Vectoring Approach to Midfacial Recontouring Using Calcium Hydroxylapatite and Hyaluronic Acid

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In the past, fillers have been used in 2 applications: to replenish volume loss and to mask volume descent, defects, or both. However, there is a third application of fillers, which is to place volume in a way that reduces relative skin laxity and restores earlier facial proportion. This third application is the subject of this article. The author describes a comprehensive, 3-dimensional vectoring approach to facial contouring that encompasses both skin surplus reduction and structural enhancement. Also presented are tissue mobility zones and premixing calcium hydroxylapatite with lidocaine before injection.

Restoring youthful anatomical features requires the reduction of absolute and relative cutaneous surplus. Cutaneous laxity can be the result of weakened support secondary to volume loss or descent (relative skin laxity), loss of elastic fibers (absolute skin laxity), or both. Both of these causes lead to the appearance of an aging face. Traditionally, fillers have been used in 2 treatment applications for the aging face to replenish volume loss and to mask volume descent, defects, or both. The literature is already replete with examples of these particular applications, especially for the nasolabial folds, cheeks, and prejowl sulcus.[1-3] In addition to these, however, there is still a third application of fillers, which is to place volume in a way that reduces relative skin laxity and restoratively approximates the youthful facial proportions of the patient.

This third treatment application constitutes a comprehensive, 3-dimensional vectoring approach to facial contouring that encompasses both skin surplus reduction and structural enhancement, which is the primary focus of this article. The treatment section is preceded by 3 other sections. The first section discusses tissue mobility zones. The second section identifies treatment protocols for midfacial contouring. The last section concerns off-label mixing of calcium hydroxylapatite (CaHA) with lidocaine immediately prior to injection.

TISSUE MOBILITY ZONES

The skin is a continuous structure with underlying contiguous elements, such as fat compartments, muscle, and salivary glands, as well as anchoring points, such as the ear concha, which is supported by a variable bony topography. Of these elements, changes in fat distribution contribute substantially to alterations in appearance as individuals age.[4]

A model on mobility that may help elucidate the morphological changes in facial soft tissue has been developed.[5] Based on this model, we can identify 4 facial tissue mobility zones: the central zone (relatively immobile), the

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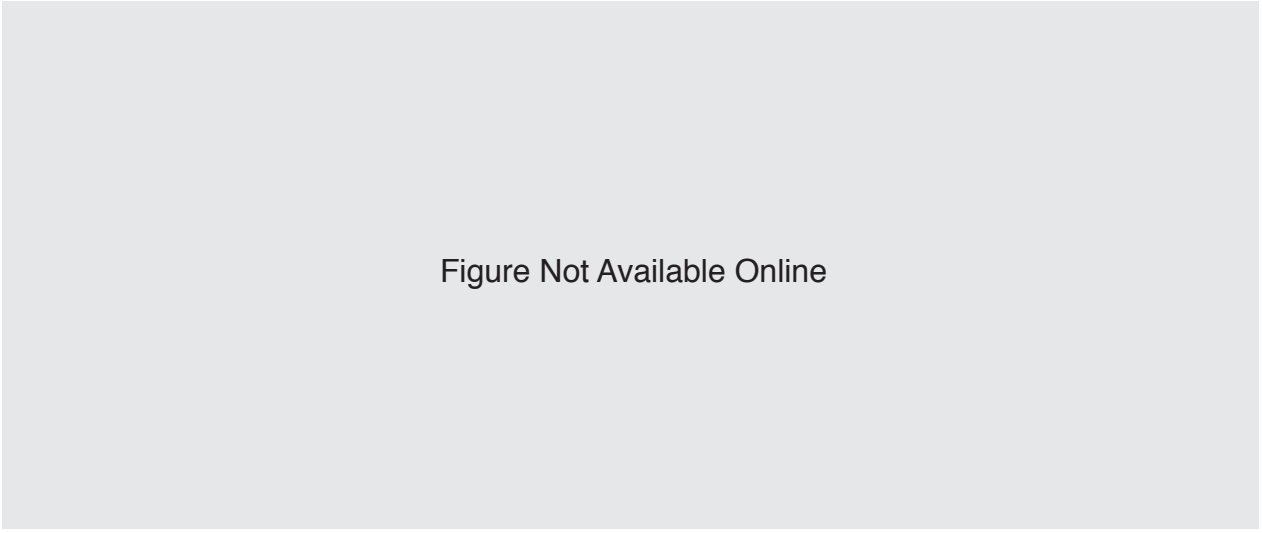

Figure 1. Tissue mobility zones can help the physician develop a comprehensive recontouring strategy. Female patient before (A) and 4 weeks posttreatment with a total of 26 mL of Radiesse dermal filler (B).

paramedial zone (highest mobility), the lateral zone (minimal mobility), and the zone of the ear concha (anchoring point) (Figure 1). Using this skin mobility model as a point of reference, the more paramedial the skin laxity from rotational sliding of the skin from the lateral zone, the more volume may need to be placed in the lateral zone to reduce relative cutaneous surplus. In addition, the more paramedial the skin laxity from vertical cutaneous sliding, the more volume over the zygomatic bone rim may need to be placed.

TREATMENT PROTOCOLS FOR MIDFACE RECONTOURING

The treatment protocol for midfacial recontouring could include 4 techniques in lateral to medial order: temporal augmentation, zygomatic enhancement, lateral canthal and suborbital area volume restoration, and malar recontouring. Each of these areas is treated with a CaHA-based dermal filler, Radiesse dermal filler (RDF) premixed with lidocaine, except the lateral canthal area. In this area, a robust hyaluronic acid (HA) derivative, Restylane, is preferred.

PRETREATMENT MIXING OF CaHA AND LIDOCAINE

The primary reason for using the RDF/lidocaine blend is to more effectively treat the temporal and preauricular fossae, albeit in an off-label preparation. With its 2-part composition of CaHA microspheres and a carboxymethylcellulose carrier gel, RDF can be used as a bifunctional filler, such as a stimulatory layering agent (more spreadability when combined with lidocaine), a stimulatory bulking filler (without lidocaine), or both.

Anecdotal and published reports suggest widespread adoption of an off-label procedure in which the CaHA has been mixed with lidocaine and administered in a single injection session.[3,6-9] The mixing obviates the need for separate lidocaine administration pretreatment. It also reduces treatment session time because it can be mixed by the office assistant while the physician begins communication with the patient in the treatment room.

Mixing involves the use of a 3.0-mL syringe, containing 0.03 to 0.1 mL of lidocaine (10%), and the manufacturer's syringe of RDF connected by a Rapid Fill Luer-Lok-to-Luer-Lok adapter between the 2 syringes. Dilution volumes differ according to the protocols being followed for each patient. Approximately 10 passes from one syringe to the other are necessary for homogenous distribution of CaHA and lidocaine.[10] This mixing results in a final volume of 1.4 mL if the original syringe with 1.3 mL RDF is to be used, or of 1.6 mL if the recently released syringe with 1.5 mL of RDF is used. Other physicians have reported lidocaine volumes ranging from 0.4 to 2.0 mL, depending on physician preference and treatment areas, such as the hands rather than the face.[7,8,11] In the interest of abundant caution and in the absence of detailed studies of possible morphologic and rheologic changes over time, prompt injection of the premixed compound is recommended. In the author's practice and for this application, epinephrine is not combined with the lidocaine.

TEMPORAL FOSSA AUGMENTATION

A fair amount of volume often must be added to reduce skin laxity without changing proportions. Consequently, the author begins corrections more laterally:

Figure 2. Patient receiving Radiesse dermal filler in the temporal fossa above the zygomatic rim, between the fascia and the subcutaneous plane (A) and below the vascular structures (B).

the temples for midface and the lateral canthal area for the suborbital region. Midfacial recontouring not only decreases redundant skin from the periorbital area, it also recreates lost natural skeletal and soft tissue arches. The needle enters the skin just above the zygomatic rim, descending to the plane between the fascia and the subcutaneous tissue and below the vascular structures (Figure 2). The target injection space can be accentuated by tenting of the skin as shown for augmentation of the dorsum of the hand.[6]

Treatment is accomplished through deep overlapping boluses and retrograde injection of CaHA premixed with lidocaine in a range of volumes from 0.7 to 3.0 mL per temporal fossa, using a 27-gauge, 1.25-in long needle. The retrograde injection of the mixture during withdrawal of the syringe limits the possibility of intravascular injection. Depending on volume loss, this correction may be extended into the forehead. The deposition is followed by a firm but not vigorous blending massage.

Ordinarily, treatment in the area results in minimal bruising, and no reports of nerve damage have been noted. However, the potential for temporary brow ptosis exists, arising from anesthetic migrating to the temporal facial motor nerve. Patients should be warned that this correction is associated with significant initial swelling that spontaneously resolves within a few days.

Figure 3 is representative of results that can be obtained in temporal fossa augmentation. In Figure 3, a 66-year-old female patient received a total of 10.8 mL of RDF for her midface recontouring. Areas treated include temporal fossae, zygomae, and maxillae and nasolabial folds. In addition, she received 1.0 mL of Restylane in the suborbital region.

ZYGOMATIC ENHANCEMENT

Deposition of filler over lateral zygoma widens the bizygomatic distance. The supraperiosteal filler deposition has several advantages over conventional soft tissue augmentation. It accentuates the underlying structure and reduces soft tissue weight because injection is not into the soft tissue. It is less traumatic to the patient, and it is faster for the injecting clinician. In addition, it may be longer lasting due to decreased filler translocation. Moreover, by decreasing discomfort with the RDF and lidocaine mix, onlay implantation over bony structures such as zygoma, maxilla, orbital rim, and mandible (including the central mentum, the submandibular region, and the posterior mandibular angle) can be quickly and easily executed.

To avoid vascular structures, the needle should pierce the skin at its thinnest entry point (lateral to the lateral canthus), using a 90° angle. When the tip of the needle makes contact with bone, it needs to be reoriented and advanced slowly while touching (but not piercing) bone underneath soft tissue structures. To inject farther into the cheek, skin can be bunched using the noninjecting hand, followed by the retrograde injection of RDF. Having moved the needle from the lateral canthus medially, the physician then likely makes a deposition of dermal filler at the supraperiosteal level, using a visual end point. This deposition involves a cylindrical bolus of filler, usually 0.7 to 1.4 mL for each zygomatic bone (Figure 4).

Although it would seem that this correction is centered on the submalar area, most of the volume and weight has in fact been reallocated over the zygoma. Because additional soft tissue weight may worsen folds, the physician will need to maintain the delicate balance of opposing vectors, just as must be done with botulinum

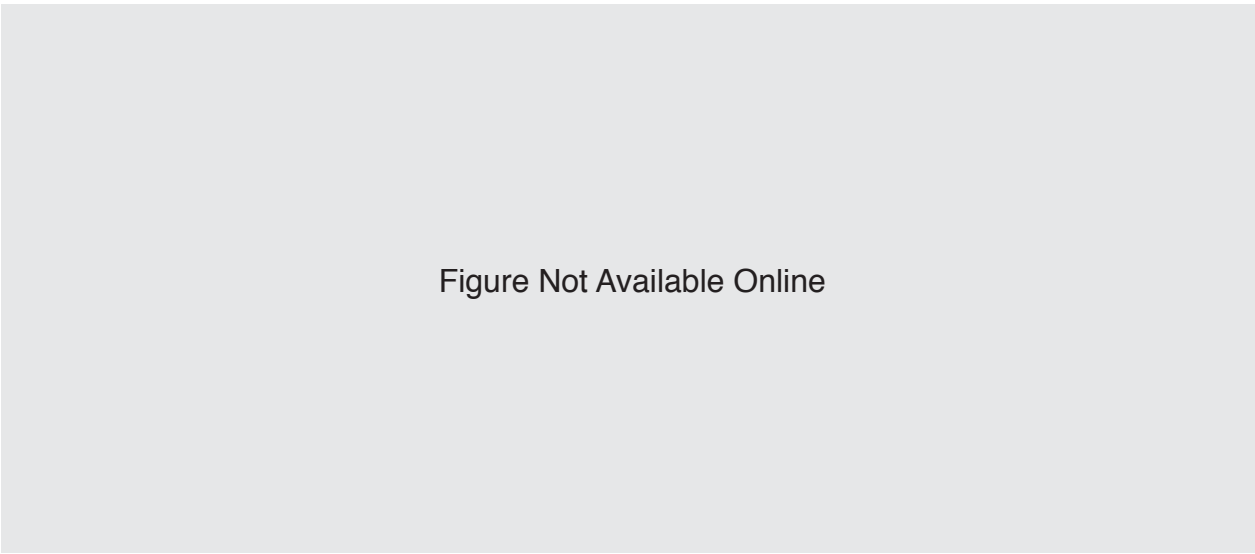

Figure 3. Representative results that can be obtained in temporal fossa augmentation. A 66-year-old female patient before (A) and 2 weeks posttreatment with a total of 10.8 mL of Radiesse dermal filler (RDF) for her full-face recontouring (B). Of this, she received 1.5 mL of RDF in her left temporal fossa and 1.5 mL of RDF in her right temporal fossa, 2.6 mL on each zygoma, and 1.3 mL on each maxilla. In addition, she received 1.0 mL of Restylane in the suborbital region.

toxin A. The weight of the RDF that is to be added must be balanced against the visible lift that the added weight induces in the face. Volume as well as reallocation of weight proportion need to be considered.

LATERAL CANTHAL AND SUBORBITAL AUGMENTATION

Orbital aging occurs from 3 separate factors: photodamage, loss of support, and fat and bone resorption. The most critical step of suborbital augmentation is volume restoration of the lateral canthal and lateral suborbital areas. Volume restoration of these areas defines contour and reduces skin redundancy feeding the tear trough, the malar hollow, the malar mound, and the nasolabial fold.

Suborbital augmentation illustrates best how an understanding of vectors and anchoring points can lead the physician to volumizing-mediated lifts to the midface. The objective is to maximize volume without inducing rounding deformities, using anchoring points to control the direction of the lift. Injection into the orbital rim is usually accomplished with one of the nonanimal stabilized HAs (NASHA), such as Restylane. Usually 1 to 2 mL of NASHA are required per suborbital region. Three-quarters of the volume goes to the lateral canthal

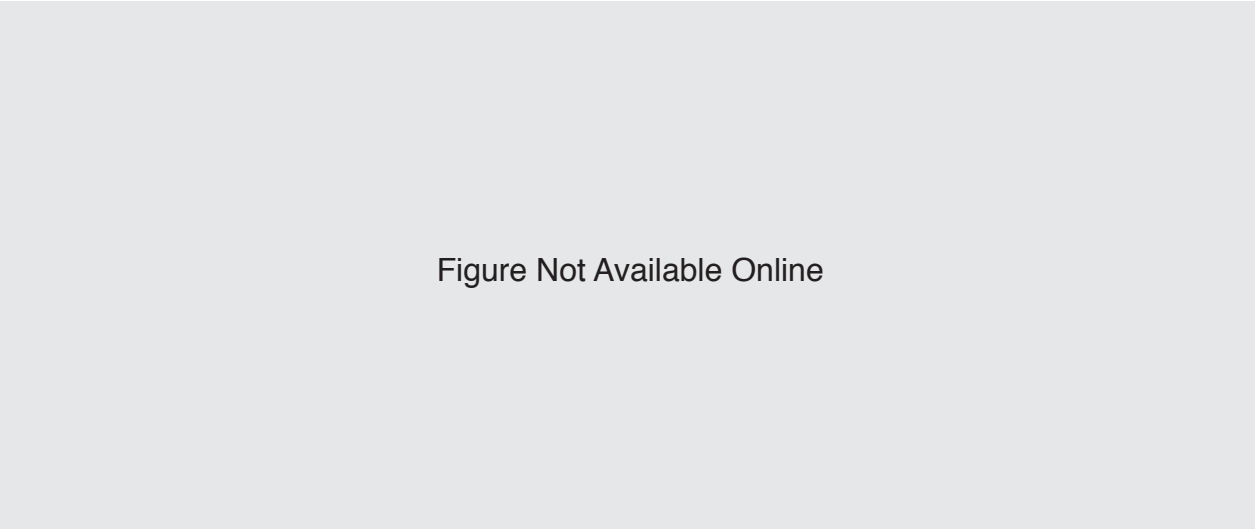

Figure 4. Patient receiving an injection of Radiesse dermal filler. To avoid vascular structures, the needle should pierce the skin at its thinnest entry point (lateral to the lateral canthus) using a 90° angle (A). Having moved the needle from the lateral canthus medially, the physician then likely makes a deposition of Radiesse dermal filler at the supraperiosteal level using a visual end point (B).

Figure 5. In treating the suborbital area through the cheek, the cheek is first manually lifted above the infraorbital groove by the noninjecting thumb.

and lateral suborbital areas and one quarter goes to the tear trough. Injection of one-quarter of product into the tear trough is at the level of the suborbicularis oculi fat.

This area is approached through the cheek, below the orbital malar septum. In treating the suborbital area through the cheek, the cheek is first manually lifted above the infraorbital groove by the noninjecting thumb, followed by injection (Figure 5). This maneuver significantly reduces suborbital bruises because the bruising tends to be more lateral in the cheek. The 32-gauge, 0.5-in needle is introduced perpendicular to the orbital rim. A supraperiosteal bolus of NASHA is then deposited, approximately 0.1 to 0.3 mL. The needle is moved sideways right to left and vice versa to spread the bolus along the rim. Should the bolus be more volume than the area requires, gentle but firm massage can be deployed for overcorrection. To improve correction accuracy, patients should keep their eyes open during this procedure.

Specific complications include ecchymosis, blue discoloration (Tyndall effect), and lumpiness. Treatment of lumpiness or blue discoloration consists of massage, incision and drainage, and hyaluronidase (Vitrase 60–100 IU per eye). A protocol for use of hyaluronidase in treating cutaneous augmentation from HA has been well explained in the literature, should physicians wish to retrieve it for their personal files.[12]

CHEEK RECONTOURING AND PROJECTION

Cheek recontouring and cheek projection can be achieved thru maxillary enhancement. Cheek treatment is ordinarily directed toward the region below the orbital malar septum. In some cases, loss of volume in the deep midfacial fat decreases support for the medial cheek compartment. When this occurs, the result is a negative vector that allows excess traction to be placed on the lower eyelid. As a consequence, the sclera becomes too pronounced in the orbital socket.

Nevertheless, with well-executed treatment, the cheek receives support that has gradually eroded, causing the patient's posttreatment midface appearance to harken back to an earlier time.

Recontouring is approached less traumatically via an intraoral entry through the gingival buccal sulcus than through traditional percutaneous insertion. The canine eminence is the landmark for needle insertion through the gingiva. The physician should inject so that the needle touches the maxilla as laterally as possible. At the maximum lateral placement, a bolus of RDF and lidocaine is delivered in Rislow space up to a visual end point. Rislow space lies behind the deep medial cheek fat, medial to zygomaticus major muscle (Figure 6).

Injection should not be too close to the infraorbital foramen; there should be no injection above the orbital rim. The infraorbital nerve can be protected from inadvertent injection by exerting pressure over the infraorbital foramen with the noninjecting index finger.

Two specific complications have been seen in clinical practice. The first complication was infraorbital neuralgia. This complication was addressed by infiltrating with triamcinolone acetonide (10 mg/cc in lidocaine 2%) and eventually resolved after 9 months in the only patient in which this complication was observed. The second complication was delayed swelling with implant palpability, which appeared in conjunction with sinusitis. This one was addressed by an oral steroidal dose pack; it resolved without difficulty.

Figure 7 is representative of results that can be obtained in treatment of tissue mobility zones with RDF and the suborbital region with HA. In Figure 7, a 44-year-old female received a total of 22.1 mL of RDF for her full-face recontouring, including 2.6 mL per temporal fossa. She also received a total of 3.0 mL of Restylane in the suborbital region.

DISCUSSION

The exponential growth of the use of dermal fillers in aesthetic care has resulted in a plethora of new treatment options for physicians and their patients. Whereas many dermal fillers, including RDF, are indicated for nasolabial folds, other off-label treatment applications for the face and elsewhere have invariably sprung up.

Though fillers can be used to replenish volume loss, mask defects, and reduce skin laxity, the unanswered question remains: do fillers lift? Although the result may appear to be a lift, in reality the result is a volumetric lift or

Figure 6. The canine eminence is the landmark for needle insertion up through the gingival-buccal sulcus (A). At maximum lateral placement, a bolus of Radiesse dermal filler and lidocaine is delivered in Rislow space up to a visual end point (B).

pseudolift. It emanates from alterations in 3-dimensional vectors that reduce skin surplus, for example, reduction of nasolabial folds by filler placement in the cheeks. In contrast to pseudolift, a true lift requires utilization of 2-dimensional vectors, using bony structures as pillars.

The midface in particular is a promising area of treatment, but it is not the area for novices. Instead, it is an area for physicians already comfortable with injection of dermal fillers into the nasolabial folds, the prejowl sulcus, marionette lines, and oral commissures. For the patients presented in this article, significant volumes of RDF were used. Large volumes are often required to sustain proportionality of the face and reduce skin laxity. The author acknowledges that the volumes and the time required for treatment result in costs that may be prohibitive for many patients. However, it is believed that real-time results provide more than adequate patient satisfaction and aesthetic improvement that are well below both the recovery phase and the financial burden of a surgically invasive recontouring procedure.

Midfacial contouring, when well executed, results in immediate and broad improvements in appearance.

Figure 7. Representative results that can be obtained in full-face recontouring with Radiesse dermal filler (RDF) and the suborbital region with hyaluronic acid. A 44-year-old female before (A) and 2 months posttreatment, with a total of 22.1 mL of RDF for her full-face recontouring (B). Of this, she received 2.6 mL of RDF in her left temporal fossa and 2.6 mL of RDF in her right temporal fossa, 1.3 mL on each zygoma, and 1.3 mL on each maxilla. In addition, she received 3.0 mL of Restylane in the suborbital region.

Although the concentration has been on technique in this article, longevity is, of course, a consideration as well. In the author's clinical practice, these results have been seen beyond 6 months in nearly all patients, persisting up to 12 months and beyond in some patients.

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