Managing Injectable Fillers in the Long-Term Aesthetic Patient: Contemporary Approaches and Surgical Considerations

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Summary: Facial aging is a multifaceted process arising from changes in skin quality, soft-tissue volume, underlying bony anatomy, and the cumulative impacts over time of factors such as expressive animation, environmental exposures, and gravity. Although historically facial rejuvenation focused primarily on surgical correction of tissue descent, enhanced understanding of volume loss as a major contributor to aging has led to the widespread adoption of soft-tissue fillers as a nonsurgical adjunct—or stand-alone treatment—for signs of facial aging. These treatments are popular with patients due to their low risk profile; minimal downtime; avoidance of scarring; and, often, reversibility. The modern aesthetic surgeon must develop strategies for managing patients across their lifetime, integrating nonsurgical and surgical approaches while maintaining natural-appearing results. This includes understanding how to plan filler for longevity and safety, modifying filler placement in previously treated areas, determining optimal timing for surgical intervention, and managing the transition between different treatment modalities. The integration of these various approaches requires not only product and technical expertise but also careful attention to patient education and long-term planning. This article provides a comprehensive framework for managing facial aesthetic patients throughout their treatment journey, with particular focus on the role of hyaluronic acid fillers at different life stages. We present strategies for assessment, treatment selection, and technical execution across different age groups and anatomical zones, supported by long-term case examples. Special attention is given to the interaction between injectable fillers and surgical procedures, as well as considerations for maintaining natural-appearing results over time. *(Plast. Reconstr. Surg.* 156: 21S, 2025.)

Facial aging is a multifaceted process arising from changes in skin quality, soft-tissue volume, underlying bony anatomy, and the cumulative impacts over time of factors such as expressive animation, environmental exposures, and gravity. Although historically facial rejuvenation focused primarily on surgical correction of tissue descent, enhanced understanding of volume loss as a major contributor to aging has led to widespread adoption of soft-tissue fillers as a nonsurgical adjunct—or stand-alone treatment—for signs of facial aging. These treatments are popular with patients due to their low risk profile; minimal downtime; avoidance of scarring; and, often, reversibility. However, recent years have seen shifting cultural attitudes toward injectable fillers, with growing concern about overfilled or unnatural appearances, prompting many high-profile individuals to publicly document the removal of their facial fillers and spurring broader and much-needed discussion about judicious use of these products.

The modern aesthetic surgeon must develop strategies for managing patients across their lifetime, seamlessly integrating nonsurgical and surgical approaches while maintaining

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natural-appearing results. This includes understanding how to plan filler for longevity and safety, modifying filler placement in previously treated areas, determining optimal timing for surgical intervention, and managing the transition between different treatment modalities. This also requires considering racial, ethnic, and cultural differences in facial aesthetics. The integration of these various approaches requires not only product and technical expertise but also careful attention to patient education and long-term planning.

This article aims to provide a comprehensive framework for managing facial aesthetic patients throughout their treatment journey, with particular focus on the role of hyaluronic acid (HA) fillers at different life stages. We present strategies for assessment, treatment selection, and technical execution across different age groups and anatomical zones, supported by long-term case examples. Special attention is given to the interaction between injectable fillers and surgical procedures, as well as considerations for maintaining natural-appearing results over time.

FOUNDATIONAL CONCEPTS IN LONGITUDINAL MANAGEMENT OF FACIAL FILLERS

Surgeons establishing longitudinal treatment plans for soft-tissue fillers must keep several key principles in mind. Patient needs and goals vary significantly across different life stages, requiring thoughtful adjustment of treatment strategies over time (Table 1). In addition, although fillers are often viewed as temporary treatments, their potential to persist in tissues and generate inflammatory or fibrotic changes necessitates careful documentation of treatment history, physical examination, and consideration of selective dissolution rather than continued augmentation. Patient education regarding these concepts and establishing shared treatment goals is crucial for maintaining safe and natural-appearing results over the long term.

Treatment strategies and goals evolve significantly across a patient's lifetime (Table 1). In younger patients (20s–30s), injectable fillers are primarily used for facial balancing, subtle enhancement, or surgical result simulation, often focusing on areas such as the lips, chin, nose, or tear troughs. As patients enter their 40s and 50s, the focus shifts toward correction of age-related volume loss and tissue displacement, particularly in areas such as the temples, cheeks, and perioral region. Surgical interventions are typically offered in the 40s–60s and, in some cases, offer opportunities to "replace" soft-tissue fillers with more permanent changes; however, fillers often continue to be used alongside surgical interventions to refine and maintain surgical results over time.

Table 1. Treatment Strategies by Decade[a]

	Goals of Treatment Strategy
20–30s: Prevention phase	Facial balancing, subtle enhancement • Skin care • Limited and selective use of fillers for cosmetic enhancement • Neuromodulators • Education regarding modifiable risk factors in facial aging
40s: Early aging	Early volume restoration, aging prevention • Focused use of fillers to counteract early volume loss • Advanced skin care modalities, including laser, microneedling, etc. • Addition of biostimulators • Continued use of neuromodulators, including on the jawline and neck • Discussion and planning for potential surgical interventions
50s: Transitional phase	Integrating surgical and nonsurgical approaches • Surgical intervention for more advanced signs of aging • Facial fat grafting and other intraoperative adjuncts to augment or replace earlier filler treatments • Continued use of neuromodulators, including in the jawline and neck • Judicious use of fillers to fine-tune results
60s: Advanced aging	Maintenance of surgical results, natural rejuvenation • Maintenance of surgical results with fillers, biostimulants, neuromodulators, and advanced skin care modalities

[a]This table provides a general framework for approaching patients' aesthetic goals and ensuring appropriate management as they age. Treatments should be tailored to each patient's anatomical needs, goals, and individual aging trajectory.

Stability of HA Fillers over Time

Understanding the long-term behavior of HA fillers in tissues is crucial for optimal patient outcomes. Although these products are enzymatically degraded over time in the soft tissue, this occurs at rates that vary significantly based on product characteristics, anatomical location, and patient-specific variables.[1] Highly crosslinked HA fillers placed in deep compartments or low-motion areas may persist significantly longer than their anticipated duration of action. Conversely, areas of high dynamic activity such as the perioral region demonstrate more predictable and rapid

filler metabolism, as well as potential displacement outside the injection zone.[2] This variable persistence, as well as the differential contribution of the deep and superficial facial fat compartments, must be considered when developing long-term treatment strategies, particularly when planning surgical interventions in previously treated areas.

Although HA fillers are generally reabsorbed within 6–24 months, noteworthy case reports have demonstrated histological persistence of HA fillers lasting up to 15 years, though the perceived clinical aesthetic effects may not be as long-lasting.[3] Highly crosslinked HA fillers have been found to last at least 24 months via the Global Assessment Improvement Scale in several studies.[4–6] A prospective magnetic resonance imaging (MRI) study of filler in the chin and cheek found persistence of cheek filler at 27 months, but absorption of chin filler by 19 months, which was thought to be volume- and mobility-related degradation.[7] Another MRI study demonstrated HA fillers lasting up to 12 years from injection in 1 patient and up to 6 years in 5 patients.[3] Mohs surgeons have found HA fillers in specimens up to 10.75 years after injection (mean 2.59 y).[8] The HA filler was found in 19 of 25,960 Mohs specimens and appeared as agglomerations without inflammatory cells, fibrosis, or encapsulation. The HA filler was hypothesized to degrade via hydrolytic degradation and absorption rather than inflammation.[8] Persistence of HA filler causing eyelid edema 5 years after injection was assumed after hyaluronidase injection resolved the edema in 5 patients.[9] These products can further lead to granuloma formation and fibrosis, which may further prolong the presence of these substances—or the body's inflammatory reaction to them—in the tissues. Despite popular belief and collective experience, the literature confirming that HA filler lasts years after injection is limited and is partly due to the 6–24 months duration of currently available clinical trials. Additional postmarket trials and improved imaging and HA assessment modalities are needed to further evaluate the biological behavior and longevity of these products.

The Role of Biostimulators

The role of biostimulatory agents as adjuncts to HA products continues to evolve. Although a detailed discussion is beyond the scope of this article, these agents can provide important support and soft-tissue enhancement. Their use requires careful patient selection and a thorough understanding of their distinct properties and potential long-term tissue effects, especially in cases of patients who have undergone other facial interventions, both surgical and nonsurgical.

Perception Drift

The psychosocial aspects of long-term filler use warrant special consideration. Repeated treatments over time can lead to gradual changes in self-perception and treatment goals, sometimes resulting in requests for progressive enhancement that may lead to unnatural appearances and associated complications.[10] This phenomenon, sometimes called "perception drift," is best managed through the establishment of a consistent relationship with a primary aesthetic provider who can evaluate changes over time and provide appropriate guidance. The increasingly common practice of seeking treatments from multiple providers on an ad hoc basis may increase the risk of overtreatment and adverse events and compromise long-term outcomes. In evaluating patients presenting with overcorrected or migrated filler in these settings, it is prudent to consider dissolving rather than continuing to augment, and to have an open discussion with the patient about the risk of distorted perception with continued, progressive overfilling.

Advances in Imaging Modalities for Evaluation and Management of Facial Fillers

High-frequency ultrasound is a reliable, high-resolution, real-time method of evaluating filler and should be a first-line imaging technique for filler complications. It is economical, accessible in the clinic, and has no ionizing radiation. Compared with ultrasound, MRI has prohibitive expense, requires intravenous contrast, and offers less detail of the superficial tissue layers.[11] Ultrasound requires training and the development of expertise. Integration of artificial intelligence has the potential to shorten the ultrasound learning curve with movement artifact dampening, image enhancement, facial anatomy mapping assistance, and clinical decision support.[12] Fillers are identified by patterns of echogenicity, posterior acoustic artifacts, and descriptions of texture, borders, internal characteristics, size, shape, anatomical location, evolution, dispersion pattern, and homogeneity/heterogeneity.[13] Initially, the HA filler seems globular and anechoic or not reflective of ultrasound waves due to its water content. The ultrasound waves pass through the HA filler faster, causing posterior acoustic

enhancement or brightening.[13] When HA filler integrates into the tissues, it becomes heterogeneous and diffuse. Calcium hydroxylapatite appears as coarse-grain snowfall or is hyperechoic with posterior acoustic shadowing or darkening beneath the calcium hydroxylapatite because it reflects ultrasound.[12,14] Poly-L-lactic acid appears heterogeneous with predominantly hyperechoic fibrosis in the tissue. Ultrasound aids management of overcorrection, filler migration, inflammation, vascular adverse events, and presurgical dissolution when indicated.[15]

ANATOMICAL CONSIDERATIONS BY REGION

The Periorbital Region

The periorbital region is particularly susceptible to age-related volume loss, resulting in hollowness, shadowing, and the appearance of fatigue. HA fillers can effectively restore volume, smooth transitions between anatomical subunits, and enhance periorbital aesthetics when injected conservatively with careful attention to anatomical planes and vascular safety.

The tear trough deformity, commonly associated with volume loss in the deep medial cheek fat, protrusion of the periorbital fat pads, and accentuation of the orbicularis retaining ligament, can be addressed with thoughtful and judicious use of properly selected fillers to camouflage the shadows formed by these anatomical changes and restore volume.[16] Fillers are typically placed deep to the orbicularis oculi muscle, either supraperiosteally with a needle or in the preseptal plane using a cannula. This approach minimizes the visible Tyndall effect and provides structural support. Care must be taken to avoid overcorrection, which can lead to a puffy or unnatural appearance, and to first treat malar deflation when indicated, as this can sometimes avoid the need for direct tear trough injection. Filler in the tear trough area has been associated in some cases with persistent edema of the lower lid and upper malar region.[17]

For lateral periorbital hollows, filler placed in the lateral sub–orbicularis oculi fat and adjacent superficial fat compartments can restore youthful fullness and soften the transition between the lower lid and cheek. The brow can also benefit from volume restoration, with filler placed in the lateral brow fat pad or supraperiosteally along the superciliary arch to achieve subtle elevation and contour enhancement.

The temple, often overlooked in periorbital rejuvenation, plays a crucial role in facial harmony and upper face aesthetics. Age-related volume loss in the temporal fat pads can result in concavity and shadowing, contributing to a hollow appearance. HA fillers can effectively restore volume in this region, smoothing the transition between the forehead, brow, and zygomatic arch for a harmonious and healthy appearance. Filler placement in the preperiosteal plane at the level of the temporal crest can restore volume and soften the appearance of this bony prominence. If injecting more superficially to provide additional correction, a cannula can be used to reduce the risk of entering the superficial temporal artery and vein, though the risk of vascular injury/occlusion with the use of a cannula technique always remains and should not be underestimated.

Vascular safety is paramount in the periorbital region due to the proximity of the angular artery and vein, as well as the deep and superficial temporal vessels. Use of a blunt-tip cannula, slow injection with small aliquots in a retrograde fashion, and frequent aspiration can reduce the risk of vascular occlusion, though even when these precautions are observed, vascular occlusion still poses a risk. Patients should be informed of potential complications, including edema, bruising, and rare ischemic events. Providers should be prepared to immediately treat any potential vascular occlusion with hyaluronidase injection, as well as consider additional adjuncts such as nitropaste. If there is any concern for vascular occlusion, patients should be closely observed and treated until flow is restored or symptoms resolve.

The Midface

Age-related bony and soft-tissue volume loss in the midface contributes to flattening of the malar prominence, deepening of the nasolabial folds, and loss of midface support.[18,19] HA fillers can restore youthful contours by offsetting both the effects of bony resorption with the use of high G' fillers at the periosteal level or deep fat pads and with the use of lower G', flexible fillers more superficially to restore volume and reduce the prominence of the nasolabial folds.[20]

The deep medial cheek fat and lateral sub–orbicularis oculi fat are primary targets for midface volumization, typically approached with a needle for precise supraperiosteal placement or a cannula for broader distribution. Injection at the zygomatic arch and malar eminence can restore projection and create a subtle lift, reducing

tension on the nasolabial fold and improving the overall facial contour. This is especially effective when combined with synergistic medial cheek and periorbital correction.

The submalar region, including the deep buccal fat pad, can be augmented to restore soft-tissue volume and smooth the transition between the malar mound and midface. Care should be taken to avoid overfilling or using stiff, inelastic HA products, which can result in an unnatural "apple-cheek" appearance or worsen infraorbital descent and edema.

The nasolabial folds, a frequent concern for patients, are best addressed through indirect support via cheek augmentation and augmentation of the piriform or deep piriform space, rather than direct filling alone.[21] Direct filling of the fold can be considered as an additional superficial treatment layer, but care should be taken to avoid adding volume immediately superior or lateral to the fold, which tends to make it appear more prominent.

The midface vasculature, including the infraorbital artery and vein, necessitates meticulous technique. Aspiration, slow injection, and awareness of anatomical landmarks can mitigate the risk of complications.

The Chin and Jawline

Injectable filler in the chin and jawline is a powerful tool for facial balancing, camouflage of aging, and maintenance of surgical results. Aesthetic ideals of the lower third suggest an ideal height ratio of subnasion to lips as one-third, and lips to menton as two-thirds.[22] The ideal chin width is commensurate with the intercanthal distance in women and the oral commissure in men. Projection of the ideal chin is balanced with the nose and lips. Following the Gonzales-Ulloa line from nasion to pogonion, perpendicular to the Frankfort line, the pogonion ideally projects the same as the lower lip in men and 1–2 mm slightly behind the lower lip in women.[20] HA filler is a noninvasive alternative to alloplastic or osseous chin augmentation that allows for a modular and reversible augmentation. The soft tissue of the chin is dense and adherent; care needs to be taken to avoid overvolumization and compression of circulation. Vasculature of the chin is robust, with the facial artery and vein crossing at the antegonial notch supplying the submental artery along the inferior border of the mandible, ascending mental artery, and labiomental artery, as well as the mental artery arising from the mental foramen. Supraperiosteal injection must be performed by keeping the needle steady on the bone and aspirating before a slow bolus. Filler placed supraperiosteally with needle and layered in the superficial and deep fat compartments with cannula can increase the projection over the pogonion and length of the menton for facial balancing.

Aging of the chin and jawline can be treated with filler placed in the prejowl sulcus, labialmental crease, marionette lines, posterior cheek, and gonial angle. Prudent volume needs to be placed in the prejowl sulcus and central chin to camouflage the jowls without creating a boxy appearance. Likewise, filler in the gonial angle should not widen the bigonial distance beyond the bizygomatic.[23] Cannulas may be used for jawline augmentation between the prejowl sulcus and anterior border of the masseter muscle because the facial artery and vein cross the mandible at the antegonial notch. The posterior mandible behind the anterior border of the masseter and ramus below the tragus may be augmented with supraperiosteal needle or cannula. The angle of the mandible should be kept between 120 and 130 degrees in women and 120 degrees in men.[23] When placing filler subcutaneously, the injector needs to be mindful of avoiding penetration of the parotid by staying superficial to its capsule. Chin and jawline filler emphasizes contours, corrects shadows, and lessens skin laxity for a more youthful, aesthetic, and slim appearance of the neck.

Gravity, movement, and aging relax the lifting and tightening effects of surgery. Marionette lines are the first to reappear, sometimes soon after the swelling of surgery resolves due to animation. Preoperatively, the expectation for touch-up with filler should be set, particularly with the marionette lines. Neuromodulation of the platysma is also recommended for the maintenance of surgical results, because the platysma inserts into the cheek and pulls downward, recreating jowls as well as horizontal neck lines and vertical bands. With time, the addition of volume to the chin and jawline can lessen recurrent neck skin laxity by rotating and recruiting skin upward from the neck.

Clinical Strategies and Considerations for Longitudinal Management of Fillers

Comprehensive assessment of patients seeking facial filler treatments begins with detailed history-taking. Key elements include documentation of prior injectable treatments, including product types, volumes, and anatomical locations.

Particular attention should be paid to prior surgical procedures or trauma, as well as other facial treatments, including the use of energy devices that may affect tissue morphology. Physical examination should focus not only on areas of concern but also on a global facial analysis. High-frequency ultrasound evaluation can help confirm the presence and identify the type of filler. Thorough photographic documentation is essential, ideally including multiple angles and facial expressions to capture both static and dynamic features.

Patient education is fundamental to successful long-term management. In particular, patients should be educated about the interplay of skin care, injectables, and surgery in managing facial aging, and encouraged to establish care



Fig. 1. (*Above, left*) The plan for this patient included blepharoplasty for the lower lids, HA with needle for the temples, HA with cannula for the orbital roof, poly-L-lactic acid for the midface, calcium hydroxylapatite with cannula for the jawline, HA with cannula for the nasolabial folds, HA with cannula and needle for the lips, and HA with needle for the chin. (*Above, right*) The patient is shown before any intervention, (*below, left*) postoperatively, and (*below, right*) after treatment with fillers (final result).

with a single provider or practice who can manage their facial aesthetic needs as they age, rather than seeking "a la carte" services that can lead to confusion about prior treatments, disharmony, and global facial appearance. Discussion should include realistic expectations about product longevity, the potential need for ongoing maintenance, and how treatment goals may evolve over time.

Surgical Planning in the Previously Filled Face

Integration of soft-tissue fillers with surgical procedures requires careful planning. When surgery is anticipated, consideration should be given to whether existing fillers should be dissolved. Fillers can affect lymphatic drainage, particularly in the malar mound and lower eyelid, and should often be removed to optimize surgical correction and healing if surgical intervention is planned. Dissolution can allow a complete assessment of the patient's preoperative anatomy without filler in place, and complete removal of the filler can be confirmed with ultrasound. In addition, fat grafting may be planned for areas previously treated with filler for a more durable and natural correction of volume loss.



Fig. 2. Before (*left*) and after (*right*) treatment with face lift, neck lift, upper blepharoplasty, and 3 cc of HA filler in the chin and jawline.

CASE REPORTS

To illustrate longitudinal management combining both surgical intervention and injectable fillers, 3 case studies are presented: 1 focusing on the perioral region (Fig. 1), 1 focusing on the lower third of the face and jawline (Fig. 2), and 1 case of comprehensive facial balancing (Fig. 3).

CONCLUSIONS

Comprehensive management of facial aging requires an integrated approach that combines surgical and nonsurgical treatment modalities, including soft-tissue HA fillers as described here, as well as other interventions beyond the scope of this discussion, including skin care, neuromodulators, energy devices, and other related modalities. Soft-tissue



Fig. 3. (*Above, left*) At age 56 (before surgery), the patient's regimen included neurotoxin, calcium hydroxylapatite, PLLA, and HA 3 to 4 times per year as needed. (*Above, right*) At age 58, she underwent upper and lower blepharoplasty, face lift, and fat grafting. After surgery, as shown at age 59 (*below, left*) and 65 (*below, right*), the patient's results were maintained with neurotoxin, PLLA, and HA 3 to 4 times per year as needed. HA products used included both nonanimal stabilized HA and Vycross, as well as flexible gels, typically in the tear trough and perioral regions; poly-L-lactic acid was applied in a panfacial manner.

fillers play distinct roles throughout the different phases of aging, including facial balancing, restoration of volume, and fine-tuning and maintenance of surgical results. Early, conservative use of fillers has the potential to delay the need for surgical intervention, while postoperative filler treatments can refine and prolong surgical outcomes. Longitudinal success relies on thorough patient education and collaborative decision-making, empowering patients to understand their evolving aesthetic needs and the best options available to address them. Regular follow-up, tailored treatment plans, and clear communication between providers and patients ensure safe, effective, and satisfying outcomes. Ultimately, an individualized, adaptable strategy allows clinicians to guide patients through the dynamic process of facial aging with natural, harmonious results.

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DISCLOSURE

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PATIENT CONSENT

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

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