

# Midface: Clinical Anatomy and Regional Approaches with Injectable Fillers

Sebastian Cotofana, MD,  
PhD

Thilo L. Schenck, MD, PhD

Patrick Trevidic, MD

Jonathan Sykes, MD

Guy G. Massry, MD

Steven Liew, MD, FRACS

Miles Graivier, MD, FACS

Steve Dayan, MD

Mauricio de Maio, MD,  
ScM, PhD

Rebecca Fitzgerald, MD

J. Todd Andrews, MD

B. Kent Remington, MD,  
FRCP

*Salzburg, Austria; Munich, Germany;  
Paris, France; Sacramento, Los Angeles,  
and Beverly Hills, Calif.; Sydney,  
Australia; Roswell, Ga.; Chicago, Ill.;  
São Paulo, Brazil; Houston, Tex.; and  
Calgary, Alberta, Canada*



**U**nderstanding the anatomy of the midface is the key to the understanding of the anatomy of the full face. (See Video, Supplemental Digital Content 1, which demonstrates the clinical anatomy of the midface, available in the “Related Videos” section of the full-text article on PRSJJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B458>.) Albeit several exceptions are present in some dedicated areas of the face, there is common basis upon all: the 5-layered structural

*From the Institute of Anatomy, Paracelsus Medical University Salzburg & Nuremberg; Department for Handsurgery, Plastic Surgery and Aesthetic Surgery, Ludwig-Maximilians University; Expert2expert Group; Facial Plastic Surgery, University of California, Davis Medical Center; Department of Ophthalmology, Keck School of Medicine, University of Southern California; Beverly Hills Ophthalmic Plastic and Reconstructive Surgery; Shape Clinic; The Graivier Center for Plastic Surgery; University of Illinois; private practice; Mauricio de Maio, Clínica Médica Dr Mauricio de Maio; Andrews Facial Plastic Surgery; and Remington Laser Dermatology Centre.*

*Received for publication April 9, 2015; accepted August 6, 2015.*

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*DOI: 10.1097/PRS.0000000000001837*

**Summary:** The clinical approach towards the midface is one of the most important interventions for practitioners when treating age-related changes of the face. Currently a plethora of procedures are used and presented. However, few of these approaches have been validated or passed review board assigned evaluations. Therefore, it is the aim of this work to establish a guideline manual for practitioners for a safe and effective mid-face treatment based on the most current concepts of facial anatomy. The latter is based on the 5-layered structural arrangement and its understanding is the key towards the favoured outcome and for minimizing complications. (*Plast. Reconstr. Surg.* 136: 219S, 2015.)

arrangement. In general, the 5 layers can be dissected into skin (layer 1), subcutaneous fat tissue = superficial areolar layer (layer 2), superficial musculoaponeurotic system (SMAS) (layer 3), deep

**Disclosure:** Dr. Massry receives royalties from Elsevier and Springer. Dr. Liew sits on advisory boards for Allergan, Galderma, and Kythera and has received honoraria from Allergan and Galderma for delivering local and international workshops and for attending board meetings. Dr. Dayan received no funding or financial support for this article. He is currently or previously has been a consultant, researcher, or had speaking agreements with Merz, Allergan, and Galderma. Dr. Fitzgerald is a speaker, trainer, and consultant for Allergan, Galderma and Merz. Dr. Andrews is a consultant for Allergan, Galderma, Merz, and Valeant and also serves on the advisory board for Allergan, Galderma, Kythera, Merz, and Valeant. He has no stock ownership. Dr. Cotofana, Dr. Schenck, Dr. Trevidic, Dr. Sykes, Dr. Graivier, Dr. de Maio, and Dr. Remington have no financial interest in any of the products, devices, or drugs mentioned in the article and did not receive any financial aid or reimbursement or honorarium for the project.



Video Available Online

**Video 1.** Supplemental Digital Content 1, demonstrating the clinical anatomy of the midface, is available in the “Related Videos” section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B458>.

fat tissue = deep areolar layer (layer 4), and deep fascia (layer 5). (**See Video, Supplemental Digital Content 2**, which demonstrates the 5 layers of the face visually, available in the “Related Videos” section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B459>.) During injections, one has to be aware of the precise location of the tip of the cannula/needle and the respective layer to understand the effects of the applied procedure.

## CLINICAL ANATOMY OF THE MIDFACE

### Layer 1

The skin varies in thickness, pigmentation, and subcutaneous adherence between different areas of the face. In the buccal and in the parotideomasseteric area, the skin is connected by vascularized septa to the subcutaneous fat layer. In the infraorbital region and medial to the midpupillary line, the skin is thin and in general no subcutaneous fat can be identified there. Inferior to the nasolabial sulcus and medial to labiomental sulcus the skin is firmly attached to the underlying mimetic muscles. This type of strong cutaneous adherence can be also identified between

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Video Available Online

**Video 2.** Supplemental Digital Content 2, demonstrating the 5 layers of the face visually, is available in the “Related Videos” section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B459>.

skin and the orbicularis oculi and the orbicularis oris muscle.

### Layer 2

The subcutaneous tissue in the midface is strongly vascularized and compartmentalized by fibrous septa. Within these septa, small vessels can (not always) be identified, and these septa have a strong relationship to the underlying mimetic muscles of the face. Being aware of the high variation of the underlying mimetic muscles, it is understandable that the precise boundaries between the subcutaneous fat can vary (Y. Saban, personal communication, 2015).<sup>1</sup> In Figure 1, the natural boundaries between the malar fat pad (also called the medial subcutaneous fat pad of the midface<sup>2</sup>) and the nasolabial subcutaneous fat can be easily identified as the course of the postmortem vascular changes encircle the malar fat pad in this specimen. In Figure 2, the relevant subcutaneous fat compartments of the midface are depicted for a better understanding. Looking at the lower lid, no subcutaneous fat be found between the palpebral part of the orbicularis oculi muscle and the skin.

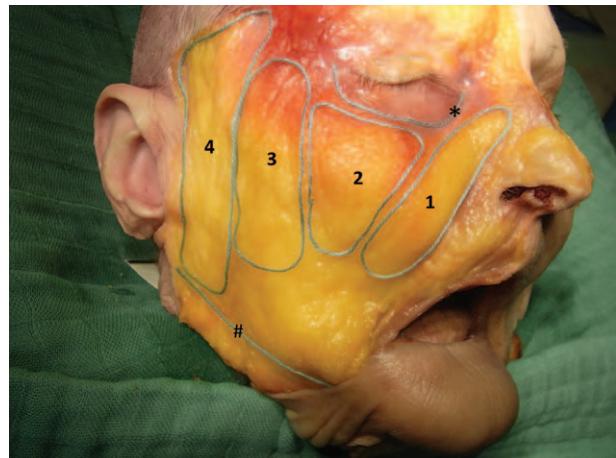
### Layer 3

The underlying framework of the subcutaneous fat compartments is the SMAS,<sup>3</sup> which can easily be dissected as 1 layer reaching from the neck (=platysma) to the temple (=superficial temporal fascia<sup>4</sup>) and to the nose (nasal SMAS<sup>5</sup>). In the periorbital region, the orbicularis oculi muscle can be identified in the same plane (Fig. 3). Layer 3 has strong connections to layer 5 deep to it. These connections serve as sheltered transit points for nerve branches passing from deep



**Fig. 1.** Cephalus of a fresh-frozen female specimen. The skin of the right side of the face has been removed, and the subcutaneous fat compartments are exposed. The subcutaneous fat is absent over the palpebral part of the orbicularis oculi muscle (\*). The tear trough is visible right inferior to the black asterisk. Postmortem vascular changes encircle the malar fat pad and thus delineate the boundaries between the nasolabial and the medial subcutaneous fat compartment (arrows).

to superficial (walls of the premasseteric compartments), as points of strong fixation and suspend (zygomatic ligament, orbicularis retaining ligament) or as pathways for the arterial blood supply (McGregor's patch<sup>6</sup>). In the boundary between the medial and the lateral midface, layer 3 is strongly connected to the buccinator muscle by the masseteric ligaments, which have no direct connection to the masseter muscle themselves. Medial to the masseteric ligaments the SMAS continues and connects the mimetic muscles (zygomaticus major and minor, orbicularis oculi, depressor anguli oris, depressor labii inferioris,<sup>7</sup> and sometimes risorius<sup>8</sup>) in a way that they can act together as a unit around the oral commissure during facial expression. On the nose, the SMAS continues and is very well identifiable with its connection to the intrinsic nasal muscles and the nasal cartilages.<sup>5</sup> Medial to the nasolabial sulcus and medial to labiomental sulcus the arrangement of the SMAS changes from type 1 to type 2<sup>9</sup> and continues as the investing fascia of the mimetic muscles as these form strong and adherent interconnections to the overlying skin.<sup>10</sup>

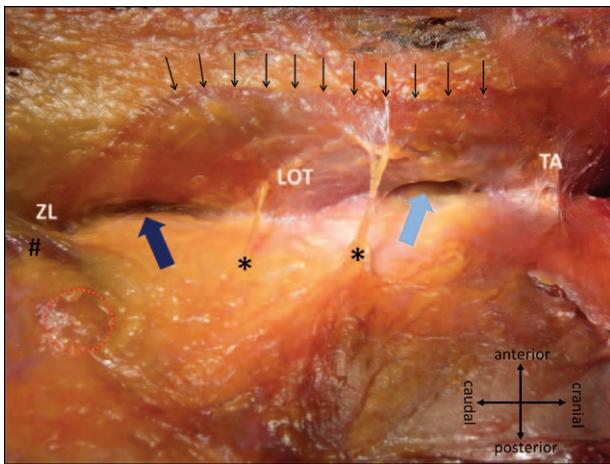


**Fig. 2.** Cephalus of a fresh-frozen female specimen. The skin of the right side of the face has been removed, and the subcutaneous fat compartments are exposed. The subcutaneous fat compartments of the midface are encircled: 1, nasolabial subcutaneous fat compartment; 2, medial subcutaneous fat compartment; 3, middle subcutaneous fat compartment; 4, lateral subcutaneous fat compartment; \*, orbital rim; #, mandibular line.

#### Layer 4

The deep areolar layer, that is, layer 4 encloses the deep fat compartments. In the lateral part of the midface superficial to the parotid gland, layer 3 and layer 5 (here the parotideomasseteric fascia) are strongly adherent. Anterior to the parotid gland 3, spaces open up in which blunt dissection can be performed: the inferior, middle, and superior permasseter compartments.<sup>11,12</sup> The floor of these compartments is the parotideomasseteric fascia and the roof is the SMAS (Fig. 4). The walls of these compartments are formed by fibrous septa through which the buccal branches of the facial nerve travel toward anterior. The superior boundary of the superior masseter compartment is the inferior margin of the zygomaticus major muscle and more occipital to this the McGregor's patch (Fig. 4).<sup>13</sup> Anterior to the masseteric ligaments, the zygomaticus major muscle passes through layer 4 and its broadly based fibrous attachment to the maxilla forms the lateral and inferior boundary of the lateral part of the deep medial cheek fat (DMCF) (Fig. 5).<sup>2,14</sup> This triangular-shaped space lies directly on the maxilla and is bordered on its medial and inferior side by the facial vein (Fig. 5) and superiorly by the zygomatic ligament. The zygomatic ligament arises from the bone, pierces through the orbicularis oculi muscle, and inserts into the skin and forms the hammock of the malar bags.

Medial to the facial vein, the medial part of the DMCF can be found. The roof of this compartment

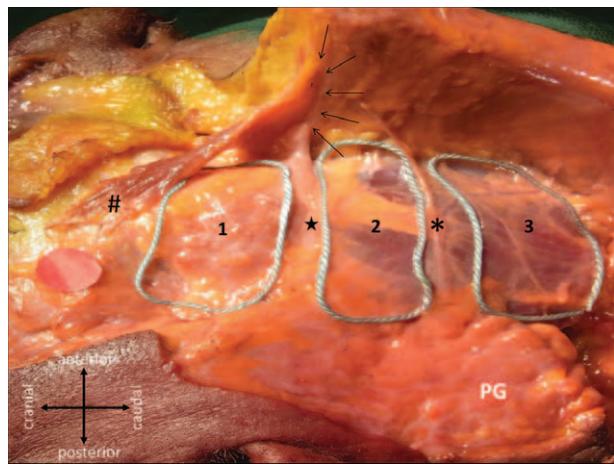


**Fig. 3.** View into the left lower temporal compartment of the face of a male fresh-frozen specimen. Dissection is performed in layer 4, that is, between the SMAS (uplifted) and the deep fascia of the face (down). The cross in the right-inferior corner of the image shows the orientation. In layer 3, the orbicularis oculi muscle is embedded (arrows). Firm adhesions between layer 3 and layer 5 are visible: temporal adhesion (TA), lateral orbital thickening (LOT), and zygomatic ligament (ZL). Between TA and LOT, the superior interval is marked by the thick, light blue arrow. Between the LOT and the ZL the temporal tunnel is marked with the thick, dark blue arrow. Frontal motor branches of the facial nerve are marked with an asterisk (\*). The zygomatic muscle is marked with the hash mark (#). The cut edges of McGregor's patch are circled in red.

is the orbital part of the orbicularis oculi muscle and the SMAS of the midface. The floor is the levator labii superioris alaeque nasi muscle. This compartment is separated from the maxilla by the levator labii superioris alaeque nasi muscle, the structures emerging the infraorbital foramen and in its inferior part by the levator anguli oris muscle and the Ristow's space.<sup>2,14,15</sup> Inferior to the medial and lateral part of the DMCF, the buccal space can be identified. The floor of this space is the buccinator muscle, the roof is formed by the mimetic muscles and the SMAS, and the anterior boundary is the modiolus. The superior boundary is the maxillary ligaments,<sup>15</sup> and the inferior boundary is formed of the loose adhesion of the platysma to the mandible. It is of importance to note that this compartment is separated posteriorly from the masticatory space (which includes the buccal fat pad and its buccal extension<sup>16,17</sup>) by the facial vein and the masseteric ligaments.

### Layer 5

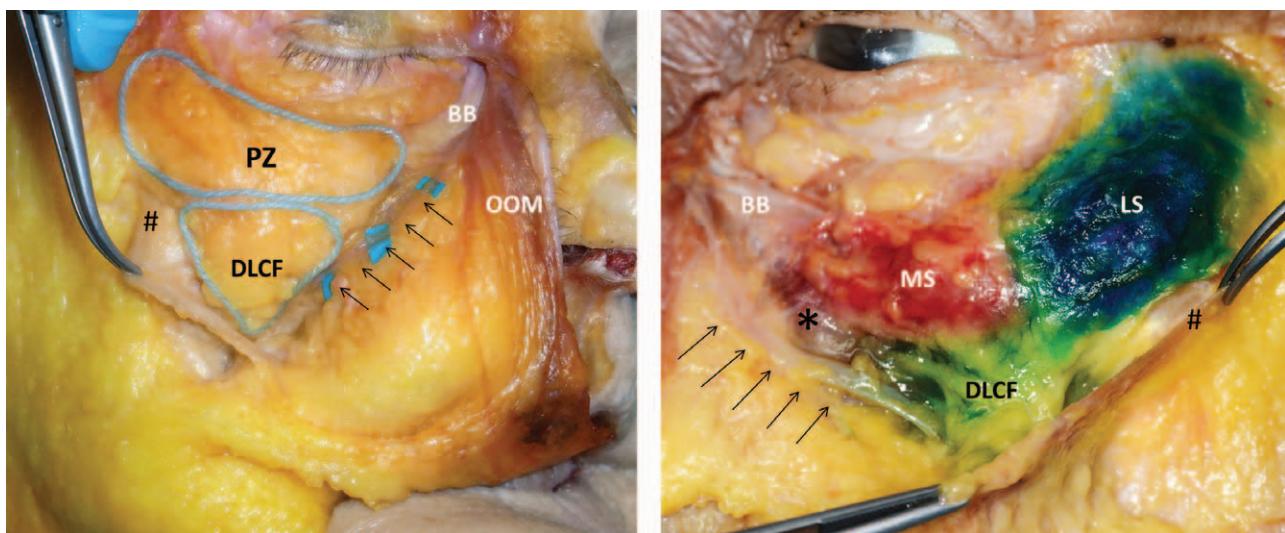
In the lateral part of the midface, layer 5 is formed by the parotideomasseteric fascia. This fascia covers the parotid gland and the parotid



**Fig. 4.** View into the right premasseter compartments of a male fresh-frozen specimen. Dissection is performed in layer 4, that is, between the SMAS (uplifted) and the deep fascia of the face which is here formed by the parotideomasseteric fascia (down). The cross in the left-upper corner of the image shows the orientation. The superior (1), middle (2), and the inferior (3) premasseter compartments are encircled. Between the inferior and the middle compartment the buccal branch of the facial nerve is marked with an asterisk. The star points to the parotid duct, between the middle and the superior premasseter compartment. Note that both the buccal nerve and the parotid duct pierce the masseteric ligaments at the anterior border of the masseter muscle. The red mark in the image shows the cut edge of the McGregor's patch. The hash mark indicates the zygomaticus major muscle which originates from the zygomatic bone and has in this image been skeletonized for a better visualization. The arrows show the location where the muscle passes through layer 3 to reach the modiolus at the angle of the mouth immediately under the skin (layer 1). PG, parotid gland.

duct and includes the buccal branches of the facial nerve. This fascia continues toward the temple over the zygomatic bone and is called there superficial lamina of the deep temporal fascia. Followed anteriorly, this fascia splits up into 2 laminae at the anterior margin of the masseter muscle and forms a "tent-like" space which is attached to the buccinator muscle and closely related to the masseteric ligaments. Inside this space the parotid duct and anterior to it the facial vein can be identified. Superiorly this fascia is attached to the broadly based fibrous attachment of the zygomaticus major muscle. There this delicate arrangement forms an opening through which the facial vein passes deep to the zygomaticus major muscle to run between the lateral and the medial part of the DMCF toward the medial canthus.

Deep to the levator labii superioris muscle, the infraorbital foramen can be found in the midpuillary line. There the infraorbital vessels emerge



**Fig. 5.** View onto the right and left infraorbital region of layer 4 (deep to the orbicularis oculi muscle (OOM) in a female (left) and male (right) fresh-frozen specimen. Left, The prezygomatic space (PZ) and the lateral part of the DMCF (DLCF) are circled. The hash symbol (left) indicates the zygomaticus major muscle with its broadly based fibrous origin. This long attachment represents the lateral-inferior boundary of the DLCF. The facial vein is marked by the arrows and represents the medial-inferior boundary of the DLCF. The OOM is flipped toward the nose to expose the bare bone (BB) where this muscle attaches on the orbital rim. Right, Dyer has been injected into the prezygomatic space (red and blue) and into the lateral part of the DMCF (DLCF, green). Note that the injection was performed with constant contact to the bone during application in all 3 locations. The red and blue areas correspond to the medial SOOF (MS) and to the lateral SOOF (LS). The hash symbol (right) indicates zygomaticus major muscle with its broadly based fibrous origin; BB, bare bone area after sharp removal of the OOM from its attachment on the orbital rim. The asterisk marks the levator labii superioris alaeque nasi muscle. The arrows point to the facial vein.

the skull in a medial-inferior direction. Inferior to the infraorbital foramen, the bony attachment of the levator anguli oris muscle can be found. These 2 muscles “sandwich” the infraorbital structures.

### Infraorbital Hollow

The tear trough area within the infraorbital region can be subdivided in a lateral and a medial part. The boundary between the lateral and the medial part lies 4–6 mm medial to midpupillary line and corresponds to the course of the facial vein. In the lateral part, 7 different layers can be identified: 1, skin; 2, subcutaneous fat layer; 3, orbicularis oculi muscle; 4, sub-orbicularis oculi fat (SOOF); 5, deep fascia (continuation of the superficial lamina of the deep temporal fascia<sup>18</sup>); 6, preperiosteal (prezygomatic) fat layer; and 7, periosteum. In the medial part (ie, medial to the facial vein), 2 layers can be identified: 1, skin; and 2, orbicularis oculi muscle. The latter is firmly attached to the bone in the medial infraorbital region, and the subdivision into its palpebral and orbital part corresponds to the course of the orbicularis retaining ligament (which is called in this area tear trough ligament and consists of 1 lamina).<sup>19–21</sup> Laterally the orbicularis retaining

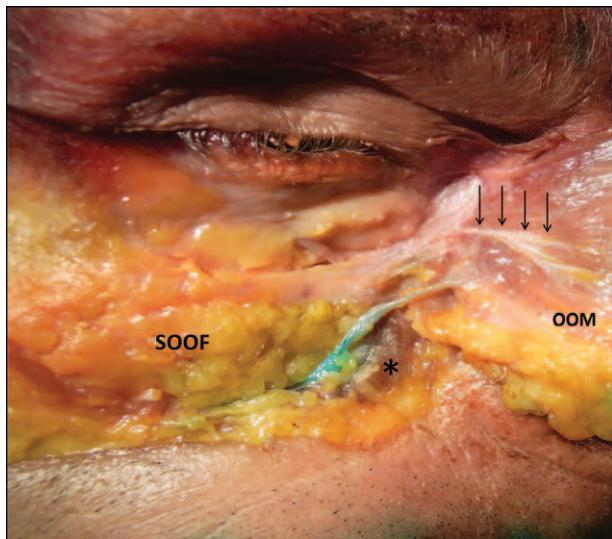
ligament consists of 2 laminae and the transition from 2 laminae to 1 single lamina has the aspect of a “Y” as is shown in Figure 6. The hollow in the medial part of the infraorbital region is formed by the retraction toward the bone of the tear trough ligament of the overlying structures (muscle and skin). The bluish or dark appearance can be partly explained (apart from changes in light shadow or the bulging of nasolabial and medial subcutaneous fat pads) by the thin and thus transparent skin which allows the muscle to shine through. This effect is not unique to the infraorbital hollow but also on the lateral part of nasal wall close to the medial canthus. Another explanation of the bluish appearance might be due to the course of the facial vein in this area.

## REGIONAL APPROACHES

### Infraorbital Hollows

**Guy G. Massry, MD; Beverly Hills, Calif.**

The infraorbital area is a high-risk zone for treatment with hyaluronic acid gel (HAG) fillers as its anatomic construct (little buffer over bone and highly vascular) predisposes to contour irregularities, lumps, bumps, blue discoloration,



**Fig. 6.** View onto the right infraorbital region of a male specimen. Dissection is performed deep to the orbicularis oculi muscle (OOM) and layer 4 is exposed. The SOOF is visible and the medially located facial vein (dyed green). The OOM is flipped medially toward the nose. During sharp removal from its bony attachment on the orbital rim, the tear trough ligament is presented. The union of the 2 laminae of the orbicularis retaining ligament toward 1 single lamina within the tear trough ligament is seen (arrows of the Y-shaped fibrous band). The asterisk marks the levator labii superioris alaeque nasi muscle.

hydrophilic reaction, excessive bruising and swelling, and potentially vascular compromise. HAG filling in this area was first reported in 2005.<sup>22</sup> Since then, clinical experience and raw data have demonstrated that product choice and injection technique are critical features of safe and successful infraorbital filling.<sup>23</sup> Although there are many ways to achieve an end, the indiscriminant filling of lines and depressions in the periorbita is a recipe for failure.

The first important criteria for safe and effective infraorbital HAG injection is an awareness that this is a nonforgiving area that is prone to complications even in the hands of the most experienced injector. Next, appropriate product selection is essential. Understanding the biochemical composition and flow characteristics of the selected gel (concentration, percent cross-linking, viscosity, G') will allow correct clinical selection for desired effect and reduce the incidence of the previously listed complications.<sup>23</sup> Finally injection technique,<sup>24,25</sup> including delivery method (cannula vs needle), and entry point are important.<sup>25</sup>

I will briefly outline my injection pearls and product choices which I have found to be consistent, reliable, and generally complication free in

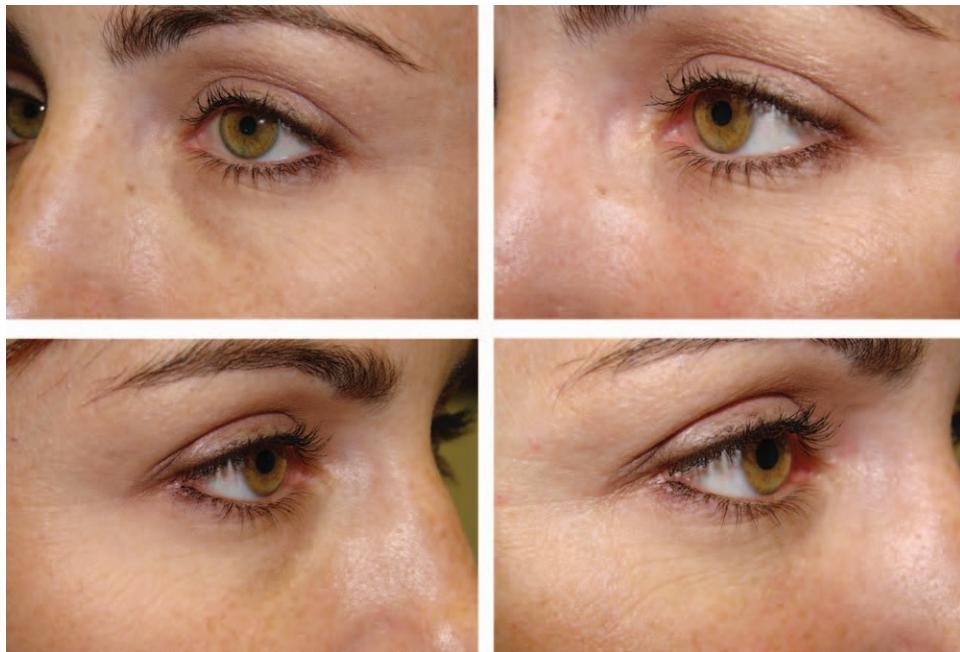
this delicate location (**see Video, Supplemental Digital Content 3**, which demonstrates Dr. Massry's personal technique for using HAG filling for infraorbital hollows, available in the "Related Videos" section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B460>). HAG fillers are implants (Food and Drug Administration approved for this indication) and should be treated as such. I prepare the skin with a Hibiclens and alcohol wipe prior to injection.<sup>26</sup> I administer regional sensory blocks (infraorbital and zygomaticofacial nerves) for comfort, as this allows definitive freedom and compliance with treatment. A 0.2-mL bolus of 1% plain lidocaine is given to the respective regional nerves. Compression of the injected bolus distributes the fluid as not to mask the local depressions. I prefer a cannula delivery to reduce potential bruising and possibly reduce the incidence of intravascular injection. The entry point is in the upper malar tissue below the orbital rim in line with the central eyelid. This thicker tissue substrate is less prone to bruising than the thinner eyelid skin directly over the infraorbital hollow.<sup>25</sup> This central entry can access the entire lid/cheek transition. A wheel of local anesthetic is given (like a tuberculin skin test) at the injection entry point. A 22-G needle perforates the skin at this location to create an entry port. The gel is administered with a 25-G 1½-inch cannula. A smaller gauge device may eliminate the benefit of a blunt delivery method and is flimsy and less precise. The cannula length allows appropriate treatment of the entire eyelid/cheek interface from this one entry site. The gel can be placed supraperiosteally, below orbicularis, or in very small amounts subcutaneously depending on



Dr. Guy G. Massry

### Video Available Online

**Video 3.** Supplemental Digital Content 3, demonstrating Dr. Massry's personal technique for using HAG filling for infraorbital hollows, is available in the "Related Videos" section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B460>.



**Fig. 7.** (Left) Oblique views of young woman with tear trough (nasojugal groove) depression on left and right sides. (Right) Note effacement of periorbital hollow after cannula method of gel (Restylane; Galderma, Düsseldorf, Germany) delivery.

anatomic deficit and clinical needs. Pulling back on the plunger prior to injection and retrograde injection theoretically reduces the risk of intra-vascular penetration. Direct massage of gel over bone tends toward more even dispersion of the material (Fig. 7).

In the infraorbital area, deeper injection of the less distensible (stiffer) and more viscous Restylane product promotes a nice 3-dimensional (3D) tissue expansion (lift and fill), while the less viscous Belotero product allows effacement of more superficial irregularities. I have found these 2 gels to be the most “user friendly” for effacement of lid/cheek interface depressions. In my experience, deep injection of Belotero, while effective, has a shorter clinical duration of effect in terms of lifting and filling than Restylane. Similarly, superficial placement of Restylane tends toward more blue color change and hydrophilic reaction than Belotero. Postinjection, for those patients concerned with swelling, a Medrol dose pack is administered with a broad-spectrum oral antibiotic if not otherwise contraindicated. Patients are asked to stay 15 minutes post injection to assure no short-term skin blanching or mottling. As a precautionary measure a hyaluronidase preparation, nitropaste (controversial) and aspirin are on hand for every filler patient.

As a final note, be careful with patient retreatment. Ultrasound studies have shown

the persistence of material after clinical effect has resolved.<sup>24</sup> Err on the side of caution in this instance as not to “stack” new on old product, whose combination may predispose to contour changes, edema, and blue color change.

### Nose

**Steven Liew, MD, FRACS; Sydney, Australia**

I prefer using hyaluronic acid (HA)-based fillers in the nose due to their established safety, plasticity, durability, and reversibility. I choose HA fillers with characteristics of high gel hardness (G\*), cohesivity, and less hydrophilic to provide sustained projection, to reduce risk of spread of product after deposition from the overlying tension of soft tissue, and to minimize swelling from fluid absorption.

My preference is to use a needle to more efficiently place the product in the precise location and anatomical plane especially superficial to caudal septum. (**See Video, Supplemental Digital Content 4**, which demonstrates Dr. Liew’s personal technique for using HA-based fillers in the nose, available in the “Related Videos” section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B461>.) In addition, wide-bore cannula and multiple passages of cannula may theoretically create dead space for product spread.

Keep the needle in the midline on the supra-periosteal and supracartilaginous plane and inject



**Video Available Online**

**Video 4.** Supplemental Digital Content 4, demonstrating Dr. Liew's personal technique for using HA-based fillers in the nose, is available in the "Related Videos" section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B461>.

slowly, measurably, with constant minuscule movements of the tip of the needle to reduce risks of intravascular accidents.

Watch for skin blanching and severe localized or distant pain, both during and after injection which may suggest vascular compromise.

The optimal position (anterior view, Fig. 8) and projection (lateral view, Fig. 9) should include a straight dorsum of the nose and with or without a supratip break.

Be cautious of previous rhinoplasty patients. Avoid administering  $>1$  mL in the dorsum in 1 injection session due to risk of product spread from tissue tension.

Prepare to review patient immediately regarding significant postinjection pain, bruising. Rule out ischemia before instructing cold compresses.

**Miles Graivier, MD, FACS; Roswell, Ga.**

Nasal contouring with fillers can be used for cosmetic reasons and structural support of the nose. (See Video, **Supplemental Digital Content 5**, which demonstrates Dr. Graivier's personal technique for using dermal fillers in the nose, available in the "Related Videos" section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B462>.) For first-time patients, I recommend using a HAG filler (Restylane, Juvederm, Belotero) because these can be reversed with a hyaluronidase. On the dorsum and sidewalls of the nose, a particulate filler can be used (Radiesse, Bellafill) if previous contouring with an HA was successful and no complications occurred.

Technical pearls and pitfalls:

- Volume varies depending on size of area, number of sites being treated, and if the filler is being used for aesthetic nasal contouring (ie, tip projection and shaping).



**Fig. 8.** Young Asian female with flat nasal dorsum and disproportionately wide alar base. Postinjectable filler to the nasal dorsum, columella, and nasal tip showed an augmented nasal dorsum with reconstitution of dorsal aesthetic lines, better balance between the alar base and nasal dorsum. Note the visual effect of narrowing of the distance between the medial canthi.



**Fig. 9.** Before and after results showing a raised and projected radix, nasal dorsum, and creation of supratip break. The nasal tip is derotated with increased fullness to the infratip lobule.

- In areas of scarring, test with local anesthesia to see if tissue planes dissect without compromise.

Most filler volume ranges from 0.1 to 1.0 mL per injection session. If serial injection planned, patient can return at 4- to 6-week intervals. After full correction achieved, patients return at 3- to 6-month intervals for evaluation and retreatment if necessary.



**Video 5.** Supplemental Digital Content 5, demonstrating Dr. Graivier's personal technique for using dermal fillers in the nose, is available in the "Related Videos" section of the full-text article on PRSJOURNAL.com or, for Ovid users, at <http://links.lww.com/PRS/B462>.

Vascular compromise can happen with any filler:

- First sign: usually blanching after injection. Recommend: first disperse material with finger massage to displace filler from capillaries. If no resolution after 5–10 minutes, proceed to injection of hyaluronidase, nitro paste, vasodilators, warm compresses, and hyperbaric oxygen therapy.

To be efficacious, the material should fill the defect or smooth the contour in such a way that it generates a natural appearance, with a seamless transition from treated to untreated areas (Fig. 10). Treat to correction, but stop if blanching or other indication of vascular compromise. Patient can return in 4–6 weeks if more correction necessary.

Soft-tissue fillers should be used with caution in the nose, especially in thin skin and in skin that has been repeatedly traumatized and devascularized, as occurs in patients who have undergone revision rhinoplasty. Use of dermal fillers may also be problematic in areas of the nose where there is dense scarring and adhesions. It should be used with caution in patients with alloplastic material in the nose.

**Steve Dayan, MD; Chicago, Ill.**

A quick fix for a difficult procedure is an attractive option. And a nonsurgical nasal



**Fig. 10.** Three and half years after first injection of 0.9 mL filler (0.5 mL HA to left concave ala and 0.4 mL calcium hydroxylapatite to supratip). A 0.3 mL HA added to left ala at 18 months and additional 0.3 mL added at 24 months after original injection.

reshaping procedure with seemingly limited downtime and expense can pose a gravitating mirage for patients. However, filler in the nose carries a risk for disastrous complications.<sup>27</sup> Anatomy, previous surgery, skill, product, and method of delivery all have an impact on the cosmetic outcome and the relative risk for untoward effects. Although there is an indication for filler in the primary nose, it is mostly discouraged in my practice; however, there are situations in which surgery is not an option and filler can be used to create symmetry, a favorable profile and tip projection. Fillers are particularly beneficial for the minor postrhinoplasty dorsal defect in which a small aliquot avoids a revision and provides a lasting solution that immediately meets expectations.

I most often use a 22-G to 27-G cannula entered into the sub-SMAS plane below the major vessels, an important plane for reducing the risk of vascular complication.<sup>28</sup> Calcium hydroxylapatite (Radiesse) or hyaluronic (Restylane) is injected in an anterograde/retrograde fashion. (**See Video, Supplemental Digital Content 6**, which demonstrates Dr. Dayan's personal technique for injecting filler in into the nose, available in the "Related Videos" section of the full-text article on PRSJOURNAL.com or, for Ovid users, at <http://links.lww.com/PRS/B463>.) For postrhinoplasty defect, I use Restylane 1 mL thinned with lidocaine 0.4

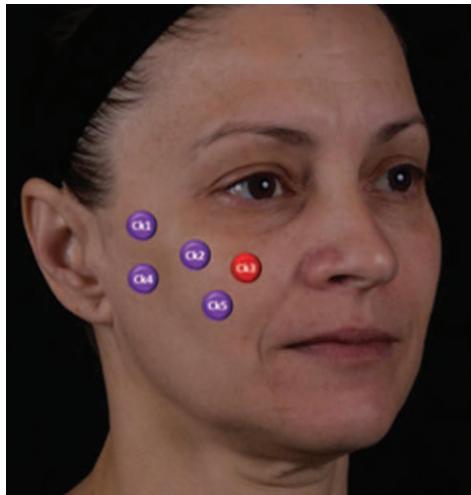
mL injected perpendicular and slowly through a 30-G needle directly on the supraperichondrial or suprperiosteal plane. Proximal ophthalmic anastomosing vessels are compressed with non-dominant hand. Extreme caution is exercised when injecting into the tip and columella.

Aesthetic endpoint is highly variable, dependent on the patient, the situation, and anatomy. Similar to rhinoplasty, it is when patient expectations are met weighed against the risk of further treatment.



**Video Available Online**

**Video 6.** Supplemental Digital Content 6, demonstrating Dr. Dayan's personal technique for injecting filler in into the nose, is available in the "Related Videos" section of the full-text article on PRSJOURNAL.com or, for Ovid users, at <http://links.lww.com/PRS/B463>.



## The MD Codes™

- Ck1. Zygomatic arch
- Ck2. Zygomatic Eminence
- Ck3. Anteromedial cheek
- Ck4. Parotid Area
- Ck5. Buccal Area

**Fig. 11.** The MD Codes: The 5-point cheek reshape.

## Midface

**Mauricio de Maio, MD, ScM, PhD; Sao Paulo, Brazil**

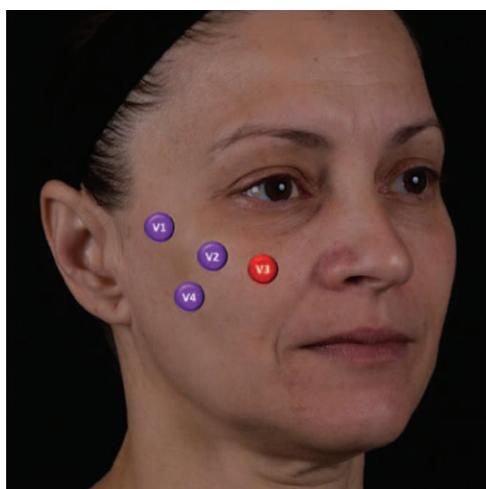
For cheek reshape, Voluma is the best option due to its lifting capacity to combat sagginess. The versatility to inject it both into subcutaneous and suprperiosteal level, easy-to-mold property, and mainly reversibility are what make this product unique.

The challenge is to deliver appropriate cheek reshape and not simply volumize it or make it fuller. The cheek subunits should be respected as demonstrated below with the “MD Codes.” Each cheek subunit is coded as follows: the 5-point cheek reshape—Ck1 (zygomatic arch, V1 for Voluma); Ck2 (zygomatic eminence, V2); Ck3 (anteromedial cheek, V3); Ck4 (parotid area); and Ck5 (submalar area) (Fig. 11). The latter are

represented as V4 also for Voluma (Fig. 12). It is important to fight gravity first by creating structural support (Ck1 and Ck2) and then correct volume loss (Ck3, Ck4, and Ck5).<sup>29</sup> As a result, appropriate cheek architecture is obtained. Anchoring the cheek with a single big bolus or injecting at random will not provide optimal contour and may lead to unnatural results especially on animation.

The aesthetic endpoint should be assessed with the patient on animation (full smile), as well as in different positions such as oblique, profile, and tilting down. Excessive cheek lifting on animation or “sausage-like fold” on the cheek should be avoided.

I use preferably needles (27 G) when deep injections onto the bone are required. Proper aspiration is mandatory. (See Video, Supplemental



## The MD Codes™ for VOLUMA

- V1. Zygomatic arch
- V2. Zygomatic Eminence
- V3. Anteromedial cheek
- V4. Submalar

**Fig. 12.** Adaptation of the MD Codes for Voluma (Allergan, Inc., Irvine, CA).



**Video 7.** Supplemental Digital Content 7, demonstrating Dr. de Maio's personal technique for cheek reshaping using Voluma, is available in the "Related Videos" section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B464>.

**Digital Content 7**, which demonstrates Dr. de Maio's personal technique for cheek reshaping using Voluma, available in the "Related Videos" section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B464>.) Cannulas (25 G) are advisable into the mid-cheek (close to infraorbital foramen) and parotid areas if comprehensive work is needed.

#### Rebecca Fitzgerald, MD; Los Angeles, Calif.

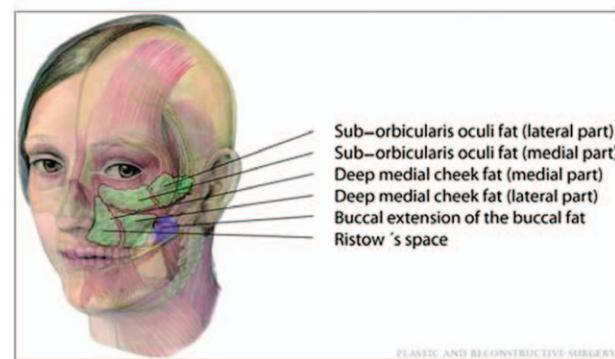
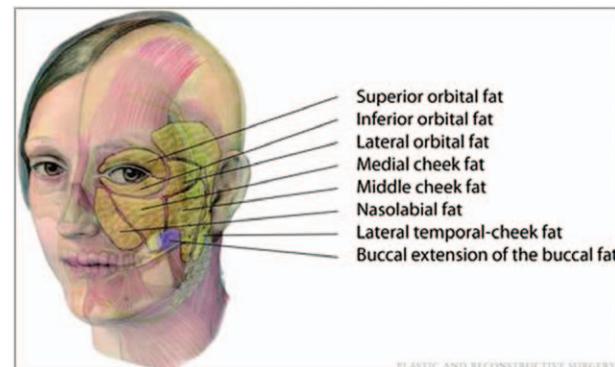
Fear of unnatural appearing results is a common concern voiced by patients new to injectable treatments. In fact, natural-looking results are desirable to both the patients and the physicians treating them. Newer understanding of the compartmentalization of facial fat both superficial and deep to the facial muscles may be helpful in achieving this goal. Here, I am using 1 mL of Voluma (Allergan, Irvine, Calif.), which has been diluted with 0.5-mL normal saline, and I am injecting with a 26-G needle. This was done to make it easier for me to reflux with one hand prior to injection as well as to enable use of the product in the SOOF (undiluted product may clump in this area). Although I routinely use cannulas, both a needle and a cannula were used here to demonstrate both. A total of 3 mL of Voluma was used in this treatment session.

The purpose of this video is to demonstrate placement of a filler into the deep fat compartments of the mid face—specifically the SOOF and the DMCF. (See **Video, Supplemental Digital Content 8**, which demonstrates Dr. Fitzgerald's personal technique for placing filler into the deep fat compartments of the mid face—specifically the SOOF, available in the "Related Videos" section



**Video 8.** Supplemental Digital Content 8, demonstrating Dr. Fitzgerald's personal technique for placing filler into the deep fat compartments of the mid face—specifically the SOOF, is available in the "Related Videos" section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B465>.

of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B465>.) Both of these deep midfacial compartments exist in discrete medial and lateral compartments and are colored green in Figure 13.<sup>2</sup> Ristow's space, a potential space which exists between the periosteum of the maxilla and the DMCF, is also pictured.

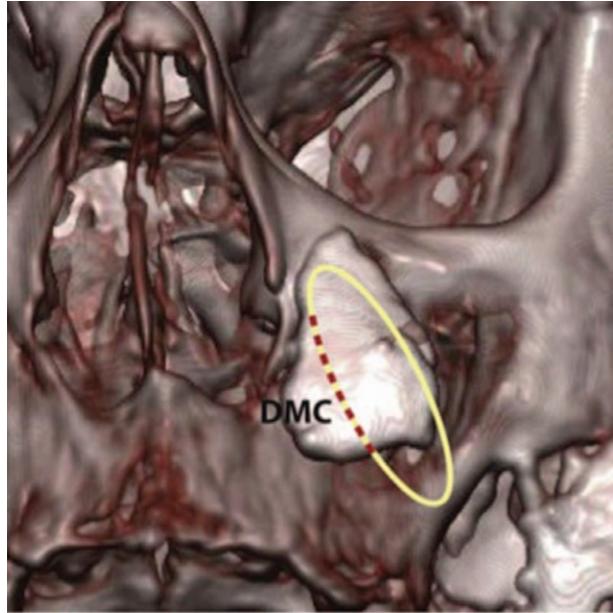


**Fig. 13.** Schematic of the superficial and deep fat compartments. Reproduced with permission from Gierloff M, Stöhring C, Buden T, et al. Aging changes of the midfacial fat compartments: a computed tomographic study. *Plast Reconstr Surg*. 2012;129:263–273.<sup>2</sup>

These deep compartments give anterior projection to the midface and provide us with a “site-specific target,” which yields predictable, consistent, and natural-looking results in the midface. The variable depth of a nasolabial fold or tear trough is likely related to the presence or absence of this deep fat which can be appreciated by the computer tomographic image of a cadaver after injection of radio-opaque dye into the medial aspect of the DMCF compartment (Fig. 14).<sup>30</sup>

Filling the DMCF prior to the SOOF may decrease the amount of filler needed in the higher compartments. Filler in the area of Ristow’s space then lifts this overlying tissue without distorting the natural topography. As we are all now aware, too much filler, especially when placed too high, in the medial aspect of the cheek or tear trough can give an abnormal appearing convexity in the infraorbital area as well as an abnormally prominent medial cheek on animation.

In general, a nice result can be obtained with a conservative amount of product in most patients. Be aware that very empty faces (from age, disease, or endurance exercise) may require a lot of product to fill—this can then be discussed



**Fig. 14.** Computer tomographic image of the medial aspect of the DMCF. Note that this fat compartment extends superiorly to the orbital rim and medially to the pyriform aperture. 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 M, Stohring C, Buder T, et al. The subcutaneous fat compartments in relation to aesthetically important facial folds and rhytides. *J Plast Reconstr Aesthet Surg.* 2012;65:1292–1297.<sup>30</sup>

with the patient prior to treatment. Additionally, in patients with advanced elastosis of their outer skin envelope it may be difficult to appreciate the fill without a great deal of product.

The endpoint is too full to the point that lifts the overlying tissue and softens the shadowing in the midface. The degree of improvement possible or even desired by the patient is variable according to age, degree of volume loss, and integrity of the outer skin envelope.

Safety here primarily concerns the avoidance of inadvertent intravascular injection. Many named vessels including the zygomaticofacial, infraorbital, and angular artery run through the midface. All of the usual precautions should be taken, that is, slow, low-pressure injections with small amounts of product through a constantly moving needle, to keep the reaction as localized as possible in the event it does occur.<sup>31</sup>

I routinely dilute HA and use this with 26-G needles to reflux prior to every injection (although it should be noted that there are no data yet available on the efficacy or reliability of this maneuver). I also use cannulas routinely around the eye as this helps locate the position of the orbital retaining ligament when injecting in this area to avoid inadvertent postseptal injections. In my hands, cannulas have also greatly decreased the amount of bruising associated with these injections.

Finally, antiseptic technique is important when injecting long-lasting fillers through the skin. I use 2% chlorhexidine with sterile water (not tap water) followed by 70% alcohol.

#### J. Todd Andrews, MD; Houston, Tex.

Dr. Andrews’ personal approach for placing filler into the lateral cheek using a needle is shown in **Video, Supplemental Digital Content 9**, available in the “Related Videos” section of the full-text article on PRSJOURNAL.com or, for Ovid users, at <http://links.lww.com/PRS/B466>.

Technical pearls and pitfalls:

- Target tissue planes: supraperiosteum and immediate subdermis
- Pattern of application dependent upon condition of skin
- If skin is in need of improved texture, overlapping subdermal fans, anticipate minimal to moderate actual volume change.
- If skin is in excellent condition, multiple small depot injections first in supraperiosteal plane. Reassess for desired 3D contour convexity.
- If this has not been achieved, additional subdermal fan overlapping application.



**Video Available Online**

**Video 9.** Supplemental Digital Content 9, demonstrating Dr. Andrews' personal approach for placing filler into the lateral cheek using a needle, is available in the "Related Videos" section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B466>.

Imagine 3D radial expansion of zygomatic bone and superolateral portion of maxilla. Need not involve complete expansion but may be preferentially superior portion, inferior portion, lateral portion, etc. as needed to create appropriate midface convexity.

Simultaneous treatment of other facial areas with immediate (nondelayed) volumizers (HA, calcium hydroxylapatite, etc.) can be performed but should involve pretreatment patient education regarding anticipated facial appearance during the 3 months following the initial treatment. That is, treatment will yield a desirable 3D contour at the time of treatment. However, 1 week later, the midface will temporarily devolumize and then slowly improve over the following 12 weeks. Two additional treatments typically will be scheduled at 4 and 10 weeks after initial treatment date.

All patients encouraged to take posttreatment vitamin C and zinc (100% recommended daily allowance) supplements for 3 months.

The aesthetic endpoint is not necessarily visualized at treatment time. Rather, endpoint is "sufficient" product to assure maximum stimulation. For typical female face, this ranges from 2.0 to 3.0 mL in suprperiosteum and 1.5 to 3.0 mL in subdermis; assumption: 9 mL reconstitution of product (7 mL, Bacteriostatic Water, 2 mL, 1% lidocaine with epinephrine 1:100,000).

Safety considerations: Subdermal application should remain uniform in depth to maximize uniformity of response. Suprperiosteal injection should involve aspiration prior to injection with each depot injection to rule out intra-arterial placement of needle tip.

**B. Kent Remington, MD, FRCP; Calgary, Alberta, Canada**

"Global Beauty: Facial Shadows"

The French author Marcel Proust said, "the real voyage of discovery consists not in seeing new landscapes, but in having new eyes."

If we look with "new eyes" at our aesthetic patients faces clinically and in our detailed study of their photographs, we discover that youthful faces have light and shadows all in just the right places.

Facial shadows are not simply dark areas that border the light. These shadows are as important as the light in giving life to the face. It is the facial shadows that shape the light and focus our attention to the light. For example, talented makeup artists understand that you cannot have shadows without light and you cannot have facial highlights without shadows. Photography experts have taught us that photography is the language of light and shadows and in fact photography literally means—writing with light.

You must have light to see, but even with light it does not mean you will have "vision." In aesthetics, to see clearly do not just look at the facial highlights but also focus on the shadows. Understanding and paying keen attention to facial shadows are often very enlightening, as the less obvious is often hiding in plain sight.

The use of an aesthetic blueprint for treating the cheek and other key facial areas creates better balance between light and shadows. I use the aid of Golden Mean Calipers in designing the blueprint for this math-art project.



**Video Available Online**

**Video 10.** Supplemental Digital Content 10, demonstrating Dr. Remington's innovative facial syringe therapy with HA fillers and neuromodulators aimed at recreating facial highlights, is available in the "Related Videos" section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B467>.

Innovative facial syringe therapy with HA fillers and neuromodulators is aimed at recreating facial highlights by lifting areas of deflation and facial contouring. (**See Video, Supplemental Digital Content 10**, which demonstrates Dr. Remington's innovative facial syringe therapy with HA fillers and neuromodulators aimed at recreating facial highlights, available in the "Related Videos" section of the full-text article on PRSJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B467>.) This is essentially a form of biomimicry—trying to mimic what the patient once looked like.

The youthful cheek "form shadow" should be left untreated as this helps re-create the cheek highlights we associate with a healthy youthful natural-looking face.

We teach our aesthetic patients that getting older is not optional but looking older is. Restoration and facial maintenance is a choice, but doing nothing is also a choice. Some of my patients say "I just want grow old gracefully". What this means is you grow older and look it. Maturing gracefully means you make a choice to look age appropriate and with careful maintenance you will start having increasing comments from those that have chosen to do nothing—these comments are usually "you always just look the same."

It is a bit of a paradox that we, as aesthetic practitioners, can create and maintain a youthful appearance for our patients through facial maintenance with HA fillers and neuromodulators. With the right blueprint, this is a very clever sleight of hand in facial aesthetics. Looking great is the best thing you can wear.

*Sebastian Cotofana, MD, PhD*

Department of Anatomy

Ross University School of Medicine

P.O. Box 266

Roseau

Commonwealth of Dominica  
sebastiancotofana@rossu.edu

or

*Plastic and Reconstructive Surgery*  
8150 Brookriver Drive, Suite s-415  
Dallas, TX 75247

PRS@plasticsurgery.org

## PATIENT CONSENT

*Patients provided written consent for the use of their images.*

## ACKNOWLEDGMENTS

*The section "Clinical Anatomy of the Midface" was written by Sebastian Cotofana, MD, PhD, Thilo L.*

*Schenck, MD, PhD, Patrick Trevidic, MD, and Jonathan Sykes, MD. The section "Regional Approaches" was written by Guy G. Massry, MD, Steven Liew, MD, FRACS, Miles Graivier, MD, FACS, Steve Dayan, MD, Mauricio de Maio, MD, ScM, PhD, Rebecca Fitzgerald, MD, J. Todd Andrews, MD, and B. Kent Remington, MD, FRCP.*

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