Rejuvenation of the Midface

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Correction of midface aging is multifactorial and requires a mastery of more than one procedure. To properly address midface aging, improving skeletal deficiencies and understanding how to improve aging of midface soft tissues are both imperative. Many patients with early midface sagging have deficient underlying bony support (Fig. 1) and are helped a great deal with malar implants (complex with ptosis of the suborbicularis oculi fat (SOOF) (Fig. 2). Older patients with adequate skeletal support of the malar bone are more likely to have problems that involve laxity of the soft tissue (Fig. 6A, B). Patients in this category are rejuvenated by operating the SOOF and malar pad (Fig. 4). Inherent in older patients is the inability to separate aging of the midface from that of the lower lid, as they each affect each other and often need to be addressed concurrently (Fig. 5A, B). Of course, some older patients have both insufficient bony support and soft tissue laxity (Fig. 6A, B).

Another feature of aging that affects the findings of the whole face, not just the midface, is the fact that as we age, decade by decade, we tend to lose subcutaneous facial fat as well as dermal thickness (Fig. 7). Fat atrophy tends to occur more in ectomorphs and definitely has a familial tendency. The degree to which the skin envelope ages is greatly influenced by smoking tobacco products, external environmental insults (such as ultraviolet light or radiation therapy), and underlying genetics. Failure to recognize and address these contributions to midface aging will lead to less desirable results. The epidermal/dermal envelope can be improved using modern topical preparations commonly found in the clinics of many dermatologists or facial plastic surgeons. Other treatments range widely, from biohormone replacement therapy to ablative or nonablative laser procedures. Skin health is a topic in and of itself and will not be further addressed in this article. With regard to fat atrophy, there are several different surgical approaches that can benefit patients with this problem: submalar implants, fat injections, and the use of injectable fillers. Later in this article, this topic will be discussed more comprehensively.

Midface Anatomy

To rejuvenate the aging midface, understanding the anatomy of this area is paramount. Key aspects to understanding the aging midface are the relationship of the malar pad with the zygomaticus major/minor muscles and the SOOF, the location and understanding of the importance of the frontozygomatic ligament, understanding how the superficial muscles of facial expression use the SMAS to form fascial fiber connections to the dermis allowing animation of the midface, and, finally, the investment of the superficial muscles of facial expression and the malar pad by the SMAS in the midface. The first anatomical point is that the malar pad overlies the zygomaticus muscles as well as the SOOF (Fig. 8A, B). The frontozygomatic ligament comes from a thickening of the SMAS that secures the midface immediately superior to the lateral attachment of the zygomaticus muscles. To properly rejuvenate the midface during surgery, the surgeon must release this ligament, as a failure to do so will impede lateral and superior movement of the malar pad during surgery (Fig. 9). The importance of understanding that the superficial muscles of facial expression in the midface use the SMAS to attach to the dermis, which allows animation of this area, explains why lifting this area in a subperiosteal plane will have little effect in improving the depth of the nasolabial fold since lifting in this plane moves all superficial structures about the same, yielding no net change in the superficial aging anatomy (Fig. 10).
Fig. 1 A young patient with lack of skeletal support for the midface.

Fig. 2 The same patient from Fig. 1 after malar augmentation, transconjunctival suborbicularis oculi fat lift blepharoplasty, rhinoplasty, and three-fourth endoscopic brow lift.

Fig. 3 Patient in the sixth decade of life with ptosis of soft tissue envelope of midface.

Fig. 4 Same patient from Fig. 3 after suborbicularis oculi fat lift blepharoplasty, deep plane minituck, chin implant, CO2 resurfacing of eyes and mouth and a three-fourth endoscopic brow lift.
The SMAS in the midface divides and envelopes the malar pad and the superficial muscles of facial expression. When we separate the malar pad from the zygomaticus muscle, we are not in a deep sub-SMAS plane. At this point, the surgeon is simply above and below the SMAS. Therefore, the correct way to describe the plane for a midface lift when lifting the malar pad, which should be above the fascia of the zygomaticus muscle, is inter-SMAS.

One of the keys to safely lift the malar pad comes from knowing how to locate the origin of the zygomaticus muscle. Several authors have proposed drawing lines from other landmarks to aid in this endeavor.\textsuperscript{1–4} The author believes that this

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**Fig. 5** (A, B) Mother and daughter showing the changes that occur with age. (A) Daughter has adequate midface skeletal support, and midface soft tissue structures have not become ptotic nor is there any facial fat atrophy. (B) Mother shows midface soft tissue ptosis marked by sagging of the malar pad and suborbicularis oculi fat pad with elongation of the lower lid and double convex deformity; she also has a degree of fat atrophy noted in the submalar area and brow ptosis.

**Fig. 6** (A) An older patient with midface soft tissue ptosis and lack of skeletal support with submalar atrophy. (B) She underwent a suborbicularis oculi fat lift blepharoplasty, a deep plane minituck, malar implant, and CO\textsubscript{2} resurfacing of the eyes and mouth.
Fig. 7  An ectomorphic older patient with generalized fat atrophy of the face.

Fig. 8  Artist’s depiction of malar fat pad overlying the orbicularis oculi that overlies the suborbicularis oculi fat pad. Inferiorly, the malar pad is over the zygomaticus muscle.

Fig. 9  Intraoperative picture of fine clamp releasing the frontozygomatic ligament.

Fig. 10  An artist’s rendition of the malar fat pad being ensnared at the level of the nasolabial fold by the fascial fiber connections between the superficial muscles of facial expression and the dermis. Surgical rejuvenation must be performed in this plane, not in the subperiosteal plane.
muscle is more easily found by locating the subzygomatic fossa, which is a palpable notch immediately below and lateral to the malar eminence (►Fig. 11). The zygomaticus muscle originates from this area of the zygoma. A recent cadaver study by Miller et al5 confirms this approach. Marking this fossa while the patient is awake allows for easier identification since the contracting head of the zygomaticus muscle can be felt when the patient smiles.

When performing a malar pad lift during facial rejuvenation procedures, avoiding the facial nerve is always a concern. However, in the midface, the facial nerve is well protected because of its location. Adding to the safety in regard to the facial nerve in this area is the interweaving of the facial nerve fibers, which occurs medial to the lateral canthus. As long as the facial plastic surgeon stays above the zygomaticus muscle and the enveloping SMAS, the facial nerve will be safe since it enters these muscles beneath them and at this point is under the SMAS. The main sensory nerve comes from the second division of the trigeminal nerve exiting the infraorbital foramen and is easily identified by palpation (►Fig. 12). It must be avoided during midface facial implant procedures and while lifting the SOOF. A smaller sensory nerve, the zygomaticotemporal nerve, exits through the body of the zygoma. Transaction of this nerve may be necessary during midface surgery for properly seating an implant, but this is rarely clinically significant since overlapping sensory nerves from adjacent areas tend to compensate for any sensory loss over time.

Inadequate Midface Skeletal Support

A weak zygomatic prominence leads to inadequate support of the soft tissue envelope of the midface area and thus early signs of midface aging. Fortunately, there are many kinds of alloplastic implants available to provide adequate structure to the zygomatic prominence.

Solid silicone (silastic) has been used as a material for facial implants since 1956.6 Silicone facial implants are solid, yet flexible and durable. They are manufactured in different durometers (degrees of hardness) to be soft or quite hard. These implants enhance soft tissue areas only. There is no bone ingrowth, making them easy to reposition, replace, or remove should there be an infection or other postoperative problem. They are easily carved during surgery, allowing the facial plastic surgeon to adapt to a particular patient’s anatomy. Allergic reactions to solid silastic implants are very rare; the author has never seen or heard of one anecdotally.

Expanded polytetrafluoroethylene (ePTFE) implants are porous and allow soft tissue ingrowth. They are not as firm as silicone and produce less bone remodeling underneath. They can also be carved on the table. Should there be an infection or a need to change the implant, ePTFE implants are difficult to remove without traumatizing some of the investing soft tissue. Allergic reactions are rare.

Polyethylene implants are biocompatible particulates of high-density polymers derived from ethylene. The material is somewhat flexible and readily carved. This material is also porous and allows for tissue ingrowth. Tissue integration is a plus in terms of stabilizing the implant, but it is also a negative...
Hydroxyapatite implants have both the porous structure and chemical makeup of a bone. They are made from coral, which is heated to 200°C; this removes all the proteins but leaves hydroxyapatite. There is bony ingrowth into this material, but resorption of the material does occur over time. The material is difficult to sculpt. Due to tissue ingrowth, the implant would be difficult to remove should the need arise.

In general, silastic should be used for the majority of cheek implant procedures. It has a long history of safety and can be easily shaped to fit the needs of patients during surgery. The smooth surface and malleable nature of silastic allow it to be folded and easily inserted through a small incision into the surgical pocket. Should there ever be a need to remove, replace, or reposition the implant anytime in the postoperative period, it is easily done without the risk of overlying tissue injury. Making a precise subperiosteal pocket makes the need to fixate the implant unnecessary. It is analogous to putting your foot into the correct sized shoe. The encasement of silastic implants by a fibrous capsule (rather than tissue ingrowth) is also valuable since it helps make the implant nonpalpable and eases the ability to exchange, remove, and/or adjust the implant. They are available in many different sizes and shapes from several manufacturers.

The surgeon’s first concern is picking a malar implant of the appropriate size and thickness. During the preoperative interview, the surgeon marks the infraorbital nerve, the malar prominence that needs the greatest augmentation, the lateral infraorbital rim, and the zygomatic arch. Picking a slightly large implant allows for easier trimming as needed during the procedure (►Fig. 13).

A successful malar augmentation begins with meticulous prepping of the inside and outside of the mouth. The implant is placed on the patient and the outline marked (►Fig. 14). A 2-cm incision is made inside the mouth through the mucosa only (►Fig. 15). A fine clamp is then used to spread the vertical fibers of the levator labii superioris and the levator anguli oris muscles,
continuing down to the most inferior medial aspect of the pocket that is necessary to house the implant (►Fig. 16A, B). From that point superiorly/laterally the dissection pocket is subperiosteal. The pocket is made to mimic the previously drawn outline made on the skin so that when the dissection is finished, the implant slips in and cannot move (►Fig. 17A, B). The implant is inserted using a sponge clamp or a similar instrument, folding the implant in half lengthwise and inserting it through the surgical opening (►Fig. 18). It is manipulated until the facial plastic surgeon is secure about its position. A suture (3–0 polydioxanone) is used to approximate the deep tissue at the level of the initial cut at the periosteum and then the mucosa is closed with a running absorbable suture (►Fig. 19A, B). A broad-spectrum antibiotic should be administered intravenously during surgery followed by Keflex or a similar oral antibiotic for 1 week postoperatively.

The author has relied on this small-incision precise pocket dissection with deep closure for the past 15 years. Good
Fig. 19  (A) Close the periosteum along the inferomedial edge of the pocket to hold the implant in place and seal it from infection. (B) A layered closure of the mucosa follows with an absorbable braided suture.

Fig. 20  (A) Markings made on the patient in the upright position for insertion and end points for trocar. Note that two threads are used for each area. (B) Picture of the trocar exiting the midface point medially.

Fig. 21  (A) Two barbed threads can be seen exiting the midface. (B) The patient is then put in an upright position, and the midface tissue is massaged superolaterally in the direction of the barbs until the surgeon is satisfied with the lift obtained. (C) Note that the immediate postoperative improvement is impressive. Long-term results have not been remarkable.
aesthetic results with no infections have been noted in more than 350 patients. Only one implant has required repositioning, and a second patient came back requesting larger implants.

Ptosis of Midface Soft Tissue Envelope
Somewhere between the fourth and sixth decade of life, most patients even with adequate maxillofacial support will begin to notice deepening of the nasolabial fold and development of a double convex deformity of the lower lid/upper midface. The author has previously written on the major contributing factors leading to this development; that being the medial/inferior descent of the malar pad associated with the inferior descent of the SOOF pad. This is accompanied by, and in part due to, the loss of integrity of the surrounding support tissues (the SMAS) and stretching of the ligaments and muscles that invest the midface. Lifting in a subperiosteal plane in the midface certainly helps to tighten the investing muscles but does little to help the major culprits of midface aging, that is, the sagging SMAS and surrounding invested fat structures. Furthermore, it is the author’s experience that pulling in a subperiosteal plane pulls in on the nasolabial fold through transference of tension from the superficial muscles of facial expression to the fascial fiber connections which attach these muscles to the nasolabial fold, thus defeating one of the purposes of this procedure, smoothing of the nasolabial fold. Due to the significant edema that follows a subperiosteal midface lift, this lack of improvement will not be appreciated unless the patient is followed for 6 months to a year. The periosteum does not move with time, and in the midface, there is little cohesion between the periosteum and the more superficial structures, that is, the SMAS, malar pad, SOOF, and investing superficial muscles of facial expression; the opposite is true for subperiosteal lifts of the forehead/brow where this approach is preferred. Those muscles mainly include the risorius and the zygomaticus major and minor. For that reason, the author and others have suggested in the past approaches that reposition the SMAS and surrounding invested fat structures back to their more youthful positions for optimal midface rejuvenation.

Much has been written over the past several years on the advantages of using barbed sutures (and other such devices) in an attempt to rejuvenate the midface without heavy anesthesia, other than local, and with minimal incisions. The advantages of such an approach are obvious in that the physician can offer improvement of the midface without the disadvantages of a prolonged healing time or the minor risks of deeper anesthesia. In brief, the technique for the midface starts with inserting two trocars in the hair-bearing part of the temporal area and advancing them in a serpentine fashion toward the lower part of the cheek mound in the direction of the modiolus labii (Fig. 20A, B). After the trocars have pierced the skin medially, they are cut at the level of the barbs; the lateral portion is pulled while the skin is massaged in a superior/lateral direction and the two

Fig. 22 Curvilinear incision made around the ear extending into the tragus inferiorly and the temporal hair superiorly.

Fig. 23 Anterior extent of subcutaneous dissection is made up to the level of the malar eminence and subzygomatic fossa. At this point, the head of the zygomaticus muscle is identified and the malar pad is noted above.

Fig. 24 View is through an endoscope within the temporal pocket made for an endoscopic browlift being performed in this case along with a midface lift. Note the lateral orbital rim with the periosteum elevated inferiorly down to the level of Whitnall’s tubercle. The deep temporal fascia is below, and the superficial temporal fascia, fat pad, and frontal branch of the facial nerve are above. There is no advantage in releasing this bridge of tissue from the zygoma and arch inferiorly as it can lead to a risk of injury to the frontal branch.
threads are tied together, making sure they are secured to the deep temporal fascia. Immediate improvement is noted by the patient and facial plastic surgeon (► Fig. 21A–C). Unfortunately, in most of the author’s patients, the long-term improvement (i.e., over a year) has been less than satisfactory with this approach. Due to the lack of longevity, this procedure is no longer performed by the author.

Lifting the malar pad complex during a facelift or as a sole procedure has been the author’s preference for more than 20 years on more than 1,000 patients. The method employed has been described earlier by the author in various publications.7,8,15 When performed as a sole procedure, a curvilinear incision is made around the anterior/superior attachment of the ear extending up to the temporal hair (► Fig. 22). When performed in conjunction with a facelift, a typical rhytidectomy incision is used. Dissection is performed on top of the deep temporal fascia past the hairline and then in a subcutaneous plane to the level of the malar protuberance and the subzygomatic fossa until the head of the zygomaticus major is identified (► Fig. 23). Using this approach avoids the risk of injuring the frontal branch of the facial nerve found above the periosteum across the level of the zygomatic arch, below the SMAS inferior to the arch, and within the superficial temporal fascia superior to the arch. A review of the author’s cases using this approach showed no weakness or paralysis of the frontal branch of the facial nerve. When this procedure is performed in conjunction with an endoscopic browlift, it is important to note the bridge of tissue that includes the superficial temporal fascia and the superficial fat pad within which the frontal branch of the facial nerve is contained; this tissue bridge is lateral to the dissection plane for a browlift and superior/medial to the dissection plane for the midface lift and is left intact (► Fig. 24). After identifying the head of the zygomaticus major, blunt dissection is performed superior to the zygomaticus muscle’s fascia toward the modiolus labii (► Fig. 25). As noted earlier, the plane at this point of the dissection is not “deep”; we are above the investing SMAS of the superficial muscles of facial expression and below the SMAS fibers that...
invest the malar pad. A fine clamp or the surgeon’s finger is used to loosen the frontozygomatic ligament, which can be palpated immediately superior to the malar prominence. Using a figure-of-eight technique, a 3–0 Mersilene suture (Ethicon Inc.) is secured to the bulk of the malar pad through a back bite, then secured to the superficial temporal fascia, then back again to the malar pad, and then again to the superficial temporal fascia (►Fig. 26A, B). Lifting through the suture, the facial plastic surgeon now looks for tethering of McGregor’s patch. This area was initially described by Mar McGregor in 1959. McGregor’s ligament consists of one or more bundles of fibrous tissues that originate near the inferior border of the zygomatic arch posterior to the insertion of the zygomaticus muscles. From there, they ascend to insert into the dermis. The strength of this ligament varies; however, if any tethering is noted in this area while securing the aforementioned suture, it needs to be released to prevent tethering. Following securing of this deep suture, the skin flap is pulled posteriorly and superiorly while a sharp cut is made above the ear so that a retention suture of 3–0 nylon can be placed. The rest of the skin is draped, cut under no tension, and closed. Typically, no drain is necessary when performed without a deep plane facelift, and when performed as a sole procedure, it may be performed without an intravenous using oral sedation in the motivated patient.

Should the upper midface show a double convex deformity, then, in addition to repositioning the malar pad and the associated structures, a SOOF lift blepharoplasty is recommended.9,10 This is typically performed through a transconjunctival approach but can also be performed through an open

Fig. 28 Lower lid everted over the blunt edge of a Desmarres retractor.

Fig. 29 The incision is made approximately 2 mm below the tarsal plate.

Fig. 30 Orbital septum has been split down to the infraorbital rim; the arcus marginalis is noted.

Fig. 31 Orbital fat being removed from the lateral fat compartment.

Fig. 32 Bipolar cautery has been used to thicken the orbital septum, which provides a long-lasting effect.
The choice of approach depends upon the degree of redundancy of the orbicularis oculi muscle of the lower lid when the patient is in repose. Should this be significant, which is rarely the case, a standard subciliary approach can be used (►Fig. 27).

A SOOF lift blepharoplasty with the transconjunctival approach requires general anesthesia. First, the lower lid is everted around a blunt-edged retractor (►Fig. 28), incising it several millimeters below the tarsal thickening (►Fig. 29). Using a combination of scissor dissection and blunt dissection with a cotton tip applicator, the orbital septum is split down to the level of the arcus marginalis (►Fig. 30). Should the patient have congenital pseudoherniation (seen in the second to third decade of life and runs in families), fat is removed from each of the three fat pockets. For the majority of patients with senile pseudoherniation (seen in the fifth to sixth decade of life), fat is removed from the lateral pocket only (►Fig. 31). After closing the hole made in the orbital septum with a 5–0 Vicryl, bipolar cautery is used to thicken the orbital septum of the nasal and middle fat pockets16 (►Fig. 32). Aggressive removal of fat in these patients leads to a mild hollow look and should be avoided.9,10,17 The hole made to remove fat is closed with a 5–0 Vicryl and also tightened with a bipolar cautery. The attachment of the orbicularis oculi to the arcus marginalis is released by the handle of the scalpel blade; scissors is used to widely open a pocket on top of the periorbital of the midface

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**Fig. 37**  (A) Suborbicularis oculi fat (SOOF) pad has been released through a transcutaneous approach. (B) SOOF pad elevated to the infraorbital rim through a transcutaneous approach in a patient with significant orbicularis oculi hypertrophy.

**Fig. 38**  (A) Oblique view of the proper position of a submalar implant. (B) Oblique view of the proper position of a combined malar/submalar implant. (C) Anterior view of the proper position of a combined malar/submalar implant. (D) Anterior view of the proper position of a submalar implant.
Fig. 39 Three sets of patients with combined malar/submalar atrophy who underwent rejuvenation including the use of malar/submalar augmentation. (A, B) The first patient had generalized facial wasting and had received previous poly-L-lactic acid injections without much improvement, as well as fat injections. She had a full endoscopic browlift, as well as a deep plane minituck and a combined malar/submalar implant. (C, D) 3 months postoperative photo of the second patient who had a lateral endoscopic brow lift, suborbicularis oculi fat (SOOF) lift blepharoplasty, full face CO₂ laser, a combined malar/submalar implant, and a deep plane facelift. (E–G) The last patient had a three-fourth endoscopic brow lift, a SOOF lift blepharoplasty, full face CO₂ laser, combined malar/submalar implant, and a deep plane minituck. The postoperative photos are at 1 year (F) and 8 years (G).
Extra periosteal dissection is performed of the midface inferiorly toward the SOOF (Fig. 33A, B). The SOOF pad is found on the anterior part of the flap surrounding the levator angularis oris muscle. A 4–0 Mersilene on an S-2 needle is used employing a horizontal mattress technique to elevate the SOOF pad to the arcus marginalis (Fig. 35). The arcus marginalis is thicker medially than laterally. This lift effaces the depression below the level of the infraorbital rim and provides for improvement of the midface (Fig. 36).

Should a subciliary approach be indicated, the author prefers leaving the tarsal portion of the orbicularis oculi intact, and lifting a skin muscle flap inferior to this, along the preseptal portion. Fat pad management is the same as with a transconjunctival approach. The SOOF pad is then released as before and suture-elevated to the arcus marginalis (Fig. 37A, B). Adding this step not only helps efface the hollow look below the infraorbital rim but also supports the lower lid superiorly.

The muscle of the septal portion of the skin muscle flap is then secured with a braided permanent suture in a laterosuperior fashion to the thick portion of the orbicularis oculi just lateral to the area of the lateral canthus. The extra skin is then trimmed conservatively with the patient’s mouth open.

**Midface Fat Atrophy Management**

For the average patient somewhere between the sixth and seventh decade of life, general atrophy of the facial fat begins. It is seen more aggressively in ectomorphs and less so in mesomorphs and endomorphs. There is definitely a familial tendency. Depending on the degree of fat atrophy, lifting the malar pad becomes less of an option. However, the SOOF seems to be less at risk in midface fat atrophy patients. Indeed, in severe cases, there is no fat to lift, and attempting to do so is inadvisable, especially for the malar pad. In these patients, the SMAS is still split over the zygomaticus muscle, and a thick cuff of tissue is available to elevate to the superficial temporal fascia similar to the malar pad lift. The SOOF pad can usually be found and lifted. Since it is a deeper structure, there should be no concern about tethering the skin, but if it is atrophied considerably, which is rare, the improvement will not be as dramatic. In patients without a malar pad due to fat atrophy, a cheek implant including the submalar component is preferred. Again, a silastic implant is preferred. Malar/submalar implants should be preferred for submalar atrophy because this approach affords the best long-term result in terms of symmetry and appearance, with much fewer complications. For lower lid hollowness (tear trough) in severe fat atrophy patients, the SOOF lift blepharoplasty is still the preferred approach; however, biological fillers are also an option. Alloplastic implants are available for these areas also (e.g., tear trough implant); however, the author feels that these implants are too visible under the skin of the lower lid and that soft tissue fillers give a more natural look. The disadvantage of this approach is the need to

**Fig. 40** (A, B) Clumping of fat injections in the lower lid area is noted. She was operated upon by another surgeon 1 year previously. (C) Fat protruding from direct incision in an attempt to correct this problem. (D, E) Three months after fat recontouring of the left lower lid after fat injections.
repeat the injections over time and the reported risk of going blind, which is in the literature.

Depending on the degree of atrophy and skeletonizing of the malar bone, as well as the relative strength of the malar prominence, the surgeon will plan a combined malar/submalar augmentation versus augmenting the submalar area only (Fig. 38A-D). The majority of patients need the former since, with age, there is also loss of volume of the facial bones.

Fig. 41 (A) Preoperative view of the patient with midface aging and significant redundancy of the orbicularis oculi. (B) One year postoperative photo after a transcutaneous suborbicularis oculi fat lift blepharoplasty followed by direct excision of malar bags and by CO₂ resurfacing.

Fig. 42 (A) A younger patient with a weak malar bone and early aging along with elongation of the upper lip. (B) 6 months postoperative photo after malar augmentation, a short flap facelift (“signature lift”), and a lip lift.
Fig. 43  (A–F) Before and after photos of a series of patients before and after midface surgery including lifting of the malar fat pad and of the suborbicularis oculi fat pad. The photos of these patients who present with aging of the midface fat demonstrate how addressing the soft tissue ptosis by using the techniques presented in this article provides excellent midface rejuvenation.
and putting an implant over a skeletonized malar bone helps to improve this finding. The alloplastic implant materials available for submalar atrophy are the same as those described for malar augmentation, but silastic implants are preferable for the same reasons as given earlier. The technique is the same as malar augmentation, with an emphasis on a small incision, precise pocket formation, careful two-layer closure, and infection prophylaxis. The main difference is the need to release McGregor’s patch and develop a pocket over the masseter muscle so that the implant fits well in this area without any inferior tension. As with malar augmentation, the author has had no serious complications using this technique and material over the past 20 years. In fact, the frequency of using this approach has increased over the years since patient satisfaction has been excellent with exceptional long-term results. \(\text{\textcopyright  Fig. 39A–G}\).

Biological fillers are another alternative to treat facial atrophy, with autologous fat injections being the best alternative in this category. The use of fat as an autograft was first reported by Neuber in 1893.\(^{19}\) The topic was revived by Peer in 1956, who reported a 45% decrease in volume 1 year after free fat implantation.\(^{20}\) With the advent of microliposuction and the availability of less traumatized fat cells, the procedure gained new converts in the late 1970s.\(^{21-23}\) Microliposuction involves the technique of harvesting fat under sterile conditions and local anesthesia using tumescent techniques, a syringe, and a blunt microcannula. The fat is typically harvested from an area that can be hidden since there may be some depression of the donor area postoperatively. The harvested fat is separated from the accompanying serosanguinous fluid, and the fat cells are then injected using 1-mL syringes. Injection is best performed under sedation. The fat is injected into the atrophied areas of the face with cannulas designed for fat injection through a submuscular to a subcutaneous plane, with overcorrection of 30 to 50%. Around the infraorbital rim, only a plane above the orbital septum, but not above the orbicularis oculi, should be used. Postoperative swelling and ecchymosis are common, with the former a concern for some patients up to a month. Potential complications include hematoma, infection, prolonged ecchymosis/edema, hemosiderin deposition, undercorrection, overcorrection, fat clumping, donor-site depression, asymmetry, fat necrosis, and fat migration. \(\text{\textcopyright  Fig. 40A–E}\). Despite these drawbacks, many reputable authors have reported excellent long-term results.\(^{21,26}\) Due to the lack of complications, longevity, and excellent results, implants, in general, should be the first choice.

Many synthetic soft tissue fillers are available for combating midface fat atrophy, suggesting the old adage that whenever there are many ways to do the same thing, none has any particular advantage. However, the author does feel that certain soft tissue fillers have a distinct advantage in the midface over others. The fillers that the author routinely uses in his practice for volume enhancement include hyaluronic acid products, poly-L-lactic acid (Sculptra), and calcium hydroxylapatite (Radiesse). The author also uses medical grade silicone (Silikon 1000) by means of a microdrop technique for small scars outside the area of the eyelid (this product should not be used for large-volume augmentation due to the unacceptable complications that may arise).\(^{25}\) The three aforementioned products, other than medical grade silicone, can potentially be used for large-volume enhancement and offer several advantages over fat injections. These advantages include less donor-site deformity, less swelling, less contour irregularity, less worry about asymmetry, ease of injection, and more predictable results. The main disadvantages are cost of the material, large volumes being expensive, and the relative impermanence of the treatments beyond 18 months, as can happen with fat injections.\(^{26}\) Poly-L-lactic acid is a good filler for fat atrophy, but the need to inject it several times, the cost of the injections, and the need to use a larger needle are all disincentives to patient acceptance. For these reasons, when patients are not candidates for or refuse alloplastic implants for midface fat atrophy, they can consider biological injections, but make sure that the pros and cons of each are reviewed with patients so that they can participate in the decision.

**Conclusion**

Midface aging is a combination of many factors. As facial plastic specialists, our goal in addressing the midface is to try to recapture or create the inverse triangle of youth, a concept we
are all familiar with. As we have seen in this article, correction of the midface comes in many forms. Correction of the midface area may not be a surgical problem. Some patients may simply have a hyperkinetic orbicularis upon smiling and need botulinum toxin. Some patients have orbicularis oculi redundancy and need a subcutaneous dissection to the lower lid with or without SOOF pad elevation (Fig. 41A, B). Some patients may have skeletal deficiency and benefit from malar augmentation (Fig. 42A, B). Some patients may have soft tissue ptosis of the SMAS and associated fat pad (the malar pad and SOOF pad) and benefit from malar pad lift (with or without a facelift) and a SOOF lift blepharoplasty (Fig. 43A–F). Some patients may need soft tissue fillers for mild cases. Some patients have bone and fat resorption over time and benefit from augmentation of both areas with or without tightening of the overlying skin/SMAS envelope (Fig. 44A–D). Some patients have combinations of the preceding findings. The facial plastic surgeon who wishes to approach this area of the face with confidence needs to be familiar with each of these methodologies and have the wisdom that comes with knowledge, training, and experience to know when to apply them.

References
3 Furnas DW. The retaining ligaments of the cheek. Plast Reconstr Surg 1989;83(01):11–16
19 Neuber F. Fat transplantation. Chirurg Der Ges Gesellch 1893;20:66–70