dimpling.

sutured anatomically as two layers of subcutaneous tissue and skin. A dressing that causes excessive pressure should be avoided.

RESULTS

There were no viability problems in any of the skin flaps of the patients. In one patient, hematoma in the middle cheek region occurred and was relieved with evacuation and pressure application. Permanent dimpling in two patients was seen with the localization of one zygomatic and two parotidomasseteric ligaments, which did not necessitate secondary surgery. These were the first three patients in the series, and the dimples were caused by the tension in the suturing of the ligaments. In two patients, temporary dimpling because of edema lasted for 3 weeks postoperatively in various locations. In one patient, hypesthesia in the mandibular branch of the facial nerve occurred, which remitted in 14 weeks. There were no other complications during the 2-year follow-up period, and excellent aesthetic results and a high level of patient satisfaction were achieved (Figs. 10 and 11).

DISCUSSION

Face-lift surgery has developed extensively; consequently, a plethora of procedures have evolved that use a variety of technical approaches. With increased experience, surgeons aim to rejuvenate the aging face anatomically, to obtain consistency, and to improve longevity of results.

Whetzel and Mathes observed that the transverse facial perforating artery provides the major direct blood supply to the lateral cheek and preauricular area following rhytidectomy, if preserved. This perforator was reported to occupy a constant anatomic location 3.1 cm lateral and 3.7 cm inferior to the lateral canthus. The greater variability in localizing the submental perforating artery was depicted; however, this perforator also contributed significantly to lateral facial blood supply. Both perforator locations were noted to be within the area of standard undermining for rhytidectomy; during this procedure, especially in the

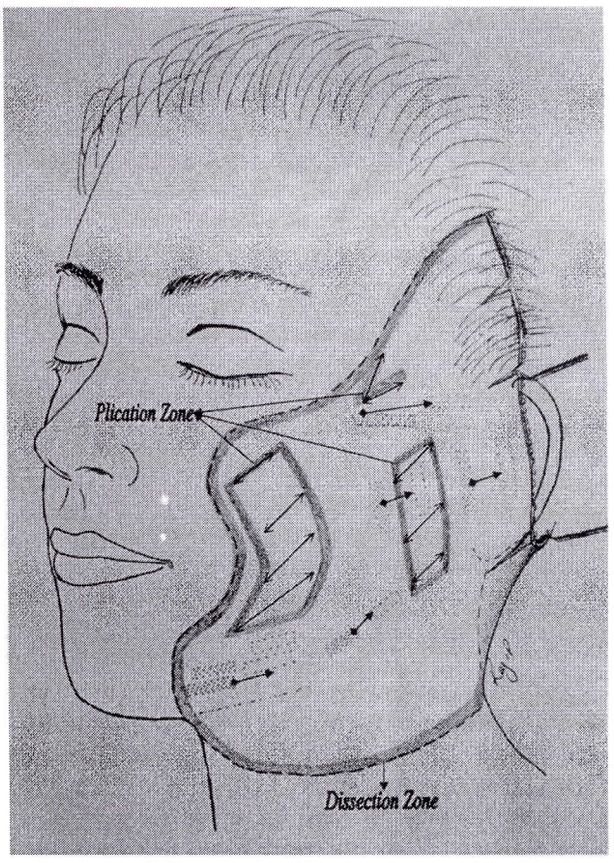

FIG. 9. Plication design in the middle and posterior cheek region.

FIG. 10. (*Above, left*) Preoperative anterior view of the patient. (*Above, right*) Preoperative lateral view of the patient. (*Below, left*) Anterior view of the patient at postoperative month 19. (*Below, right*) Lateral view of the patient at postoperative month 19.

clinical setting of a patient with vascular compromise or who is a smoker, the lateral facial perforators were proposed to be preserved.[11]

The descending part in the cheek and midface region is composed of fat tissue in between the septa of the facial fat layer. The structures supporting the cheek are named as the retaining ligaments of the face, preventing the descent conservatively.[2]

De la Plaza mentioned that the supraperiosteal–sub-SMAS lifting technique had been performed since 1985. For rejuvenation of the upper two-thirds of the face, a comparison of two dissection planes, supraperiosteal–sub-

FIG. 11. (*Above, left*) Preoperative anterior view of the patient. (*Above, right*) Preoperative lateral view of the patient. (*Below, left*) Anterior view of the patient at postoperative month 14. (*Below, right*) Lateral view of the patient at postoperative month 14.

SMAS versus subperiosteal, culminated in the fact that the supraperiosteal–sub-SMAS technique was more logical physiologically because it produced less tissue trauma, which led to fewer complications and a more rapid recovery to a normal social life.[12]

In the central suspension technique of the midface, the principles of which were developed by Hamra, Barton, Barton and Gyimesi, Flowers, Hagerty, and others, the lower eyelids, malar eminence, and nasolabial folds are addressed. The operation consists of a lateral suspension technique of the eyelid carried further, with wide undermining. The procedure combines lateral suspension of the orbicularis muscle, removal of skin, and subcutaneous dis-

section of the nasolabial fold. This results in elevation of the soft tissues of the midface and softening of the nasolabial fold.[13–17]

Heinrichs et al. presented their experience on the subperiosteal face lift and concluded that subperiosteal face lift was a simplified procedure designed to rejuvenate the upper and middle thirds of the face, with reduced risk of facial nerve injury.[18] Ramirez described the advantages and disadvantages of the facial rejuvenation techniques derived from the subperiosteal approach.[19]

Hamra emphasized the composite rhytidectomy, which is the addition of the repositioning of the orbicularis oculi muscle to the deep plane face lift to achieve a more harmonious appearance of the face by adding periorbital rejuvenation. It was explained that a thin nonrestrictive mesentery between the deep plane face-lift dissection and the zygorbicular dissection still allowed vertical movement of the composite face-lift flap without interrupting the intimate relationship between the platysma, cheek fat, and orbicularis oculi muscle. It was reported that the concept of periorbital rejuvenation as an integral part of facial rejuvenation not only produced a more harmonious immediate result but prevented the possible unfavorable sequelae of conventional rhytidectomy and lower blepharoplasty, and had more predictable and impressive results.[15] Kamer reported on the subplatysmal face-lift technique in a deeper anatomic plane of the face, which was continued extending over the zygomatic muscle and melolabial fold, and claimed that in conjunction with wide cervical undermining and an anterior platysmal plication, the deep plane face lift afforded a predictable improvement for the aging face and neck.[20]

In the study conducted by Har-Shai et al., it was found that the SMAS was a composite fibrofatty layer consisting of collagen and elastic fibers interspersed with fat cells, and a considerable number of elastic fibers were in close relationship to the collagen fibers, microscopically. On scanning electron microscopic examination, the collagen fibers in the virginal SMAS indicated a convoluted appearance similar to that found in the dermis and in the reexcised SMAS tissue; also, there was some evidence of parallelization of the collagen fibers as seen in the stretched dermis. Mechanical tests displayed definite viscoelastic properties of skin and SMAS, with a tendency for an increased stiffness and a reduction in viscoelastic effects on repeated working and with the viscoelastic properties of the SMAS being less pronounced.[21]

Gosain et al. reported that the progressive thickening of the dependent portion of the cheek fat pad and overlying skin, with no appreciable change in the muscle plane including the levators of the upper lip, resulted in more acute and deeper nasolabial folds. To diminish nasolabial folds, surgery for facial rejuvenation should be directed to the skin and subcutaneous tissue planes superficial to the mimetic muscles to the upper lip.[22,23]

Keller and Cray revealed that middle cheek dissection performed over the fibromuscular SMAS and a rotation of the fat pad augmented the cheek and that stabilization of the elevation of the nasolabial fold, the melolabial fold, and the corner of the mouth was obtained by the use of suspension sutures from the SMAS to the malar eminence. Stabilization of the malar fat pad was provided by a laterally directed flap of SMAS that was sutured to temporal fascia.[24] Barton[13] and Barton and Gyimesi[14] claimed that it could be possible to improve the contour over the nasolabial fold during rhytidectomy procedures by severing the dermal extensions of the mimetic muscles along the nasolabial fold, which could allow better gliding of the skin and subcutaneous tissue over the nasolabial fold, thereby resulting in a smoother crease.

Robbins et al. indicated that the prominent nasomandibular folds and cheek concavities were common sequelae of the aging process, and anterior SMAS plication as an adjunct to subcutaneous rhytidectomy was proven to be an effective, straightforward method of flattening and rejuvenating the nasomandibular folds. The ptotic cheek fat is reported to be returned to the cheek hollow with permanent suturing lateral to the nasomandibular fold of the anterior SMAS plicated vertically. Less tension was required on the skin flaps at closure with decreased morbidity of more extensive dissections, with an additional cost of two sutures and an extra 10 to 15 minutes of operative time.[25]

Cardenas-Camarena and Gonzalez recommended the use of combined plication to manage the SMAS-platysma complex during a rhytidoplasty. The opposing vectors should be considered when planning the combination of pilications.[26]

Fixation of the face-lift flap was originated

from the skin flap technique, in which extensive undermining resulted, with an area to be covered with the flap. In 1950, Aufricht sutured the subcutaneous layer to the parotidomasseteric fascia.[4] The SMAS or deep plane face-lift surgery described by Skoog included the fixation of the superficial fascial flap to the masseteric muscular fascia. The developments in SMAS surgery provide the attachment of the mobilized SMAS flap to the preauricular region with a localization of the periosteum of posterior zygomatic arch or the deep fascia of the undissected SMAS of the region, instead of the middle cheek region.[27] Recently, the fixation to the middle cheek region was proposed by Stuzin et al. and Mendelson.[1,3,4,6]

The development of SMAS surgery revealed the subperiosteal approach, allowing the repositioning of the ligaments of the middle cheek over the periosteum of the zygoma. However, the attachments were localized between masseteric fascia and dermis, and restricted repositioning of the medial cheek and nasolabial fold was encountered because of insufficient tension over the unblocked periosteum of the middle cheek region. Inadequate mobilization and inappropriate suturing resulted in the dimples or increased tension in the face-lift flaps. The fundamentals of face-lift surgery should include the fixation parallel to the natural anatomic ligaments unrestricting the functional results. The SMAS indicates various properties throughout the regions of face and is strengthened with vertical retaining ligaments including the deep fibrils of the reticula cutis. The description of the zygomatic and masseteric retaining ligaments of the cheek supports extended SMAS face-lift surgery with the function and the localization of the retaining ligaments taken into consideration in the mobilization of the flaps. The principle of fixation at the middle cheek region instead of the preauricular region is proposed by the help of the better understanding of the localization of the retaining ligaments and the deep attachments that form a mobile medial cheek and a less mobile part laterally.[4,6]

The retaining ligaments of face support facial soft tissue in normal anatomic position, resisting gravitational change. As this ligamentous system attenuates, facial fat descends in the plane between superficial and deep facial fascia and the stigmata of facial age develop. A loss of zygomatic ligament support allows for the inferior descent of the malar pad, influencing nasolabial fold prominence, whereas a loss of masseteric ligament support allows for the inferior descent of facial fat to the mandibular border, leading to the formation of facial jowling. Repositioning of the descended fat pads culminates in a young face. During the sub-SMAS surgery over the masseteric region, care should be taken to avoid injuring the branches of the facial nerve. The contouring of the facial soft tissue remains a difficult challenge because of the variations in the quality of facial skin and in fascial content of the SMAS from patient to patient. Fixation of the thin superficial layer results in early descent, and the excess SMAS is preferably plicated over instead of being excised.[1,3]

The retaining ligaments of the cheek are stout, firm, and flexible, attaching the facial skin to the facial skeleton and to the deep fascia through subcutaneous tissue. Their efficiency depends on the width of the attachments to the skin and, if small, the ligament stretches in time. The ptosis of the cheek anterior to the zygomatic ligament and the jowling posterior to the mandibular ligament are evidence. The release of all the structures preventing vertical mobilization of the ptotic facial tissue during elevation of the midface and nasolabial fold results in better repositioning of the skin vertically, and the formation of a new insertion to the zygomatic ligament allows a younger face. The most effective lift is achieved when the release of the zygomatic ligament is accomplished at the most descended part of the cheek. The surgical importance of the mandibular ligament includes the inadequate lifting force applied to the submandibular and jaw region, hindering the skin in vertical motion. The release of this ligament provides more effective submental lifting and a passage for lipectomy without an extra incision. The platysma auricular ligament is crucial in continuation of the dissection through the false layer.[2,5]

The attachments of the facial mimetic muscles, especially the zygomatic muscles, to the SMAS cause difficulties with the sub-SMAS dissection, which ought to be held attentively. These attachments account for the minimal change in the nasolabial crease after a sub-SMAS face-lift dissection.[13]

Stuzin et al. mentioned the variability of fat tissue composition from patient to patient and the necessity of the various vectors in lifting. Materials such as Vicryl mesh could be used where the SMAS is weak and in regions where

fixation is difficult, such as the inferior SMAS region.[1,3]

Mendelson proposed fixation of the mobilized region to the immobilized region, and claimed that the more suturing was performed to the small area, the better were the results that were encountered. During the dissection and fixation at the middle cheek and buccal region, the risk of facial nerve injury is high. Because of the loose and descended part of the face after repositioning, the plicated SMAS descends with stress. The lifting vectors should be parallel to the mimetic muscles of the face and should be in at least three vectors, considering the plane in three dimensions, which would not flatten the face, forming the natural view. The plications could decrease the tension and also the incision scar.[4,6]

For correction of the aging face, various techniques have evolved and have been used and have both advantages and disadvantages. The understanding of the mechanism of the aging face and the correction depending on this is the basic principle in face-lift surgery. Anatomic repositioning of the anatomic layers, muscles, fat pads, ligaments, and skin structure seems to be possible.[1–27]

Investigation of the cutaneous arterial supply of the face-lift flap is useful during dissection and preservation of sufficient structures, especially in patients with vascular compromise or who are smokers. Although the subperiosteal face lift, central suspension, deep plane, and multiplane face-lift techniques have been used in face-lift surgery today with the disadvantages determined and explained by the authors, the properties of being physiologic and less traumatic, and having decreased complications and fast healing are proposed to be major advantages. However, the lifting of the facial structures superiorly in one vector and the alteration of the anatomic localization of all the structures for repositioning of the facial fat pads correctly is a conflict to be illuminated in the future with unacceptable and unaesthetic results. The authors have accomplished these techniques successfully in only selected and exceptional patients recently. Blepharoplasty combined with the same incision with the face lift is claimed to result in fewer complications, despite the fact that restricted release and fixation of the face-lift flap could have negative effects on the blepharoplasty and face lift in the long term. In our opinion, the anatomic regions of the face should be considered separately, and the surgical procedures should be applied according to the distinct properties of these regions.

The similar properties of the skin, dermis, and SMAS are revealed with anatomic studies. The attachments of the mimetic muscles to the skin and subcutaneous tissue in the nasolabial region constitute the nasolabial fold. Because of the redistribution of the cheek fat pad without any alteration in the skin composition and while maintaining the projections of surface landmarks within the cheek mass during smiling, SMAS plication for repositioning of the fat pads, rather than SMAS mobilization, is sufficient. The plication also increases SMAS stability and resistance and, in some instances, Vicryl mesh use is reported. The vectors of plication should be planned perpendicular to the relaxation of the SMAS by the mimetic muscles, so that repositioning of the fat pads is accomplished in addition to the strong stabilization of the SMAS, meanwhile reestablishing the contour of the nasolabial fold. The plication or Vicryl mesh use in the middle cheek region is efficient in accordance with the delicate and loose structure of the SMAS. The rigid and tight property of SMAS in the parotid region prevents excessive relaxation. The plication should be parallel to the mimetic muscles of the face with minimal suturing between increased distances. Colorless 5-0 propylene with the knots placed inferiorly could decrease the possibility of visibility and perception of the suturing. The dissection in the new localizations of the retaining ligaments of the face should be held deeper, leaving more subcutaneous tissue in the face-lift flap, and the figure-of-eight or continuous suturing techniques with colorless 5-0 propylene could decrease the possible irregularities in the soft tissue and dimpling. The SMAS plication and restabilization of the retaining ligaments of face are necessary for restoration of the normal anatomic structures of the face, with aesthetic results in the rejuvenation of the aging face. The dimpling in the initial patients was abolished with deeper dissection in the new localization of the retaining ligaments and continuous or figure-of-eight suturing instead of suturing primarily. The SMAS plication and the correction of the retaining ligaments of face could establish a better contour in the laxated and expanded skin in the aged face and the tension in the preauricular region could be decreased. Avoiding the sub-SMAS dissection constitutes a safer

layer in avoiding facial nerve injury. Performing blepharoplasty at the same time as face lift could establish the total correction of the midface in selected patients. Complications that occurred in the combination of blepharoplasty and face-lift techniques such as dimpling, hematoma, and neurapraxia are avoided in the latter cases with increased experience. In our opinion, the technique of SMAS plication and the correction of the retaining ligaments of the face is an alternative for rejuvenation of the aging face, with high patient satisfaction and excellent aesthetic results.

Ragip Özdemir, M.D.
Alidede Sokak, No. 6/28
Aşağıayrancı 06540, Ankara
Turkey
ragipoya@hotmail.com

ACKNOWLEDGMENTS

We would like to thank Dr. Namık Kemal Baran for sharing his experience, Dr. Ibrahim Tekdemir for his help in anatomic study, and Dr. Ebru Serinsöz for her contributions in evaluating the pathologic examinations.

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