

Volume Management of the Middle Third-Lower Orbit/Midface

Edward D. Buckingham, MD¹ Robert Glasgold, MD² Theda Kontis, MD³ Stephen P. Smith Jr., MD⁴
 Yalon Dolev, MDCM, FRCS(c)⁵ Rebecca Fitzgerald, MD⁶ Samuel M. Lam, MD, FACS⁷
 Edwin F. Williams, MD⁸ Taylor R. Pollei, MD⁸

¹ Director, Buckingham Center for Facial Plastic Surgery, Austin, Texas

² Department of Surgery, Rutgers University-Robert Wood Johnson Medical School, Piscataway, New Jersey

³ Department of Facial Plastic Surgery, Johns Hopkins Medical Institutions, Facial Plastic Surgicenter, LLC, Baltimore, Maryland

⁴ Department of Otolaryngology, The Ohio State University, Columbus, Ohio

⁵ Department of Facial Plastic and Reconstructive Surgery, ENT Specialty Group, Westmount, Canada

⁶ Department of Dermatology, David Geffen School of Medicine, University of California Los Angeles, Los Angeles, California

⁷ Willow Bend Wellness Center, Plano, Texas

⁸ Williams Center for Excellence, Latham, New York

Address for correspondence Edward D. Buckingham, MD, Department of Facial Plastic Surgery, Buckingham Center for Facial Plastic Surgery, 2745 Bee Caves Road #101, Austin, TX 78746 (e-mail: edbuckin@yahoo.com).

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Abstract

This is the second of the three articles discussing volumetric rejuvenation of the face. The previous article, Volume Rejuvenation of the Facial Upper Third, focused on the upper one-third of the face while this article focuses on the middle one-third, primarily the lower eyelid, cheek, and perioral area. Again, the authors (RG, TK, SPS, RF, SL, and EFW) from the upper face article have provided a summary of rejuvenation utilizing a product of which they are considered an expert. Robert Glasgold has provided volumetric analysis of the region as an introduction.

Keywords

- ▶ facial volume loss
- ▶ facial volume replacement
- ▶ facial rejuvenation

Volume Rejuvenation of the Midface: Robert Glasgold

Aesthetic Analysis

The manifestations of midfacial aging are largely due to changes in facial volume. Aging leads to an overall change in facial shape due to a volume shift from the upper midface to the lower face; this transitions the youthful “heart” shaped face into a more aged “rectangular” shape.^{1,2} Within the midface exist specific patterns of age-related volume change that transition the midface from a youthful convex platform dominated by highlights to an aged platform segmented by shadows (concavities) (–**Figs. 1** and **2**). As with other areas of the face, comparing characteristics of young and elderly faces is an invaluable step in outlining the appropriate and natural aesthetic endpoint for facial rejuvenation strategies.

For the purposes of this article, I define the midface as spanning from the lower eyelid to the level of the oral commissure. Ideally, a youthful midface is dominated by a greater degree of volume in the upper portion with a gentle taper toward the lower face; creating the previously mentioned “heart”-shaped appearance. Younger midfaces have a convexity running from the lower eyelid to the nasolabial fold (NLF), creating a dominant cheek highlight. In a youthful face, soft tissue covers the bony skeletal components of the midface providing a softer appearance; the inferior orbital rim is masked minimizing any delineation between the lower eyelid and cheek.^{1–3} The zygomatic arch, providing the foundation of lateral cheek volume, is adequately covered by soft tissue to hide the shadows that delineate its superior and inferior margins (–**Fig. 1**). We speak of ideals to define these hallmarks of a youthful face, realizing that not all individuals fall

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Fig. 1 A woman in her late teens demonstrates the hallmarks of a youthful face: a full upper midface tapering toward the lower face, and a convexity from lower eyelid to cheek, creating a dominant cheek highlight. (Reprinted with permission from Glasgold RA, Glasgold MJ, Lam SM. Periorbital fat grafting. In Massry G, Azzizadeh B, Murphy M, eds. *Master Techniques in Blepharoplasty and Peri-orbital Rejuvenation*. New York, NY: Springer; 2011.)

into this category. Those with congenital weakness of their midface skeletal structure may have a facial shape, and exhibit shadow patterns, more typically associated with aging (see ►**Figure 3** in Volume Rejuvenation of the Lower Third, Perioral, and Jawline).

Advancing age is associated with a generalized deflation of the midface, particularly in the upper aspects. The combination of volume loss and the effect of underlying facial retaining

ligaments contribute to the hallmarks of midface aging (►**Fig. 2**). The most relevant ligaments in the midface are the orbital retaining ligament, malar septum (zygomaticocutaneous ligament), and McGregors patch (zygomatic ligament).⁴⁻⁷ Volume loss at the inferior orbital rim creates a concavity, and overlying shadow, separating the lower eyelid from the cheek. Outside the scope of this article, although important to assess, is the contribution of pseudoherniated lower lid fat on this concavity. Volume loss in the anterior cheek converts the youthful convexity into a concavity with its base tethered by the malar septum. Lateral cheek volume loss diminishes the dominance of midface volume and skeletonizes the zygomatic arch, creating a harsh submalar shadow. When present, buccal volume loss accentuates an aged and unhealthy appearance. Finally, recession at the precanine fossa due to bony volume loss contributes to depth of the NLF.⁸

Volume rejuvenation of the midface is focused on restoring the dominance of midface volume to give a more heart-shaped face and minimizing the segmenting shadows seen with age. Adding volume into the inferior orbital rim will reunify the lower eyelid and cheek segments. Filling the cheek, with a focus on the malar septal depression, will recreate a convex cheek with a strong highlight (►**Fig. 3**). Volume may need to be added to the lateral cheek when there is deficient lateral projection, but more importantly is filling around the zygomatic arch to restore youthful soft contours. In the remainder of this article the contributing authors will discuss their preferred method of revolumizing the midface, detailing the benefits, and challenges of each technique.

Hyaluronic Acid Rejuvenation—Midface: Theda C. Kontis

Tear Trough

One of the most rewarding by certainly the most difficult injection of any filler is injection of the tear trough deformity. When performed flawlessly, dark circles and infraorbital



Fig. 2 (A) A woman in her 60s demonstrates the effects of midface aging. Volume loss at the inferior orbital rim and cheek manifest as shadows segmenting the midface. (B) The tethering effect of facial ligaments, the orbital retaining ligament (c) and malar septum (b), influence the location of midface shadowing. The malar mound (a) is seen as an elevation delineated by these two ligaments. (Reprinted with permission from Lam SM, Glasgold MJ, Glasgold RA. *Complementary Fat Grafting*. Philadelphia, PA: Lippincott Williams & Wilkins; 2007.)



Fig. 3 (A) Preoperatively this patient in her 50s has typical findings of midfacial aging. (B) Postoperatively, following autologous fat transfer to the inferior orbital rim and cheeks, a youthful midface is restored. The addition of volume recreates a single convexity spanning from the lower eyelid to nasolabial fold devoid of shadowing. (Reprinted with permission from Glasgold RA, Glasgold MJ, Lam SM. *Adjunctive techniques III: complementary fat grafting*. In Carniol P, Sadick N, eds. *Clinical Procedures in Laser Skin Rejuvenation*. New York, NY: Informa; 2007.)

hollows disappear. Hyaluronic acid (HA) is an ideal filling material for this region because of its pliability and reversibility. It can also be used to camouflage the malar bag by injection onto the orbital rim and in the area of the zygomatic-cutaneous ligament attachments.

The tear trough can require up to 0.7 mL HA per side. My preferred product in this region is Restylane (Galderma S.A., Lausanne, Switzerland). I believe that Juvederm (Allergan, Inc. Irvine, CA) is too thin and migrates due to the muscle action in this region. If I have a patient who develops the Tyndall effect (bluish hue seen through the skin), I will remove the product with hyaluronidase and reinject 1 to 2 weeks later with Belotero (Merz Pharmaceuticals, Frankfurt, Germany) mixed with lidocaine. Because of the hydrophilic nature of HA, watery bags of edema can occasionally develop after injection of the lower lids. Dilution of the product with 0.1 to 0.3 mL plain lidocaine (1 or 2%) may lessen this occurrence.

Injection of HA in this region demands thorough patient education, meticulous and slow injection technique, and patience. It is better to under correct this region and have the patient return 2 to 3 weeks later for a subsequent injection once the bruising and swelling have subsided. One may find that as the patient changes the direction of their gaze, the positioning of the filler is altered. My technique involves placement of the HA deep on the periosteum in either a depot or linear threading technique, then I apply gentle, even pressure over the product to allow it to flatten into the depressed areas. The entire orbital rim may be treated in this manner (see **Fig. 4**).

Cannulas may also be used in this region. I have found that when using a cannula, it is helpful to inject a small amount of 1% lidocaine with 1:100,000 epinephrine at the planned cannula insertion site. I use a 25 G needle to make the initial puncture and then insert the cannula in the same orientation. With the cannula port facing down, HA is layered over the infraorbital rim in a fanning motion, similar to the technique used for fat augmentation in this area.

Injury to the lacrimal apparatus has not been reported and I have never seen any serious complications of HA injected into this region, except for the expected bruising and swelling. It may take extra handholding of patients after treatment in this region, but once the final results are achieved, they may last a year or more.

Injection of the lower lid can be either a home run or a nightmare for the injector. Occasionally, patients develop swelling and bruising during the procedure that makes further contouring difficult. It is crucial that injectors who use large volumes in this region have a frank discussion with their patients about the risks of bruising and swelling after these injections; complications can sometimes be seen several days following injection. It may take multiple office visits and minor adjustments to get the filler in the tear trough region “just right.”

Malar Prominence

Augmentation of the malar prominence has become a focus of attention for injectors and patients as a result of the recent U.



Fig. 4 Before (A) and 6 weeks after (B) injection of the lower lids with HA. HA, hyaluronic acid.

S. Food and Drug Administration (FDA) approval of Juvederm Voluma (Allergan, Inc.).⁹ Use of this product will produce expansion of the malar and submalar regions. In my experience, treatment with Voluma in this region will improve the volume deficits in the cheeks and midface, but does not provide the dramatic midface lift and jowl effacement that some patients are seeking. These findings have been problematic for injectors, who must explain that the Voluma studies used an average of 4.6 mL of filler per patient.¹⁰ Although Voluma is FDA approved for the midface, it also may play a role in other regions of the face needing volume expansion, such as the temples and deep NLFs. Similarly, any HA can be used to augment the malar prominence; differences just lie in the amount of product injected.

When injecting the malar region, the injector may want to draw out Hinderer lines: the intersection of two arbitrary lines, one drawn from the tragus to nasal ala and the other from the lateral canthus of the eye to the ipsilateral oral commissure. The intersection of these two lines determines the maximum projection the malar cheek. Filling this region returns the fullness of the cheek seen laterally as the Ogee curve (see ►Fig. 5). The technique of filling this region can be performed either with a cannula or needle. Filler is placed in a fanning or depot technique by placing the product deeply in the preperiosteal plane and/or subcutaneous plane. Injectors who are experienced with the use of Voluma have found that filling the superolateral region (zygomaticomalar) should be addressed first by placing product preperiosteally. Treating this region initially will give the maximal volume expansion, then the injections can be performed medially and inferiorly, as needed.

The intraoral approach is also an option for filling the malar prominences and is not associated with an increased

chance of infection. However, the most difficult issue with such technique is obtaining cheek symmetry and occasionally a percutaneous injection is still required to “fine tune” the area. I also suggest that patients not sleep on their sides for a few days to prevent compression or flattening of the product.

Submalar Region

Often treatment of this area is combined with augmentation of the inferior orbital rim or the malar prominence. Flattening of this region is seen with aging and, in some Asian faces, can be flat to concave. Depot injections or linear threading into the deep subcutaneous tissues can fill this region and soften the contour between the lower lid and cheek.

The angular artery runs alongside the nose and is at risk for intravascular injection. The injector should not inject deeply in this region and should perform a reflux maneuver on the syringe before injection.

Nasolabial Fold

The NLF was the first facial region to be studied when HA fillers became popularized.¹¹⁻¹³ This anatomic region proved ideal because it allowed side-to-side comparisons of product efficacy. Restylane was the first HA to be approved for treatment of the NLFs and replaced collagen as the gold standard against which subsequent fillers had to be compared.¹³

Injection of this area can be performed with either a cannula or needle, however, I currently prefer a needle because I feel I can more accurately place the product. My technique involves linear threading both along the NLF and also perpendicular to it (from medial to lateral). Such horizontal injections allow the mass of the filler to act as “scaffolding” that may be needed to support a ptotic cheek.



Fig. 5 Before (A) and immediately after (B) volumization of the malar prominence with HA. Arrow indicates the restoration of the Ogee curve. HA, hyaluronic acid.

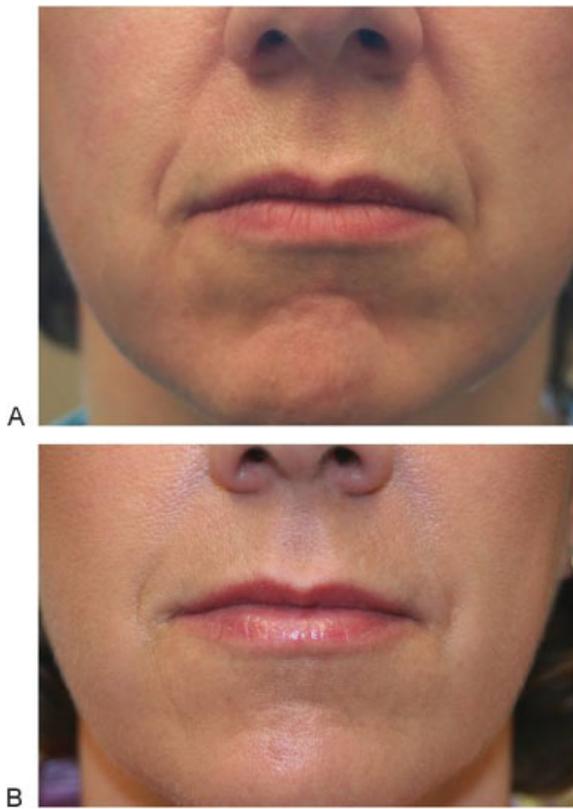


Fig. 6 Before (A) and 10 days after (B) treatment of the NLF and lower face with HA. HA, hyaluronic acid; NLF, nasolabial fold.

Injections should be in the subdermal or dermal plane. Care must be taken when injecting at the nasal alar crease, where the angular artery is encountered.

Bruising, asymmetry, and lumpiness are the most common postinjection sequelae. Most patients do not have symmetric NLFs and often asymmetric amounts of product are necessary to attempt to regain their lost symmetry (see **Fig. 6**).

Nonsurgical Rhinoplasty

HA is probably the only filler that should be used for nonsurgical rhinoplasty, in my opinion. By capitalizing upon the firmness of HA, it can be used as a camouflage graft, tip graft, supratip graft, radix graft, and even a batten graft or rim graft for internal or external valve collapse.

Nasal injections should not be performed by novice injectors. Those performing injections for a “nonsurgical rhinoplasty” must have both the aesthetic sense of nasal proportions as well as knowledge of the pertinent anatomy. Injections should be placed in the preperiosteal plane to avoid vascular occlusion.

By using small depot injections and massage, filler may be placed to straighten a crooked nose or remove a dorsal hump by placing the HA as a graft would be placed surgically (see **Fig. 7**). Such procedures can be performed for patients who do not desire or are not candidates for rhinoplasty surgery or more often, for those with minor postoperative irregularities in whom revision surgery is not desired.

It is important not to overcorrect regions of the nose. In general, small amounts of filler are placed and massaged to



Fig. 7 Before (A) and immediately after (B) injection of HA to the dorsum and tip to produce a straighter dorsum and increase tip projection. HA, hyaluronic acid.

reduce irregularities. Extreme caution must be taken in patients who have undergone multiple rhinoplasty surgical procedures as the blood supply to the skin may be tenuous and vascular compromise may occur with filler injections.

Ear Lobe Rejuvenation

The short, plump earlobes of youth become deflated and elongated with aging. Those patients with pierced lobules note that their earrings may droop because the lobes have lost their support. Filling agents can be used to fill the lobes and allow ear rings to sit more securely (see **Fig. 8**).

HA fillers are the ideal material for injection of this region. Often small amounts of filler are necessary to achieve the desired result. Filler is injected in a u-shaped fashion underneath the pierced earlobe hole. Patient satisfaction with this simple procedure is excellent.

Calcium Hydroxyl Appetite Midface: Yalon Dolev and Steve Smith

Midface—Malar and Submalar Areas

The use of Radiesse (Merz Aesthetics, Frankfurt, Germany) in the malar and submalar regions is considered off-label unless it is to treat midfacial human immunodeficiency virus (HIV) lipoatrophy. It has, however, been used extensively in this area as an excellent volumizing agent owing to its high G' (see section on rheology in the previous Upper Face Rejuvenation chapter) in the non-HIV aging patient.¹⁴ Its ability to maintain its form and lift soft tissues despite the multiple muscular forces in the midface has made it a popular choice for midface volume restoration. For this reason, malar/submalar augmentation is our preferred indication for Radiesse. As volume is lost in the midface, the tear troughs and NLFs are enhanced further contributing to the appearance of aging. It is our opinion that rather than treating the NLF and tear troughs by various methods, the early use of volumizing agents such as Radiesse has a profound rejuvenating effect and can preclude

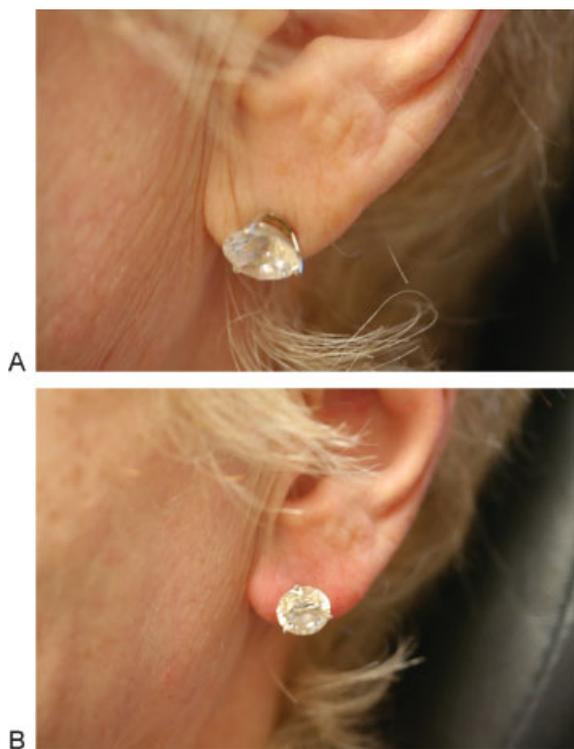


Fig. 8 Before (A) and immediately after (B) injection of HA to plump earlobe and increase support to a drooping earring. HA, hyaluronic acid.

the need to treat the NLF and periorbital regions early in the aging process by delaying their progression. Often, both midfacial volume restoration and effacement of the nasolabial and periorbital regions are required. When this is the case, the malar region should be augmented first, as it will also have an effect on the latter.

Malar augmentation involves first carefully assessing the area of volume loss. The presence of central malar, lateral malar, and submalar volume loss is identified. Asymmetries must be identified and disclosed to the patient. Alcohol is applied and a white eyebrow pencil is then used to mark the areas of volume loss. This should be done in the upright or sitting position since gravity has a significant effect on this area. The outline marked can vary but usually consists of a variation of an inverted equilateral triangle. The medial border of this triangle is at the NLF, the superior border about 1 cm below and paralleling the orbital rim, and the lateral border joining the two in a curvilinear fashion. If the submalar region is affected, an additional area is marked as necessary. Although the placement of the skin markings is described above, it should only be used as a guide since significant variability if volume loss exists from patient to patient.

Mixing lidocaine with Radiesse provides insufficient anesthesia for malar augmentation. An infraorbital nerve block is therefore performed using a small bolus of 0.5 mL 1% lidocaine with epinephrine. Once anesthesia has been successfully administered, Radiesse is delivered in a supraperiosteal plane. Although other authors have described fanning and

cross-hatching techniques in different tissue planes,^{15,16} we prefer to deliver controlled boluses of Radiesse equally to each eminence. This avoids causing asymmetries and palpable irregularities. The first bolus is delivered in the center of the marked triangle and consists of half of the volume reserved for that side. The remaining volume is then delivered as required based on subjective evaluation and requirement for volume in the submalar and lateral malar areas. A small amount of product is always reserved to address any asymmetries that may have been created or that become apparent. Within the first 5 minutes, the product is readily malleable and can be adjusted. The area is then immediately iced. Patients are reassessed at 2 to 4 weeks for further augmentation as required.

Midface—Periorbital Region

Although some authors have described the use of Radiesse in the periorbital region without complication,¹⁷ we do not advocate its use in that region owing to the thin skin and minimal periorbital subcutaneous tissues. Great care should be employed with any filler in this region. Better alternatives exist for this area but are outside the scope of this article.

Midface—Nasolabial Folds

The use of Radiesse for the NLFs is considered on-label and is the most common site for its use. Several large studies have published about its effects, longevity, and minimal adverse events and complications.^{14,15,18–20}

The technique involves linear threading of the compound along the deepest portion of the NLF. The skin is first cleansed with alcohol and NLF is then marked with a white eyebrow pencil. The markings usually widen as the NLF approaches the alar facial groove. Radiesse is then mixed with lidocaine as previously described. The needle is first introduced at the inferior aspect of the NLF and advanced to the alar facial groove. This should be done in the immediate subdermal plane. Injection intradermally is not advised. Approximately 0.2 mL is then injected on egress. To achieve a more fluid transition between the cheek and lip, the needle is then withdrawn and readvanced more inferiorly again to the nasal facial groove but this time slightly more inferiorly. A smaller volume is injected again on egress. The needle is periodically withdrawn and the entire length of the NLF gently massaged with the index finger on the inside of the mouth and the thumb over the NLF. The product is thus evenly distributed throughout the NLF. Injection is then repeated until the desired effect is reached. Care should be taken to avoid injecting above the NLF as this will accentuate it rather than efface it. A depression at the junction of the NLF and alar facial groove superomedially is usually present. Its volumization can help greatly. We have made a habit of injecting a small bolus of 0.1 to 0.2 mL of Radiesse there to achieve this desired effect. Complete effacement of the NLF should never be attempted, as this will confer an unnatural appearance to the face. Almost all patients will develop immediate erythema and swelling owing to the needle trauma as well as the massages. It usually resolves within days. Bruising is less common but not infrequent and patients should be

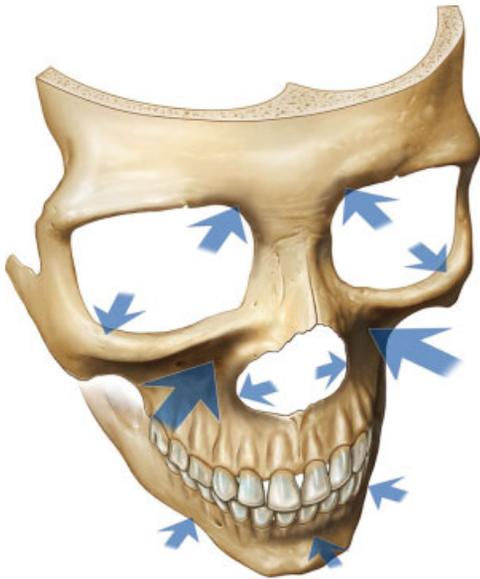


Fig. 9 Arrows indicate the areas of the facial skeleton susceptible to resorption with remodeling. The size of the arrow correlates with the amount of resorption. (Reprinted with permission from Mendelson.)

forewarned of this possibility. When bruising occurs it usually resolves within a week but can last up to 2 weeks.¹⁹

Poly-L-Lactic Acid, Midface: Rebecca Fitzgerald

Areas to avoid: Placement in areas of hyperdynamic muscular activity around the eyes and lips (such as the crow feet, infraorbital area, vermillion border, body of the lips, and upper lip perioral lines) may result in nodules and should be avoided. Poly-L-lactic acid (PLLA) is not used on the nose as the subsequent fibroplasia may be visible in this area.²¹

Areas to treat: Medial and lateral cheeks, malar and submalar area, preauricular area, earlobes.

Evolving information on the anatomy of aging of the craniofacial skeletal support and fat compartments can be used to guide filler placement.²² PLLA can be used to mimic skeletal support (the zygomatic arch, anterior and medial maxilla as well as the pyriform aperture/canine fossa) lost with aging (►Fig. 9, Mendelson bony remodeling). As noted earlier, those with congenital weakness of their midface skeletal structure may have a facial shape, and exhibit shadow patterns, more typically associated with aging. This is well illustrated in ►Fig. 4 in the upper face section on PLLA, as well as in ►Figs. 10A–C and 11A, B. Note the ovalization of the face and the classic youthful proportions noted after treatment of the craniofacial skeletal support illustrated in these examples.

Discovery and refinement of our knowledge of the compartmentalization of fat (subcutaneous fat both superficial and deep to the superficial muscular aponeurotic system as well as the role of deep fat in anterior projection of the midface, have enabled more “site-specific” placement of fillers to achieve a predictable outcome. These fat compartments are illustrated in the schematics shown in ►Fig. 12A, B. This concept is illustrated in the following figures. The first (►Fig. 13A, B) is of a patient with congenital lipatrophy who despite a lack of superficial fat (in the pattern illustrated in yellow in the schematic in ►Fig. 12) has retained a good deal of her deep fat (in the pattern illustrated in green in the schematic in ►Fig. 12) and therefore has good anterior projection of her midface with no “NLF” or “tear trough” despite an otherwise hollow and skeletonized appearance. This appearance is treated using the superficial fat compartments as a “guide” to placement. In the next example, we see an endurance exercise patient (►Fig. 14A, B) who has lost a good deal of deep fat leading to a lack of anterior projection in the midface and the subsequent appearance of a “NLF” and “tear trough” that can be resolved with use of filler in the area



Fig. 10 A 40-year-old female patient with ample soft tissue and good skin tone shows only a focal deficit of craniofacial support and only a mild amount of deficit. It can be predicted that she will not need much product or many treatments. A half vial of poly-L-lactic acid was used on each side of her face for a total of one vial done in only one session. A, markings; B, baseline; C, 4 weeks following treatment. (Reprinted with permission from Fitzgerald and Vlegaar. Facial volume restoration of the aging face with poly-l-lactic acid. *Dermatol Ther* 2011;24(1):2–27.)



Fig. 11 A 37-year-old female patient with good skin tone shows mild deficit of both craniofacial support and soft tissue. One vial of product was used on either side of her face to cover this moderate surface area for a total of two vials per session in one session. It can be predicted that this mild deficit will need only one treatment. **A**, baseline; **B**, 3 months following treatment.

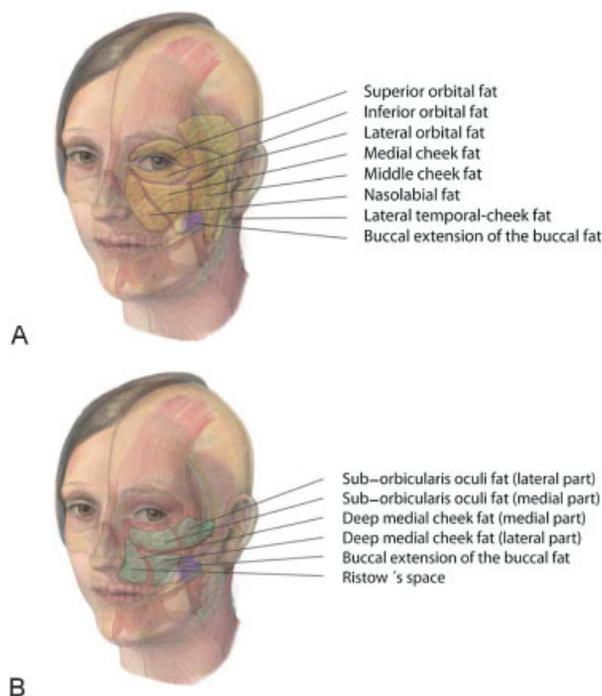


Fig. 12 Schematic of the superficial and deep fat compartments. The midfacial fat is arranged in two and paranasally in three independent anatomical layers. The superficial layer (yellow) is composed of the nasolabial fat, the medial cheek fat, the middle cheek fat, the lateral temporal cheek compartment, and three orbital compartments (A). The deep layer (green) is composed of the medial and lateral sub-orbicularis fat, and the medial and lateral deep medial cheek fat. An independent “buccal extension” of the buccal fat was also found. A deeper compartment exist paranasally (B). (Reproduced with permission from Gierloff et al. Aging changes of the midfacial fat compartments: a computed tomographic study. *Plast Reconstr Surg* 2012;129:263–273.)

of the deep medial cheek fat (► **Fig. 15**) (also illustrated in the lower row of green in the schematic in ► **Fig. 12**). Treatment directly in the tear trough and the infraorbital rim should be avoided with PLLA (as this again leads to visible nodularity). However, as illustrated in ► **Fig. 14**, this area can often be improved indirectly by using PLLA to support the adjacent areas. On review of this photograph in the preparation of this article it appears that this patient would benefit from additional treatment in the superficial fat in the preauricular area.

The midface can be treated with a 25 or 26 G needle or cannula. Cannulas are preferable to some practitioners but may prove cumbersome after several treatments (due to fibroplasia). A short (cross-hatching is usually done with the short needle using 0.1 mL/injection) or long needle (fanning is usually done with the long needle using a volume of 0.1 to 0.3 mL/cm²) may be used. Do not serially redeposit product at the base of the fan. A single nodule in the lower cheek is likely due to this common error.

General considerations: All treatments in the midface should be placed deeply (subcutaneous or supraperiosteal) except in the lateral third of the face. In this preauricular area, a cross-hatching or fanning technique is done parallel to the skin in the subcutaneous plane above the mesenteric and parotid fascia. This technique can serve to “pick up” mild skin laxity in a patient with otherwise good support (► **Fig. 16A, B**) or to fill a hollow preauricular area in a thin patient status after the facelift. Superficial injections into the dermis should be avoided as this may lead to visible fibroplasia and nodularity. A reflux maneuver should be performed routinely to minimize any risk of inadvertent intravascular injection. Injection should be performed slowly without using excessive pressure and product should never be forced through the syringe.



Fig. 13 A 50-year-old female patient with familial lipoatrophy. She has good craniofacial support and good skin tone, but global severe lipoatrophy. Interestingly this patient does show ample anterior projection of her midface consistent with the presence of deep midfacial fat. It can be predicted that correction of this large surface area will require several vials of product per session and that the severe degree of atrophy will require several sessions to correct. A total of nine vials of product were used in this patient using three vials per session in three sessions spaced 4 weeks apart. A, baseline; B, 6 months following treatment. (Reprinted with permission from Fitzgerald and Vleggaar. Facial volume restoration of the aging face with poly-L-lactic acid. *Dermatol Ther* 2011;24(1):2–27.)

A clogging needle is usually from excessive foam. If this happens, remove the needle and syringe from the tissue, take off the clogged needle, clear the foam by pushing it up through the hub of the syringe, and replace with a new needle. The new needle should be primed (dripping) before reinjection.²³

The end point at each session is to blanket the area to be treated. The final volumetric correction is determined by the number of treatments, for example, in the patient with global severe lipoatrophy seen in ►**Fig. 13**, it can be predicted that correction of this large surface area will require several vials of product/session and that the severe degree of atrophy will require several sessions to correct. This is in contrast to the

patient pictured in ►**Fig. 10** needing correction of focal, mild deficits where only a small amount of product requiring only one session is needed. The “treat, wait, assess” mantra is especially important in younger or fuller faces as additional sessions at early intervals may result in an inadvertently overfilled face.

Posttreatment massage is done immediately after treatment and the patients are instructed to continue this massage at home several times daily for the first several days after treatment. It is not uncommon for a patient to feel some tenderness with this massage, and they may need reassurance that this is normal.



Fig. 14 A 42-year-old athletic female patient with good craniofacial support and good skin tone who has lost a good deal of facial fat. In contrast to the familial lipoatrophy patient in Fig. 13, this patient has poor anterior projection of her midface consistent with a lack of deep midfacial fat. A total of four vials were used in this patient using two vials per session in two sessions spaced 4 weeks apart. A, baseline; B, 3 months following treatment.

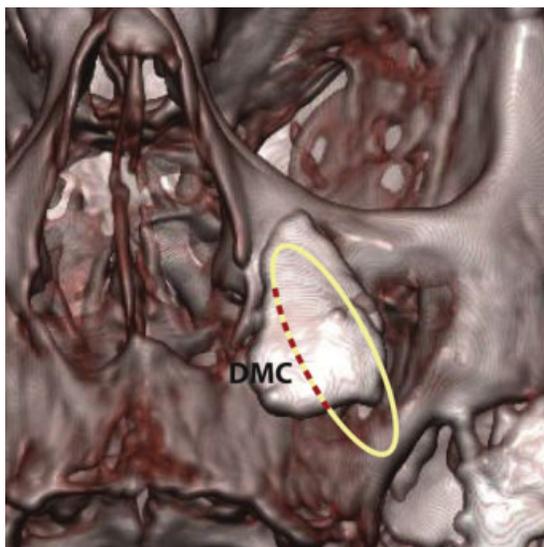


Fig. 15 Computed tomography image of the medial part of the deep medial cheek fat. The yellow line indicates the position of the overlying nasolabial fat compartment. The red dashed line indicates the course of the nasolabial crease. (Reproduced with permission from Gierloff et al. The subcutaneous fat compartments in relation to aesthetically important facial folds and rhytides. *J Plast Reconstr Aesthet Surg* 2012;65(10):1292–1297.)

Polymethylmethacrolate/ArteFill Midface: Sam Lam

Volume Rejuvenation of Middle Third—Lower Orbit/ Midface with ArteFill

Unequivocally, for me, ArteFill (Suneva Medical Inc., San Diego, CA) is the most superior product that I have used to manage the lower eyelid region. Although fat grafting is a very

good product, I believe it should only be placed deep below the muscle to be safe and the fact that it has variable resorption, a patient who desires the best result in the lower eyelid^{24–26} area I always think of ArteFill as my preferable choice. ArteFill is the only product that allows me to sculpt the lower eyelid/tear trough area right up to the immediate subdermal level without significant risk of visibility of the product. HA-based products on the other hand suffer from three major issues: Tyndall effect (in all HA products), variable postinjection edema, and clumping in the tear trough area during smiling when too much is added. I have not seen these issues at all with ArteFill. For all fillers (fat, HA, ArteFill, and so on) I use disposable microcannulas exclusively. I inject parallel to the orbital rim rather than perpendicular to it (as I would with fat grafting) and with ArteFill I can inject right under the dermis and not see product. My entry point is typically laterally (►Fig. 17, marked “a” in the figure) to approach the medial tear trough in a parallel fashion. I then can use that same entry point to aim laterally to capture the lateral orbital rim hollow. At times, I will use a third entry site somewhat more laterally (►Fig. 17, marked “b” in the figure) to manage the middle section of the lower eyelid hollow so that I can approach that portion of the rim in a parallel fashion. I only need entry “b” in perhaps about 1 in 10 patients. I will inject approximately one syringe (1 mL) (half per lower eyelid) in most cases but have used a total of three to four mL in the lower eyelids during a single session. I always warn the patient that approximately 20% of the result will diminish over 6 weeks to 2 months’ time when the collagen in the product dissipates and one’s native collagen has not replaced the original bovine collagen in a 1:1 fashion. The patient can then return any time after that for additional fillers as needed. It may take two to four times to manage a



Fig. 16 A 60-year-old female patient with good craniofacial skeletal support, a large masseter, and some anterior projection in her midface consistent with the presence of deep medial cheek fat, with a moderate loss of volume in her temporal/lateral cheek fat. Replacement of this volume in this patient served to “lift” sagging skin along the jawline. Patient was treated with two vials per session in two sessions. A, baseline; B, 8 months following treatment.

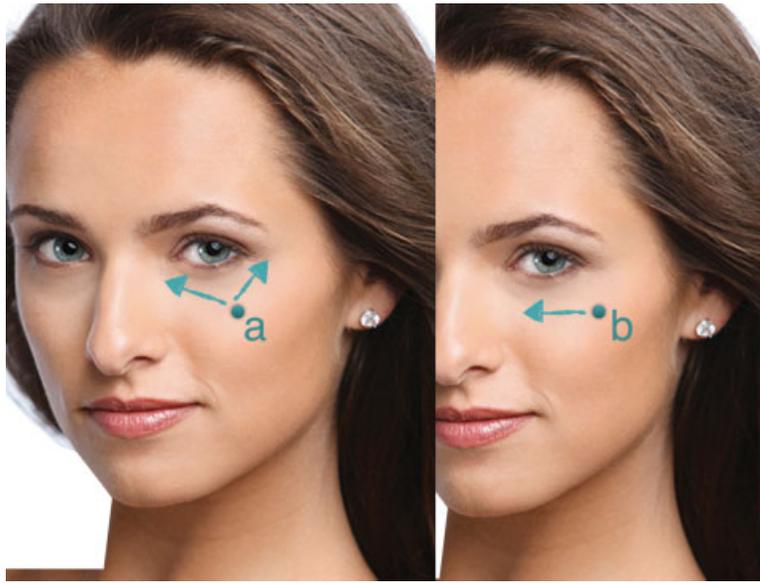


Fig. 17 This figure demonstrates the access point (dots) and the direction of cannula injection to augment the entire expanse of the lower eyelid (a) and at times when needed the middle horizontal component to the lower eyelid through a separate entry point (b).

lower eyelid effectively but again I have not seen a better product in the lower eyelid than ArteFill. I have even done ArteFill exclusively in the lower eyelid, where I feel I will achieve a more excellent outcome for the patient, and then use HA products for the remainder of the face for cost reasons.

As mentioned, I inject patients almost 100% of the time using disposable, 27 G cannulas for safety and accuracy reasons with the only exception being for intradermal scars or fine lines in which case I would use a needle. The midface is no exception to this rule. There really is no difference in the approach to the midface using ArteFill as compared with other fillers, and I believe there is no real benefit other than the durability of the product. When filling the buccal expanse, I prefer to use Juvederm Voluma when the deficit is extreme because I can typically use fewer syringes to achieve this result, as the buccal area can be a bottomless pit to fill with fillers to achieve a desired outcome. Another pearl is that I typically put very little filler in the anterior cheek because I believe patients can truly look too full in that area, which can look worse when they smile and may make them look like a chipmunk. I typically inject upward medially from a more medial position (→ Fig. 18, marked “a” in the figure) to cover the anterior cheek and central buccal area and (→ Fig. 17, marked “b” in the figure) from a more lateral position to manage the outer cheek and area below the zygomatic arch. Unless the anterior cheek is significantly deflated, I typically prefer to inject no farther anterior than the anterior border of the malar bone to minimize an over cheeky appearance to the anterior cheek. If I am concerned about this problem, I will have the patient smile during the administration of the filler to ensure this complication is minimized. One more point is that I believe ArteFill has one advantage besides permanence over HA fillers in the cheek is that because most of the product is composed of one’s own natural tissue, the product simply will not migrate. I have noticed that with a lot of HA fillers placed into the middle third of the face, the area can be

compressed during sleeping or aggressive massage well after placement of product. Radiesse has a similar profile to ArteFill in its stability of position, but I stopped using it a decade ago because I have noticed that with multiple syringes the subcutaneous space becomes very firm and cannula passage is compromised for future sessions. I have not observed this point with ArteFill.

Autologous Lipotransfer Midface: Taylor R. Pollei and Edwin F. Williams

Midface and lower orbit volumetric loss is the most visible and commonly treated age-related facial volume change. Current treatment options include midface suspension, lower eyelid



Fig. 18 This figure demonstrates the access point (dots) and the direction of cannula injection to augment the medial cheek/central buccal area (a) and the lateral cheek/subzygomatic region (b).

tissue excision, and volumization with tissue preservation as well as the judicious use of combined approaches.²⁷⁻³¹ Autologous lipotransfer addresses components of midface and lower orbit aging that tissue excision or suspension alone cannot.

Aging of the middle third of the face encompasses the lower eyelid and midface; two distinct anatomic areas whose aging processes are very interdependent. Due to this functional relationship, attempts at rejuvenation must address both simultaneously. Lipotransfer specifically addresses the following anatomic changes: periorbital hollowing, bony projection, accentuated tear trough deformity, lengthening of the lower eyelid, and midface flattening and fat pad descent. In tandem, loss of overall skin turgor and subcutaneous thinning result in visibly thin skin with textural changes, which intensify the pronounced bone structure. All of these concerns can be successfully treated with the use of autologous midface/lower eyelid lipotransfer.

From its earliest descriptions, free fat tissue transfer has had well known benefits and detractors.³² Over time it has been shown to represent a reliable adjunct to traditional surgical therapy of the region, and has a reasonable safety profile.³²⁻³⁵ We feel that two of its greatest advantages are its longevity when compared with HA, calcium hydroxyapatite, or poly-L-lactic acid fillers, and the associated overlying skin rejuvenation effects that are not seen with the injection of nonautologous products.^{36,37}

Previously described favorable considerations also include: cost-effectiveness, adequate supply, accessibility, biocompatibility, longevity, and ease of injection.^{33,38,39} When compared with nonautologous injectable fillers, lipotransfer detractors include prolonged edema, bruising, delayed recovery, risk of fat necrosis/resorption, and unpredictability with the potential for additional procedures.^{32,33,38}

The specific fat graft harvest and processing technique we employ has been well described previously, therefore

this discussion will not focus on details.^{30,36} Anesthetic options for fat harvest and injection include local anesthesia with or without oral sedation, monitored anesthesia care, or general anesthesia. Potential donor sites include (in descending preference): periumbilical access for abdominal fat, lateral access for flank fat, outer thigh, and inner thigh fat. Our standard is to inject approximately double the amount of tumescent solution as the goal lipoaspirate volume. Following centrifugation and processing, typically 50 to 60% of the lipoaspirate volume remains and can be used for injection.

Key Points

Injectable fillers are typically used more to solve an individual problem, such as facial folds, fine rhytids, troughs, and so on. If needed in a significant quantity to fill volume, it can become cost prohibitive. Autologous fat can be thought of more as a facial volumizer than a tissue filler.

Patient education is key. The process of managing expectations begins in the preoperative consultation. Begin with discussing the specific areas of greatest volume loss and what treatment options exist. The midface tends to be the highest yield starting point for volumization.

Counsel patients of age extremes, smokers, or those who exercise heavily that they may exhibit less immediate graft take and notice a shorter duration of effect.

We often advocate the use of adjunct facelift, midface lift, blepharoplasty, or skin resurfacing to help minimize visibility of contour irregularities. Conceptually this allows tightening of the soft tissue envelope while augmenting from underneath, thus synergistically increasing overall rejuvenation. Volumizing without tightening in patients with significant skin laxity results in less optimal lipotransfer results (→ Fig. 19A, B).



Fig. 19 (A) Preoperative: Lipotransfer to bilateral lower eyelids and midface, forehead, glabella, temple, perioral, prejowl, plus full face CO₂ laser resurfacing. (B) Postoperative: Lipotransfer to bilateral lower eyelids and midface, forehead, glabella, temple, perioral, prejowl, plus full face CO₂ laser resurfacing.



Fig. 20 (A) Preoperative: Lipotransfer to bilateral lower eyelids and midface. (B) Postoperative: Lipotransfer to bilateral lower eyelids and midface.

With continued lipotransfer experience, a significant reproducible improvement in skin texture is seen postinjection. This includes overall turgor, decrease in abnormal pigmentation, and overall a more healthy skin appearance.

All patients are counseled that following initial injection, edema occurs and that about 30% of injected volume will be lost. Therefore, we plan to over deliver a volume of 10 to 15% to account for early fat loss. There will be continued gradual fat loss that coincides and progresses with natural age-associated facial volume loss. However, it is not clear if this objectively quantified volume loss correlates with a clinically significant fat graft loss.

Lower Eyelid Lipotransfer

Periorbital hollowing, tear trough deformity, and lengthening of the lower eyelid are all effectively addressed with lower

eyelid injection. Typically, each side is accessed with an injection site over the malar eminence as well as a site several centimeters lateral and slightly inferior to the lateral canthus. The goal is a smooth transition from the lower lid to the midface, raising the lid/cheek junction shadow up onto the lid, thus “erasing” the visible indentation resulting from the orbicularis retaining ligament and zygomatico-cutaneous ligament.

Several passes from the lateral entry site are placed first below and then softly above the orbicularis oculi muscle. Use caution in injecting the lower lid too quickly or too superficially since either may result in visible or palpable lumpiness. Utilize a fanning pattern and begin with deep injections followed by the more superficial injections. A 0.9-mm blunt tip cannula is used in the lower eyelids and upper midface with a 1.2-mm blunt tip cannula in the lower midface.



Fig. 21 (A) Preoperative: Lipotransfer to bilateral lower eyelids and midface. (B) Postoperative: Lipotransfer to bilateral lower eyelids and midface.

Typically less than 1 mL is injected superficially on the lower lid. Approximately total 2 to 3 mL is used for each lower eyelid.

Midface Lipotransfer

The goal is overall volumization rather than filling of specific folds or defects. This is completed via the lateral lower lid injection site as well as an additional inferior entry site placed 2 to 3 cm lateral to the oral commissure. The combination of sites allows for access to the submalar area and malar eminence. Fat is aimed for the original malar fat pad location, as well as superior attachments of the zygomaticus major and minor musculature. NLFs can be softened, but avoid aggressive volumization in this area that can result in an unnatural appearance. Most patients are wary of an overly “cheeky” appearance, therefore excessive injection onto the surface of the malar eminence tracing onto the anterior zygomatic arch is avoided. Around 3 to 8 mL is injected into the midface on each side (►Figs. 20A, B and 21A, B)

Patient satisfaction tends to be based on two factors: longevity of results and degree of correction. If secondary lipotransfer is indicated, waiting for 1 to 2 years is reasonable. When degree of patient satisfaction, cost, procedure-related factors, duration of effect, and potential complications/detractors are weighed, autologous fat transfer a good value, and adjunct as a facial volumizer.

Note

Samuel M. Lam declares that he received no compensation from any company for any of his remarks, which in turn are based solely on his own clinical experience. Therefore, these subjective comments that he made are not meant to be dogmatic, objective, or derogatory in any way to any of the manufacturers.

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