Received: 10 August 2019 | Revised: 24 October 2019 | Accepted: 12 December 2019

DOI: 10.1111/jocd.13277

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ORIGINAL CONTRIBUTION

JCD Journal of Cosmetic Dermatology

WILEY

Nonsurgical jawline rejuvenation using injectable fillers

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Funding information
Dr Aria Vazirnia has no conflicts of interest to disclose. Dr André Braz is an advisor & speaker for Allergan and Merz. Dr Sabrina Fabi is an investigator, advisor & speaker for Allergan, Galderma, and Merz.

Abstract

Background: A well-defined jawline is a critical component in the perception of facial attractiveness in both men and women. Dermal fillers offer a nonsurgical, temporary method of correcting mild-to-moderate mandibular bone resorption.

Aims: The authors discuss pertinent aspects of anatomy, pathophysiology of aging, patient evaluation, gender considerations, injection technique, and complications in jawline augmentation using injectable fillers.

Methods: A brief review of the literature surrounding jawline augmentation using injectable fillers in both men and women, as well as the authors' experience in this area, is provided.

Results: Nonsurgical jawline augmentation using injectable fillers can be performed effectively and safely with adequate background knowledge of the regional anatomy and appropriate patient selection. The authors discuss both injection techniques in the published literature and their own approach. Potential complications are also reviewed.

Conclusion: Jawline rejuvenation is a key component to global facial aesthetic rejuvenation. Therefore, it is important for physicians to understand how to safely and effectively perform nonsurgical jawline rejuvenation using injectable fillers.

KEYWORDS

aging, dermal filler, facial rejuvenation, jawline, non-surgical

1 | INTRODUCTION

The jawline is integral to the perception of attractiveness and facial youth, as well as key to defining masculine vs feminine facial features. The aging face is a function of facial volume loss, resulting from a combination of bony resorption, fat repositioning, and tissue laxity.[1] In the lower face, this age-associated volume loss leads to loss of definition of the jawline.[2] Therefore, a comprehensive approach to facial rejuvenation should include an evaluation of the jawline in both men and women.

2 | LOSS OF JAWLINE DEFINITION & JOWL FORMATION

Facial aging is a multifactorial process that reflects gradual changes in skin texture, soft tissue volume and elasticity, and underlying bone volume and structural support.[1,2] There is a shift in the 3-dimensional structure of the face resulting from subcutaneous fat redistribution and atrophy as well as skeletal remodeling and resorption.[3,4] In the lower face, age-associated resorption of the mandibular bone and the gravitational descent of the superficial mid-facial fat compartments result in loss of the youthful jawline definition with ptosis of the skin, jowling, and formation of prominent Marionette lines.[1,2,5,6] Blunting of the jawline is worsened by the downward pull of the depressor labii inferioris, depressor anguli oris, and platysmal muscle fibers, which find resting tone on resorbing mandibular bone.[3,7]

To combat the signs of aging and help restore a more youthful appearance, multiple nonsurgical techniques have been utilized to improve skin texture, skin laxity, and underlying volume and structural support. Ablative and nonablative lasers, microfocused ultrasound, and subsurface monopolar radiofrequency have been shown

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FIGURE 1 Right-sided view (A), right 3/4 view (B), and left 3/4 view (C) of a woman before (left photo) and after (right photo) injection with 4 mL of a 20 mg/mL highly cohesive HA filler to the mandibular angle, jawline, and chin

to significantly improve age-related skin wrinkling and laxity.[8] In addition, dermal fillers are an effective noninvasive modality to lift facial soft tissues and improve jawline contour (Figure 1).[5,9] In the subsequent sections, we discuss the anatomy of the jawline and provide our experience on the use of injectable fillers for jawline rejuvenation and contouring.

3 | ANATOMICAL CONSIDERATIONS

3.1 | Bone and soft tissues

The primary structural component of the jawline is the mandible, which provides structural support for overlying soft tissues. From superficial to deep, the soft tissues overlying the mandible are arranged in layers. A different arrangement of layers can be identified posterior to vs anterior to the labiomandibular sulcus (Marionette line).

Posterior to the sulcus, the following arrangement of soft tissues can be identified along the jawline (from superficial to deep): skin, superficial subcutaneous fat, platysma, deep fat, parotideo-masseteric fascia, masseter muscle, and periosteum of the mandible (Figure 2). Anterior to the sulcus, the layered arrangement is as follows (from superficial to deep): skin, subcutaneous fat, muscles of facial expression (superficial to deep—depressor anguli oris, platysma, depressor labii inferioris, mentalis), deep fat consisting of the labiomandibular fat and the deep mental fat pad in the chin.

The inferior margin of the labiomandibular sulcus is formed by the mandibular ligament, which can create a dermal depression immediately anterior to the jowls. The subcutaneous fat is arranged in fat compartments laterally, while there is a diffuse interplay of muscle fibers, adipose cells, fibrous connective tissue, and elastic fibers medially. This difference in subcutaneous tissue arrangement allows for the formation of jowling lateral to the labiomandibular sulcus and hallowing/volume loss with age medial to the sulcus.

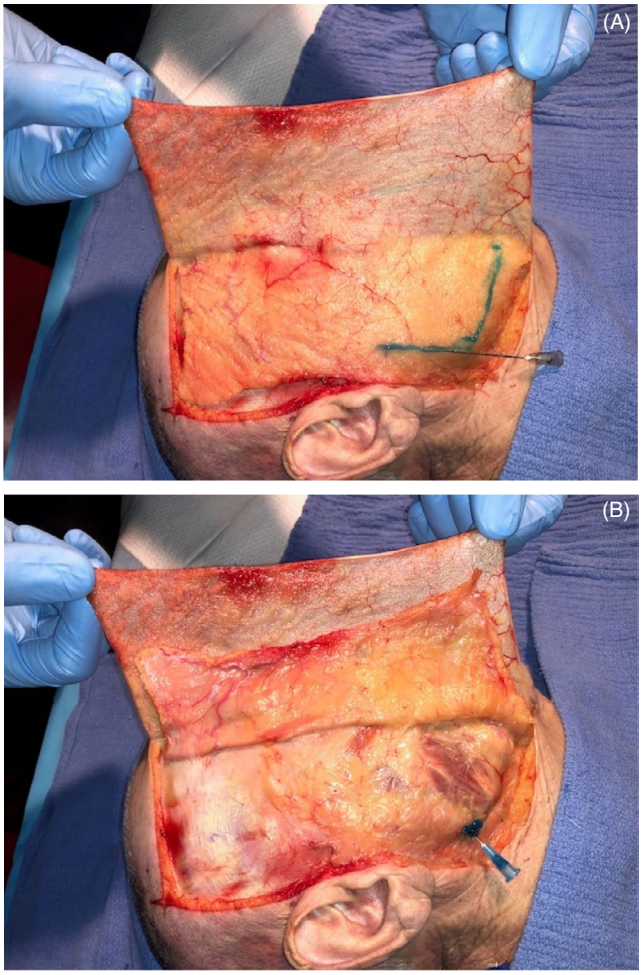


FIGURE 2 Cadaveric dissection showing the superficial subcutaneous fat (A) and deep fat (B) soft tissue layers. Photographs contributed by Sebastian Cotofana, MD, PhD

3.2 | Neurovasculature

Important neurovascular structures traverse the inferior border of the mandible. These include both the facial artery and vein as well branches of the facial nerve. According to Lee et al[10], the facial artery is located about 27 mm anterior to the apex of the mandibular angle. The facial artery and vein cross the mandible anterior to the masseter muscle and are located in the deep fat, deep to the platysma (Figure 3). The facial artery courses deep to the platysma inside the buccal space and is connected to the modiolus at the corner of the mouth. Here, it branches into the superior and inferior labial arteries while continuing as the angular artery.[11,12] Within the nasolabial sulcus, the artery becomes more superficial and is located superficial to the muscles of facial expression.

Branches of the facial nerve, particularly the marginal mandibular nerve, are located in between the masseter muscle and the parotideo-masseteric fascia. Posterior to the antegonial notch and anterior margin of the masseter muscle, branches of the facial nerve can be found about 1-2 cm below the inferior mandibular border[13,14]; however, anterior to the masseter, branches can be located above the mandibular border.[13,15]

In detailed layer-by-layer anatomical dissections of the lower face, Suwanchinda et al[7] noted no major neurovascular structures in the subdermal plane overlying the platysma. While the subdermal plane along the jawline is relatively devoid of important neurovascular structures, it is important to understand the location of the facial artery, facial vein, and branches of the facial nerve when performing dermal filler injections.

3.3 | Parotid gland

The parotid gland is located within the preauricular area and covers the posterior aspect (and sometimes extends more anteriorly and covers about 75%) of the masseter.[16,17] The parotid duct is usually located on an imaginary line connecting the ear lobe to the oral commissure.[16,17] The parotid duct arises from the anterior portion

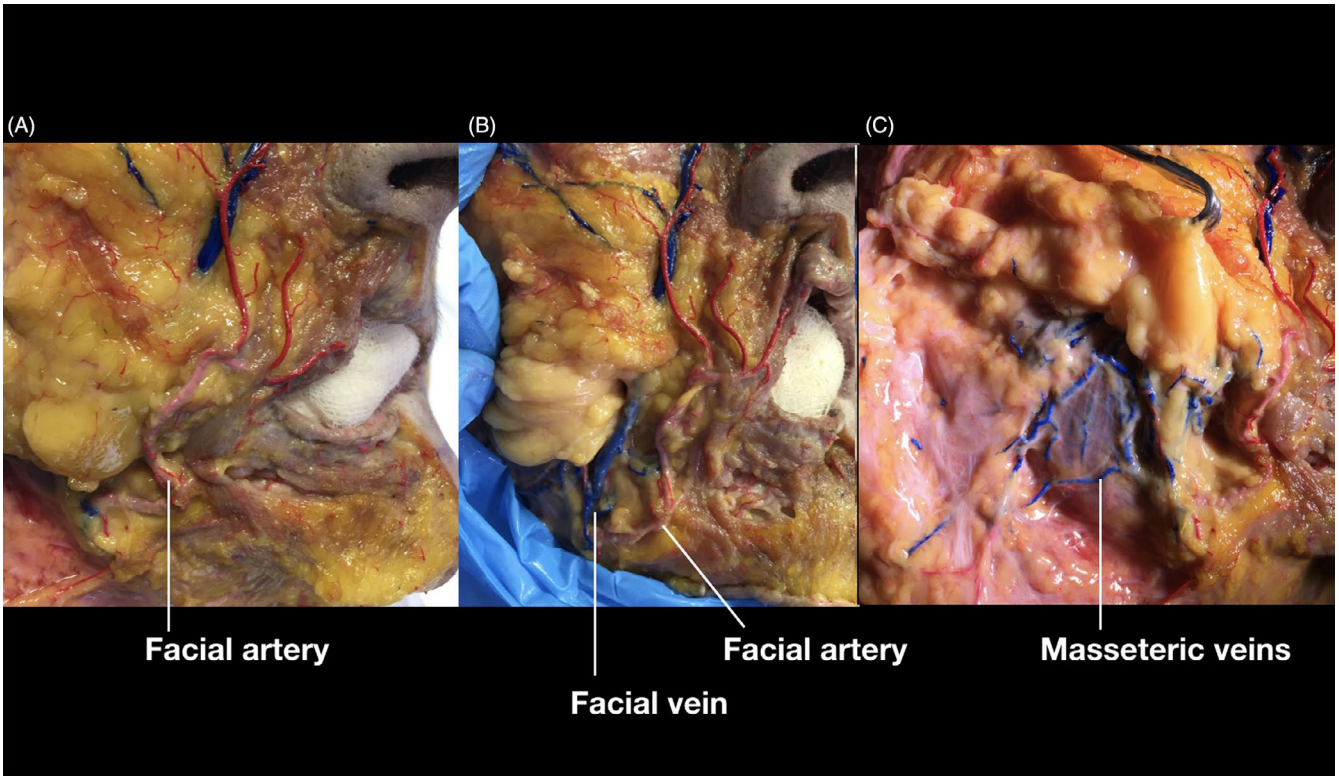


FIGURE 3 Cadaveric dissections showing the vasculature of the lower face. The facial artery and facial vein cross the mandible anterior to the masseter muscle and are located in the deep fat, deep to the platysma (A & B). The masseteric veins (C)

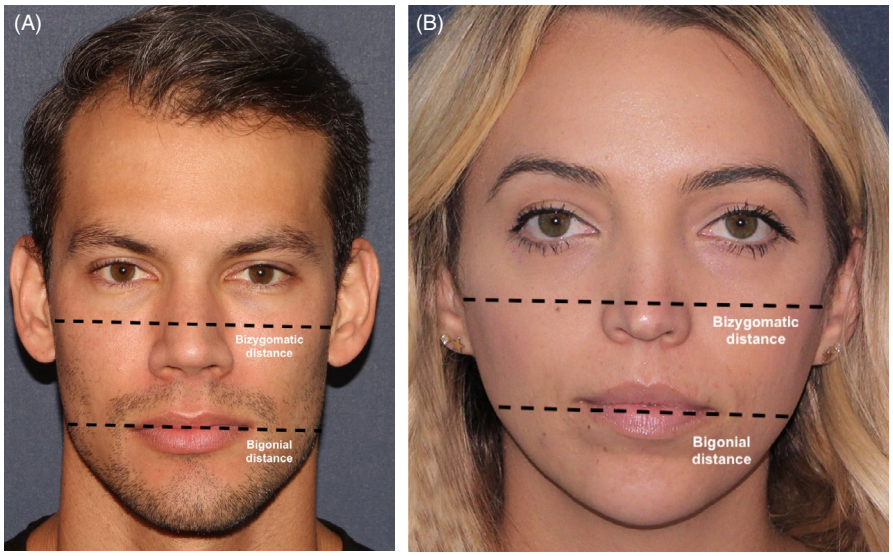


FIGURE 4 Men have a bizygomatic to bigonial distance that is approximately 1:1 (A). A youthful woman's face has a bizygomatic distance that is wider than the bigonial distance (B)

of the gland and then runs in between the masseter muscle and the parotideo-masseteric fascia. At the anterior border of the masseter, the parotid duct then passes through the buccinator muscle where it then enters the oral cavity.[18-20]

4 | EVALUATION

As with most facial rejuvenation procedures, it is important to conduct a careful aesthetic evaluation of the patient prior to using injectable fillers. Special focus should be given to the prominence of the mandibular angle, jawline, chin projection and length, prejowl sulcus, and Marionette line.[21] There should be awareness of important neurovascular and anatomical structures near injection sites, which include the facial artery and vein, the marginal mandibular nerve, the parotid gland and duct, and the masseter muscle.[21]

Patients should be examined at rest and in animation while in an upright position.[6] The examiner should have flexibility in moving around the patient to analyze the face from different angles.[21] Photographs at baseline and after treatment should be taken at the

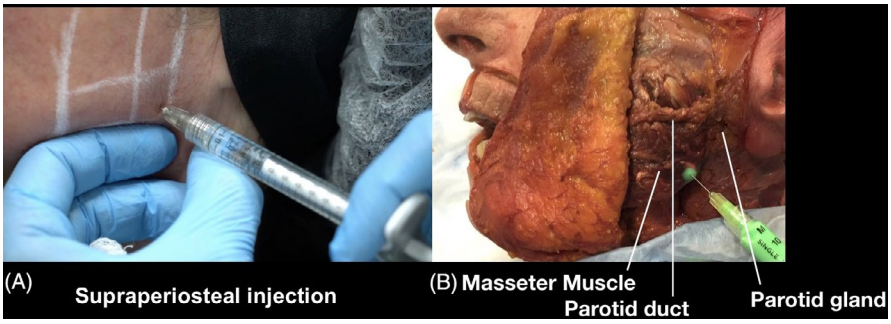


FIGURE 5 Supraperiosteal injection at the inferoposterior aspect of the mandibular angle in a patient (A) and cadaveric section (B). In the cadaveric section (B), note the location of the parotid gland, parotid duct, and masseter muscle in relation to the injection point

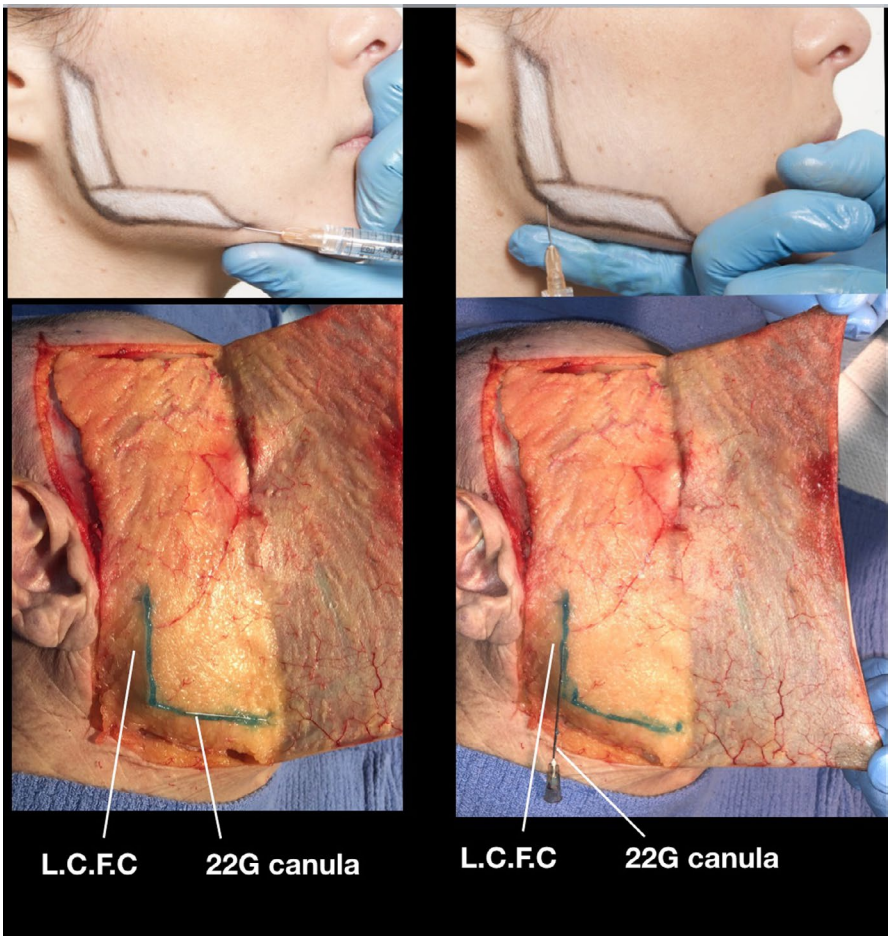


FIGURE 6 Authors' injection strategy for fillers along the female jawline using cadaveric sections. A blunt-tipped 22-gauge, 1.5-inch cannula is inserted into the lateral cheek fat compartment (LCFC) to create a *mandibular sweep* along the mandibular angle. In general, it is important to maintain the cannula within the LCFC above the superficial musculoaponeurotic system (SMAS)

anterior, oblique, and lateral positions. Validated scales, such as the Merz Jawline Grading Scale and the Global Aesthetic Improvement Scale, may be used to evaluate the jawline and objectively assess treatment efficacy.[22,23]

The aesthetic goal in jawline rejuvenation is to straighten the jawline, to smooth the transition between the mentum and the jowls, and to lift the jowls upwards and posteriorly.[18] However, gender differences must be taken into account. The aesthetic endpoint in men and women differ in that the male jaw is more angular and more prominent than that in women.[2,18] Other masculine facial features include a wider interorbital distance, wider nose, more prominent mental subunit, thicker and lower-positioned eyebrows, and thinner lips.[24,25] While men have a bizygomatic to bigonial distance that is approximately 1:1, a youthful woman's face is characterized by the inverted "triangle of youth," with a bizygomatic distance that is wider than the bigonial distance (Figure 4). In women, this is considered the ideal and should be maintained to avoid masculinizing the female face.[24]

As with other cosmetic procedures, it is important to set realistic expectations of results with patients. Jawline rejuvenation with injectable fillers may not achieve the same results as a surgical neck or face lift procedure, and therefore there should be a discussion about combination procedures with monopolar radiofrequency, microfocused ultrasound, and laser devices in those who prefer noninvasive treatment modalities.[18]

5 | AUTHORS' TECHNIQUE

Fillers used for jawline rejuvenation include hyaluronic acid (HA), calcium hydroxylapatite (CaHA), poly-L-lactic acid (PLLA), and autologous fat.[6,18] The authors recommend use of HA or CaHA fillers (*Juvederm Voluma XC*, Allergan, Inc; *Restylane Lyft*; Galderma SA; *Radiesse (+)*, Merz North America, Inc) due to the stiffer gel characteristics of these products that allow them to provide more structure along the jaw. Of note, *Juvederm Voluma XC* has less elasticity and viscosity than *Restylane Lyft* and *Radiesse (+)* yet is more significantly cross-linked.

It is important to thoroughly cleanse the face with an antiseptic preparation that extends below the jawline and onto the preauricular region. The authors begin with a supraperiosteal depot injection of HA or CaHA filler at the inferoposterior aspect of the mandibular angle (Figure 5), followed by small 0.1 mL-0.2 mL supraperiosteal aliquots injected superiorly along the ramus of the mandible. Aspiration is recommended to avoid intravascular injection. In female patients, a blunt-tipped 22-gauge, 1.5-inch cannula is then used to create a sweep along the mandibular angle that has now been augmented to the earlobe, within the subdermal plane to avoid injection into the parotid (Figure 6). The cannula entry point is 4 cm medial to the mandibular angle (as the facial artery and vein are ~3 cm medial or anterior to the mandibular angle). In male patients, the cannula is not directed toward the earlobe but superiorly directed in the direction of the ramus from the mandibular angle to create a squarer, angular appearance (Figure 7). A blunt-tipped 22-gauge, 1.5-inch cannula is used to deposit product in the subcutaneous plane, immediately subdermal, as there are many veins that course over the masseter. From the same entry point along the jawline, the cannula can be directed anteriorly in both men and women. Special care should be taken to avoid broadening the jaw in a woman by avoiding placing filler over the masseter, which is more of an aesthetic endpoint in the male face (Figure 8). However, to masculinize and widen the male face, filler can be placed subdermally over the masseter with caution to avoid inadvertent injection into the parotid gland or facial vein.[6,18]

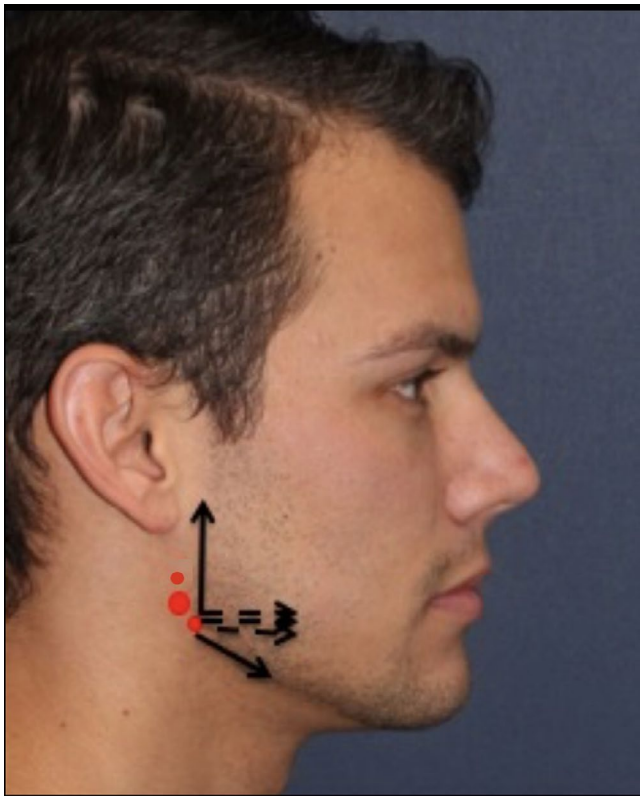


FIGURE 7 Authors' injection strategy for fillers along the male jawline, where larger dots indicate larger depots supraperiosteally along the mandibular angle and up the ramus, black arrows indicate linear threads of product in the subdermal plane and broken arrows indicate the optional placement of product in the subdermal plane in men to widen the jawline and add to a more masculine appearance (maintaining a bizygomatic distance that is the same as the bigonial distance)

6 | COMPLICATIONS

The most common complications from nonsurgical rejuvenation of the jawline with injectable fillers include redness, bruising, tenderness, and swelling.[1,5] Other potential complications, although rarer, include infection and foreign body granuloma formation. Granulomas can develop months to years after the original injection.[1] Although the subdermal plane along the jawline is relatively free of important neurovascular structures, the facial artery and vein as well as the marginal mandibular nerve traverse the lower border of the mandible supraperiosteally; therefore, it is important to be aware of the dangers of vascular occlusion with intravascular injection of filler.[5]

Intravascular injection of filler results in pain and blanching along the distribution of the artery, which leads to tissue ischemia, necrosis, and rarely stroke and blindness.[18,26] High-risk areas include the glabella, nasal bridge, and nasolabial folds, yet filler-induced vascular injury can occur anywhere on the face.[18,26] At the onset of any warning sign of vascular occlusion, the practitioner should immediately infiltrate the area of pending necrosis with injectable hyaluronidase, apply warm compresses, and consider administering aspirin, topical nitroglycerin, hyperbaric oxygen, and/or low molecular weight heparin.[18,26] Aside from vascular injury, superficial injections over the masseter muscle carry risk of injury to the parotid gland and duct. Trauma to the parotid gland may result in infection or injury to branches of the facial nerve running through the gland.[5,6] Injury to the parotid duct may result in infection, ductal obstruction, mucocele formation, and/or or salivary fistulas.[27] No intravascular occlusion, infection, granuloma formation, or parotid gland/duct injury has been experienced by patients using the "Authors' Technique" as described above.

7 | CONCLUSION

Use of injectable dermal fillers is an effective nonsurgical treatment modality in jawline rejuvenation. Treatments may be combined with



FIGURE 8 Frontal view (A), right 3/4 view (B), and left 3/4 view (C) of a man at baseline (left photos) and after a series of injections with hyaluronic acid filler (*Juvederm Voluma XC*) to the chin, prejowl areas, jawline, and mandibular angle (right photos). This patient received 1cc to the chin, 1cc to each of the prejowl areas (2cc total), 1.5cc to each side of the jawline (3cc total), and 1.5cc to each side of the mandibular angle (3cc total). Note the broadening of the jaw, which is an aesthetic endpoint in the male face

other noninvasive modalities, such as neuromodulators, radiofrequency devices, and ultrasound devices, to not only improve contouring but also skin laxity and tone.[28]

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How to cite this article: Vazirnia A, Braz A, Fabi SG. Nonsurgical jawline rejuvenation using injectable fillers. *J Cosmet Dermatol*. 2019;00:1–8. https://doi.org/10.1111/jocd.13277