Suture Suspension Malarplasty with SMAS Plication and Modified SMASectomy: A Simplified Approach to Midface Lifting

R. Barrett Noone, M.D.

Philadelphia and Bryn Mawr, Pa.

Background: The elements of midfacial aging include elongation of the lower eyelid, flattening of the malar eminence, hollowing in the submalar area, laxity of the jowls, and deepening of the nasolabial crease. Attention to rejuvenation of these areas has included various techniques involving movement of the superficial musculoaponeurotic system (SMAS) and elevation of the malar fat pad. A trend toward simplification in midface lifting has introduced the use of suspension sutures.

Methods: This paper describes an approach to midfacial rejuvenation that combines the elements of SMAS plication and lateral SMASectomy with a suture suspension of the malar fat pad to achieve long-lasting improvement of the aging midface. The ptotic malar fat pad is suspended by suture to the deep temporal fascia. The suture passes from the subcutaneous position where it is fixed to the malar fat pad, through the SMAS, and over the periosteum of the zygoma, and is fixed to the deep temporal fascia. Plication of the SMAS over the suture, combined with lateral SMASectomy, provides three vectors of elevation beneath the skin in midface rhytidectomy.

Results: This technique was used in 259 patients between October of 2000 and October of 2004, producing effective long-lasting results with limited convalescence and minimal complication rates.

Conclusions: Safe dissection in the subcutaneous plane avoids injury to facial nerve branches. Plication of the SMAS with suture suspension of the malar fat pad avoids the prolonged convalescence and other morbidities of extensive sub-SMAS or deep plane dissections. This simplified approach can be quickly and easily performed under local anesthesia as an isolated midface procedure, or can be combined with surgery of the forehead, eyebrows, eyelids, or neck by standard techniques of rejuvenation. (*Plast. Reconstr. Surg.* 117: 792, 2006.)

The effects of the aging process on the soft tissues of the midface include elongation of the lower eyelid, flattening of the malar eminence, volumetric loss in the submalar area of the cheek, prominence of the jowls, and deepening of the nasolabial fold. Since the description of the superficial musculoaponeurotic system (SMAS) by Mitz and Peyronie in 1976,[1] surgical solutions for facial rejuvenation have supplemented external incision, skin-tightening rhytidectomies with direct procedures involving the SMAS. These range from simple plication to extensive composite rhytidectomies. Variations in SMAS techniques have resulted in substantial long-term correction of the above elements, with the exception of the nasolabial crease. Recognition of the malar fat pad as an entity distinct from the SMAS and intimately involved with the aging process at the nasolabial fold led to an evolution of techniques involving repositioning of the malar fat pad in combination with SMAS procedures. Although they produce excellent results, many of these techniques require extensive dissection and have the potential for increased morbidity and prolonged convalescence. The search for less extensive solutions to the problem has introduced the concept of suspension sutures in various forms for facial rejuvenation.

From the University of Pennsylvania School of Medicine, and the Division of Plastic Surgery, Main Line Health Hospitals.
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This article describes a simplified approach to midface rhytidectomy that combines suture suspension of the malar fat pad with SMAS plication and limited lateral SMASectomy. This technique was used in 259 patients in the 4-year period between October of 2000 and October of 2004.

APPLIED ANATOMY

In the midface, the SMAS is a fascial layer separating the subcutaneous fat from the fascia enveloping the parotid gland, the mimetic muscles, and facial nerve branches. The SMAS is an extension of the superficial cervical fascia into the face and is continuous with the temporoparietal fascia in the temporal region. The SMAS is thickest over the parotid region and becomes thin in its anterior extent over the malar region. The malar fat pad, a triangular subcutaneous structure based at the nasolabial fold with its apex at the malar eminence, lies superficial to the SMAS in the anterior midface, and is considered part of the "fascial-fatty" layer of the face.[2] Ligaments from the periosteum of the zygoma run through the subcutaneous portion of the malar pad and insert directly into the dermis. Thus, the malar pad provides fullness in the youthful midface. With aging, these fibrous septae relax, allowing ptosis of the malar fat pad and deepening of the nasolabial fold. Traction on the malar fat pad in a superooblique direction, along a line from the midportion of the nasolabial crease to the junction of the zygoma and temporal bones, elevates the skin of the medial cheek and flattens the nasolabial fold.

An understanding of the anatomy of the temporal region is critical to this technique.[3] The SMAS extension (the temporoparietal fascia) invests the frontal (temporal) branch of the facial nerve (cranial VII) and the branches of the superficial temporal artery. This superficial fascia is separated from the deep temporal fascia by loose areolar tissue. The deep temporal fascia covers the temporalis muscle and splits to envelop the periosteum of the zygomatic arch. As will be described, the suture retriever is placed on the surface of the deep temporal fascia and is directed through the loose areolar tissue in the prezygomatic space[4] deep to the temporoparietal fascia and the temporal nerve branch.

The temporal branch crosses the zygomatic arch and innervates the frontalis, orbicularis oculi, and corrugator muscles. The zygomatic branches extend to the lateral angle of the orbit and also into the orbicularis oculi. The buccal branches are deep to the SMAS and are well away from any maneuvers involved with the technique. The temporal branch is well posterior to the point of penetration of the SMAS by the suture retriever. The zygomatic branches are inferior and anterior to this point, described by Mendelson as a surgical "safe space."[5]

DESCRIPTION OF TECHNIQUE

Suture suspension malarplasty with SMAS plication may be performed as an isolated midface lift procedure, or can be combined with other facial rejuvenative operations, including blepharoplasty, brow lifting (open or endoscopic), and any procedure performed for rejuvenation of the neck. The location of incision depends on the extent of the operative procedure selected. The conventional incision enters the temporal area on a line corresponding to the posterior aspect of the external auditory canal. Alternatively, a skin incision may be made along the temporal hairline, but the posterior aspect of such an incision must allow exposure to the deep temporal fascia. The incision extends in the conventional face lift location into the post auricular sulcus if only the midface is addressed. If exposure for neck surgery is desired, posterior extension over the mastoid extends along a line directed posteriorly from the superior aspect of the external auditory canal. The skin flap is elevated in a subcutaneous plane to a point consistent with a line drawn perpendicular from the lateral canthus. The anterior extent of this dissection is approximately 2 cm posterior to the oral commissure in the face. The integrity of the adherence of the malar fat pad to the skin lateral to the nasolabial fold is maintained. If neck surgery is combined, superficial dissection of the skin continues inferior to the border of the mandible to reach the submental incision. The superior extent of the subcutaneous dissection extends to just below the orbital rim and over the superior border of the zygoma. At this point, the subcutaneous dissection is superficial to the superficial temporal fascia and caudal to the hair-bearing skin of the temple. The supra-auricular incision in the temporal area is carried deep to the superficial fascia to identify the deep temporal fascia. Dissection is continued in an anterior direction in this plane until the parietal branch of the superficial temporal artery is identified, suture ligated, and divided. Thus, a deep plane is entered between the superficial and deep temporal fascia. The extent of flap dissection in the plane immediately above the deep temporal fascia is dependent on the extent of temporal scalp resection desired. Only minimal deep dissection anterior to the division of the artery is needed for exposure for the suture

retriever. After dissection is complete, the malar fat pad is identified and elevated with the surgical forceps along the line between the upper nasolabial fold and the midzygoma. An estimate is made of the amount of movement of the malar fat pad and the contiguous anterior SMAS. Measurements indicate that the malar fat pad can be advanced between 1.0 and 2.5 cm. When the maximum excursion is judged with the surgical forceps, a figure-of-eight suture of 2-0 monofilament polydioxanone (taper SH needle; Ethicon, Somerville, N.J.) is placed in the substance of the malar fat pad and its enveloping fascia (Fig. 1). Thin suture-passing instruments are available in all general operating rooms. The SNARE suture retriever manufactured by Smith and Nephew (Andover, Mass.) is preferred. It is long and thin (external diameter, 2 mm) but sturdy enough to penetrate the SMAS. When opened, the wire loop at the tip allows easy entry of the suture. The suture retriever is passed along the surface of the deep temporal fascia and over the periosteum of the zygoma at the anterior third of the zygomatic arch. At this point, it penetrates the SMAS through the surgical "safe space." The end of the suture retriever is then in the subcutaneous position, with the handle at the level of the deep temporal fascia (Fig. 1). The polydioxanone suture is passed through the wire loop of the suture retriever by way of the proximal needle end and secondly by the distal free end of the suture. Both are passed through the aperture in the same direction. The needle is then cut from the proximal end and both ends of the suture are pulled along the track of the retriever to the deep temporal fascia (Fig. 2). A free needle is then used to secure one end of the polydioxanone suture into the deep temporal fascia. A surgeon's knot is used to place the desired tension through the suture to the malar fat pad to achieve the excursion determined by the initial measurement. The suture is then tied securely to the deep temporal fascia. The SMAS inferior and posterior to the suture location in the fat pad is then plicated at the lower border of the zygoma with interrupted sutures of 3-0 polydioxanone reinforced with a continuous suture of 3-0 Vicryl (polyglactin 910, PS2 needle; Ethicon). The imbrication of the anterior aspect of the malar fat pad conceals the suspension suture and is usually performed with the suture that eventually completes the SMAS plication. This maneuver serves to create malar augmentation as well as SMAS elevation. After plication along the fat pad and the zygomatic arch is completed, strip SMASectomy is performed by resecting 2 to 3 cm of redundant SMAS, extending from a point just posterior to the SMAS plication toward

Fig. 1. After division of the parietal branch of the superficial temporal artery, a deep plane is entered between the superficial and deep temporal fascia. A figure-of-8 suture of 2-0 polydioxanone is placed in the substance of the malar fat pad and its enveloping fascia. The suture retriever is passed along the surface of the deep temporal fascia, over the periosteum of the anterior third of the zygomatic arch, and through the SMAS, well anterior to the temporal branch of the facial nerve.

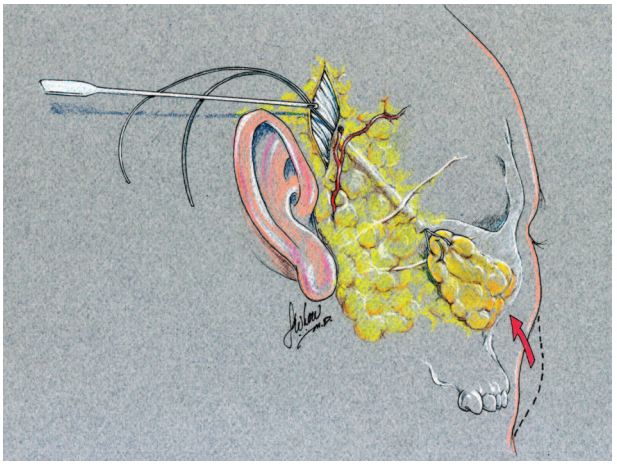

Fig. 2. Traction on the suture moves the malar fat pad between 1 and 2.5 cm in a vertical-oblique direction. When the desired position of the fat pad is achieved, the suture is secured by a free needle to the deep temporal fascia.

the earlobe and then into the neck along the anterior border of the sternocleidomastoid muscle (Fig. 3). Closure of the SMASectomy is also completed using 3-0 polydioxanone suture and 3-0 Vicryl (Fig. 4).

Cautery hemostasis is followed by skin excision and closure. The skin tightening is directed in a line slightly more posterior than the obliquely directed malarplasty and the vertically directed SMAS plication. Skin excision, drains, closure, dressings, and postoperative care are at the discretion of the surgeon, consistent with standard face lift techniques.

RESULTS

After the addition of the suture suspension to the author's face lift technique, 259 patients underwent the procedure between October of 2000 and October of 2004. The majority of the operations were performed in combination with other rejuvenative procedures of the face, especially blepharoplasty and neck lift with platysma plication. Endoscopic brow lifts were often combined with the midface procedure. In only 19 patients was the midface procedure performed as an isolated entity. Although evaluation was subjective, in the 187 patients followed for more than 1 year after surgery, nasolabial fold improvement was noted when compared with previous subjective evaluation of SMAS plication without attention to the malar fat pad. In the first 135 patients, nonabsorbable 3-0 Prolene was used for the suture suspension. Because two patients required removal of the suture from the deep temporal fascia as a result of persistent palpability, including actual erosion of the skin by the suture in one patient, a transition was made in September of 2002 to the use of 2-0 polydioxanone suture. In the subsequent 124 patients, no complications related to this absorbable suture were encountered. One patient complained of persistent headaches in the temporal region associated with trismus, but this resolved by the sixth postoperative week after treatment with a nonsteroidal anti-inflammatory agent. Palpability of the polydioxanone sutures used in the

Fig. 3. The elevated SMAS is plicated at the lower border of the zygoma, with sutures placed in the fascia and not in the periosteum. The plication sutures conceal the suspension suture and imbricate the SMAS and fat pad. Redundant SMAS (shown in *green*) is excised.

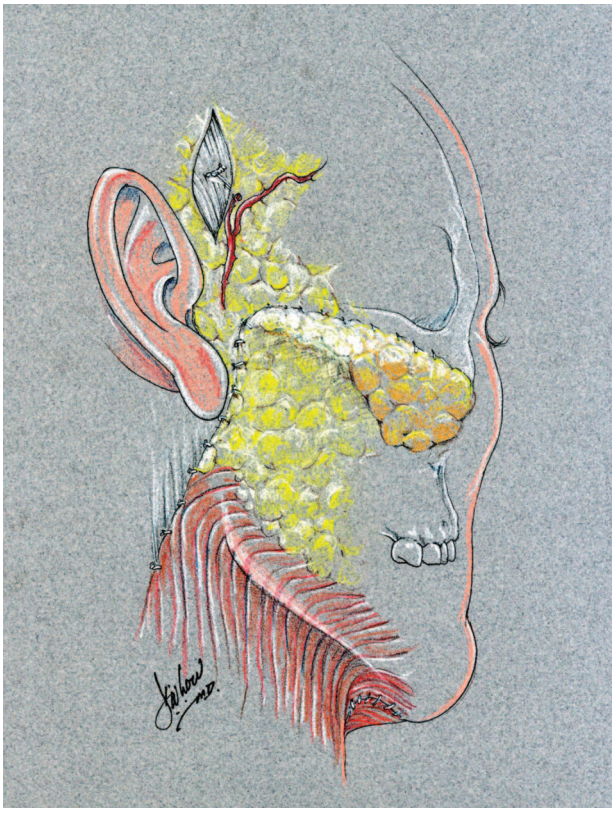

Fig. 4. The elevated SMAS, fat pad, and defect from the SMASectomy are closed as a unit.

Fig. 5. This 45-year-old woman illustrates the use of suture suspension malarplasty with SMAS plication and redundant SMASectomy for midface lifting only. (*Above*) Preoperative and postoperative frontal views. (*Below*) Oblique preoperative and 12-month postoperative views.

SMAS plication was often noted in the early postoperative period, with complete resolution in all patients after 4 months. There were no instances of muscle paresis secondary to facial nerve injury. Four patients (1.5 percent) required reoperation for evacuation of hematoma; all cases were associated with complete neck skin undermining and platysma surgery. One of the patients requiring hematoma evacuation and a second patient, a chronic smoker, devel-

oped preauricular skin necrosis. Both healed with conservative treatment.

The low incidence of morbidity was accompanied by rapid convalescence. With appropriate makeup techniques, most patients were able to return to employment and social activities 2 weeks after the midface lift combined with neck lift and blepharoplasty procedures. When subperiosteal endoscopic brow lift was added, an additional week of convalescence was expected.

All elements of midface aging were addressed with this technique. As an isolated procedure, it is reserved for a relatively young person who does not need neck, eyelid, or brow surgery (Fig. 5). Suture suspension malarplasty with SMAS plication can be combined with other procedures, such

Fig. 6. Suture suspension malarplasty with SMAS plication in the midface is combined with upper and lower blepharoplasty, platysmaplasty, and perioral carbon dioxide laser resurfacing. Frontal and lateral preoperative and postoperative views illustrate marked improvement in nasolabial fold appearance 18 months after surgery.

Fig. 7. Fat pad elevation and fixation addresses the long lower eyelid, one of the common signs of midface aging. (*Above*) Preoperative oblique view. (*Below*) View after suture suspension of the malar fat pad with midface lifting 16 months after surgery.

as four-lid blepharoplasty, corset platysmaplasty, lateral platysma plication, and perioral carbon dioxide laser resurfacing (Fig. 6). The lower eyelid can be shortened with fat pad elevation and fixation (Fig. 7). The most effective result from the procedure is seen with nasolabial fold improvement (Fig. 8).

Undermining of the skin over persistent malar mounds, with imbrication of the SMAS and the suspended malar fat pad, can correct the malar mound deformity (Fig. 9). This same technique of skin undermining and redraping with SSM and plication can be used to treat untoward results of primary or secondary aesthetic procedures (Fig. 10).

DISCUSSION

Advancement of the malar fat pad, the SMAS, and the skin in different vectors gives a mechanical advantage during and after healing to produce the best opportunity for improved long-term results. The supero-oblique direction of pull of the malar fat pad presents a vector perpendicular to the nasal labial fold. The second vector, in a vertical direction, is a result of SMAS elevation by plication and imbrication over the malar fat pad suture. Despite the anatomic fact that the malar fat pad is superficial to the SMAS, the imbrication of the SMAS tissues in an anterior direction is extended to an imbrication also of the malar fat tissues, producing even more malar augmentation. This second vector overlaps the first and fixes the SMAS and malar fat pad together in a higher vertical direction, shortening the elongated lower eyelid. In addition, the volumetric improvement of the zygoma and anterior malar area is an attempt to satisfy the concept popularized by Little that creation of the Ogee curve to the face in oblique view restores a more youthful appearance.[6,7] The SMASectomy, which begins at the posterior aspect of malar plication sutures, essentially removes the redundant SMAS in a posterolateral direction, contributing to a smoother contour and providing a third vector fixation point, along with redraping and excision of the skin. The malar fat pad and the enveloping overlying skin contribute to the midcheek mass, which must be elevated and fixed to provide improvement at the nasolabial fold. Tightening the SMAS only, without attention to the overlying cheek fat and the skin, may produce an actual deepening of the nasolabial fold rather than its flattening.

The suture suspension malarplasty–plication technique combines some concepts introduced by others into a simplified coordinated technique for midface rejuvenation.

SMAS Plication

After the SMAS was described,[1] surgical attempts to correct aging were directed toward techniques of tightening the SMAS.[8–10] In the early 1980s, I instituted SMAS plication into my face lift technique. After Baker introduced the concept of lateral SMASectomy in 1994,[11] I added a modification of this technique to the plication method. Because the SMAS is elevated by the plication maneuver, the SMASectomy I describe is not the classic technique of Baker. My technique serves only to resect redundant SMAS. Hamra's introduction of the deep plane rhytidectomy in 1990 focused attention on an entirely new concept of rejuvenation by composite repositioning of facial tissues.[12] This very effective, but complicated, procedure opened the possibilities of further morbidity in midface lifting. The prospective study that compared lateral and standard SMAS face lifts with extended SMAS and composite rhytidectomies by Ivy, Lorenc, and Aston[13] reinforced for many a renewed confidence in the simpler, safer approach. These authors reinforced the contribution by Webster et al.,[14] who showed no difference between SMAS plication and SMAS undermining with imbrication in face lifting. The use of SMAS plication and later lateral SMASectomy produced for me consistent reproducible results with jowl

Fig. 8. Improvement of nasolabial fold appearance is demonstrated 1 year after surgery. (*Left*) Preoperative frontal and lateral views; (*right*) postoperative views.

elevation, midface fullness, and some malar augmentation. However, the results in long-term improvement of the nasolabial fold were disappointing, and attention to the cheek mass, consisting of malar fat and skin, was necessary.

Malar Fat Pad Elevation

The disharmony produced by SMAS techniques alone, without addressing the anterior midface relationships of the malar fat pad, the skin, and the nasolabial fold, gained attention in the 1990s. More effective results were produced by combining vertical-vector orientation of the malar fat pad with the SMAS procedures. Owsley popularized this concept by undermining beneath the fat pad and separating it from the SMAS, keeping the fat pad attached to the skin, and repositioning the fat pad by attaching it to the SMAS.[15–17] This contribution demonstrated the effectiveness of nasolabial fold improvement by

Fig. 9. (*Left*) Malar mounds persisted after upper and lower blepharoplasty. (*Right*) After suture suspension malarplasty and SMAS plication, improvement is illustrated in the appearance of the malar mounds 15 months after surgery.

elevating the composite of malar fat and its attachments to the skin. However, similar to the deep plane dissections, Owsley's technique required a dissection above the SMAS-invested levator muscles. Because branches of the facial nerve in that region lie deep to the SMAS, it was considered safe to separate the fat pad from the underlying SMAS tissues. Careful dissection in this area is obviously required and the potential for nerve injury could exist absent detailed attention to dissection techniques. Others have emphasized elevation of the malar fat pad without separating it from the underlying SMAS and thereby moving the SMAS along with the malar fat pad and skin to elevate and reposition the nasolabial fold as well as the commissure area of the mouth.[18,19] The emphasis of these contributions on movement

Fig. 10. (*Above, left*) A malar deformity and tragal distortion persisted after subperiosteal a midface lift through the subciliary approach. The prior surgeon's attempt at revision resulted in fibrosis and distortion of the infraorbital soft tissues. (*Above, right*) Frontal view after subcutaneous dissection, suture suspension of the malar fat pad, and SMAS plication, 20 months after revision surgery. (*Below, left and right*) Left oblique preoperative and postoperative views of the above patient.

of the superficial tissues along with the anterior SMAS is directed toward counteracting the effects of gravity on the skin and subcutaneous tissue by vertical elevation and fixation. Repositioning the malar pad in deeper plane techniques results in more prolonged swelling and

delayed convalescence than do the simpler techniques of elevating the malar fat pad in conjunction with plication of the SMAS tissues.

Suture Suspension

The technique described in this article combines the elements of malar fat pad elevation with concepts of suspension techniques in the midface. Yousif et al.[20] use a polytetrafluoroethylene strip cut from a sheet of Mycro Mesh for suspension. Sasaki and Cohen[21] approach the midface by using a percutaneous cable suture. Another less complicated technique fixes a pursestring plication of the SMAS to the zygomatic bone.[22]

My technique is similar to other suspension techniques in that I keep the connections among the malar fat, the overlying skin, and the underlying SMAS, and in that suspension sutures are used to fix the fat pad. My technique differs in that the suture suspension is done by passing the suture deep to the SMAS and fixing the suture to the deep temporal fascia, thereby totally eliminating the suture from the subcutaneous position. DeCordier et al.[19] suspend the fat pad by sutures in the subcutaneous position to the superficial temporal fascia at the level of the lateral eyebrow. Although they do not notice palpability or visibility of the suture in the subcutaneous tissue, this is a concern I avoid by keeping the suspension suture deep in the facial tissues by passing it through the SMAS, over the periosteum of the zygoma, and fixing it to the deep temporal fascia. Since the change in suture material midway through the above-described patient series, no need for suture removal because of exposure or palpability has been seen.

Data supplied by Ethicon indicate that absorption of the polydioxanone suture is minimal until about the 90th postimplantation day, allowing ample time for collagen synthesis, adherence of the tissues by fibrosis, and development of tensile strength.[23] Absorption of the suture is essentially complete within 6 months.

CONCLUSIONS

Effective rejuvenation of the midface can be achieved by a safe, simplified approach combining suture suspension of the malar fat pad with lateral modified SMASectomy and SMAS plication. A safe dissection in the subcutaneous plane avoids injury to facial nerve branches. Plication of the SMAS with suture suspension of the malar fat pad avoids the prolonged convalescence and other morbidities of extensive sub-SMAS or deep plane dissections. This simplified approach can quickly and easily be performed under local anesthesia as an isolated midface procedure, or it can be combined with rejuvenation of the forehead, eyebrow, eyelids, and neck by adding other conventional techniques of facial rejuvenation. Since October of 2000, the technique has been used in 259 patients, with effective results and minimal morbidity. Satisfactory improvement was noted in flattening of the nasolabial fold, augmentation of the malar area, elevation of the jowls, shortening of the lower eyelid, and restoration of volume to the midcheek.

R. Barrett Noone, M.D.
888 Glenbrook Avenue
Bryn Mawr, Pa. 19010
rbnoone@parsal.com

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