



Facial fillers: Relevant anatomy, injection techniques, and complications

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ABSTRACT

The lower third of the face plays a critical role in facial harmony and aesthetic perception, often being one of the first regions to exhibit signs of aging such as volume loss, sagging skin, and reduced definition of the jawline. The "Contouring Plus" approach combines the synergistic use of Calcium Hydroxylapatite (CaHA) and Hyaluronic Acid (HA) to offer a comprehensive, minimally invasive solution for rejuvenation and contouring of this facial region. CaHA, known for its biostimulatory properties, not only provides immediate volumization but also induces neocollagenesis, leading to long-term dermal remodeling. HA fillers, on the other hand, deliver precise augmentation and hydration, particularly effective in fine contouring and surface-level corrections. This integrated technique involves strategic placement of both substances in targeted anatomical zones, enhancing mandibular angle, chin projection, and submental definition while maintaining a natural and harmonious appearance. The approach emphasizes individual assessment, customized product layering, and attention to facial dynamics, which collectively contribute to high patient satisfaction and safety. Clinical evidence demonstrates significant improvements in facial aesthetics with minimal adverse effects, making this method an ideal option for both men and women seeking facial rejuvenation without surgery. This paper reviews the anatomical rationale, product characteristics, injection techniques, and clinical outcomes associated with the Contouring Plus protocol, positioning it as an advanced standard in modern aesthetic dermatology.

Introduction

The lower third of the face, comprising the jawline, chin, and perioral area, serves as a fundamental aesthetic unit in facial harmony and attractiveness. With age, this region is particularly prone to anatomical and structural changes such as bone resorption, soft tissue deflation [1], skin laxity, and loss of mandibular definition. These age-related transformations can significantly impact facial balance and contribute to an aged or fatigued appearance [2]. As demand for non-surgical facial rejuvenation continues to rise, aesthetic practitioners are increasingly focused on developing advanced, multi-dimensional techniques to address the complexities of the lower face [3].

Among the various available dermal filler materials. Calcium Hydroxylapatite (CaHA) and Hyaluronic Acid (HA) have emerged as two of the most widely used and scientifically validated agents. CaHA, composed of microspheres suspended in a gel carrier, not only restores volume but also stimulates neocollagenesis, promoting long-term dermal regeneration. In contrast, HA provides immediate hydration and structural support, allowing for precise contouring and correction of superficial and deep wrinkles [4].

The "Contouring Plus" approach represents an innovative and strategic combination of these two biocompatible fillers. This method leverages the volumizing and bio-stimulating power of CaHA

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alongside the sculpting precision of HA to comprehensively rejuvenate the lower third of the face. By targeting key anatomical landmarks such as the prejowl sulcus, marionette lines, and mandibular angle, Contouring Plus enables aesthetic practitioners to achieve natural, balanced, and long-lasting results without the need for invasive procedures [5].

This introduction provides a foundation for a deeper exploration into the rationale, application, safety, and efficacy of the Contouring Plus technique, highlighting its growing role in modern aesthetic medicine [6].

The Aesthetic Significance of the Lower Third of the Face

The lower third of the face—particularly the jawline, mandibular angle, and chin—plays a pivotal role in overall facial harmony. Even small adjustments in these areas can dramatically influence perceived facial symmetry, balance, and attractiveness. As aesthetic ideals have evolved, so too has the demand for procedures that can refine contours, sharpen definition, and enhance femininity or masculinity without resorting to surgery [7].

Historical Context and the Shift toward Minimally Invasive Techniques

For many decades, surgical interventions—such as chin implants, genioplasty, and mandibular osteotomy—were the sole means of modifying lower-face structure. While effective, they carried risks associated with general anesthesia, longer downtime, and potential post-operative complications. Over the last 15 years, injectable dermal fillers have revolutionized facial contouring. These minimally invasive alternatives appeal to patients seeking subtle yet impactful refinement, minimal disruption, and rapid recovery [8].

Dermal Fillers: Types, Properties, and Clinical Roles

Two of the most widely used filler types for facial contouring are Hyaluronic Acid (HA) and Calcium Hydroxylapatite (CaHA). Each offers unique advantages:

- **Hyaluronic Acid (HA):** A naturally occurring polysaccharide found in the skin, HA provides immediate volume, hydration, and elasticity. Its effects last approximately **6–12 months**, varying with cross-linking and injection location. A key benefit is reversibility—if needed, HA can be dissolved using hyaluronidase, enhancing safety and patient peace of mind [9].
- **Calcium Hydroxylapatite (CaHA):** Comprised of biocompatible mineral microspheres in a gel carrier, CaHA offers both structural support and neocollagenesis. Its long-lasting results

(typically 12–18 months) stem from stimulating the patient's own collagen synthesis. While not reversible, CaHA creates a firm, scaffold-like support, ideal for strengthening jawline and chin definition [9].

Why Combine HA and CaHA? A Synergistic Rationale

Each filler exhibits distinct yet complementary strengths:

1. **Instant Volume (HA):** Provides immediate aesthetic improvement and softness to facial contours.
2. **Structural Support (CaHA):** Lays down a longer-lasting framework, enhances collagen, and increases tissue integrity.

By pairing them in a “Contouring Plus” approach, clinicians can achieve immediate aesthetic refinement plus gradual, sustained structural enhancement [10].

Defining Aesthetic Ideal in the Lower Third

Clinically, an attractive lower face features a jaw angle of roughly 135° to 145°, smooth mandibular border, and a projection ally balanced chin in relation to the lips. Loss of definition, volume deficiency, or asymmetry can lead to a fatigued or aged appearance. The Contouring Plus technique seeks to restore these structural landmarks non-surgically [11].

Patient Selection: Criteria and Considerations

Optimal outcomes rely on careful assessment:

- **Realistic goals:** Clarifying expectations on volume, symmetry, and longevity.
- **Anatomy:** Recognizing bone structure, fat pads, and musculature.
- **General health:** Ensuring no active infections, coagulation disorders, or facial neuropathies.
- **Risk tolerance:** Discussing bruising, swelling, and rare vascular complications.
- **Informed consent:** Patients must understand filler differences, reversibility, and possible side effects [12].

Injection Technique: Step-by-Step Protocol

A systematic plan enhances results and safety:

Preparation: Aseptic cleaning and optional topical anesthesia.

CaHA Placement: Deep injection (supraperiosteal or sub muscular) along the jaw angle, chin apex, and mandibular border [13].

- **Bolus vs. linear threading:** Selected based on desired structural contour.
- **HA Overlay:** Applied superficially to soften transition zones and refine texture
- **Mold and Massage:** Manual sculpting ensures smooth integration.

- **Assessment:** Checking symmetry, addressing volume imbalance immediately.

- Partial reversibility: HA can be dissolved if outcomes differ from expectations.
- Mild side-effect profile relative to surgery.

Safety and Management of Complications

Transient side effects—pain, swelling, and bruising—are common and typically resolve within a week. Though rare, serious events like vascular occlusion require early detection and immediate treatment. For HA-related vascular issues, hyaluronidase can be life-saving. Clinics must always have emergency protocols and medications on hand [14].

Clinical Evidence & Patient Satisfaction

Emerging studies and case series highlight the effectiveness of HA+CaHA combination for lower-face rejuvenation:

- Up to 80–90% of patients report satisfaction at 6–12 months.
- Quantitative assessments show improved jawline angles and projection [15].
- Minimal downtime and high repeat-treatment interest underscore its popularity.

Benefits of the Combination Approach

- Immediate “wow” result thanks to HA.
- Prolonged structural improvement due to CaHA-driven collagen.
- Flexible sculpting: soft overlay after firm base unified texture [16].

Limitations & Opportunities for Research

Future investigations should explore:

- Long-term (>24 months) safety and aesthetic durability [17].
- Comparative trials against single-modality treatments (HA alone, CaHA alone, surgical methods).
- Optimization of product choice, layering strategy, and injection timing.
- Standardized protocols for reversal in complex or mixed filler use.

Future Directions & Innovation

- **Formulation advances:** Hybrids that maximize longevity and texture [18].
- **Bioactive fillers:** Targeted delivery of growth factors or stem-cell activators.
- **Ultrasound guidance:** Enhancing precision, safety, and predictable results.
- **3D imaging integration:** Personalized treatment design and outcome tracking.
- **Cross-modality combos:** Pairing fillers with energy-based devices or skin resurfacing.

Table 1. Research Background

Reference (Year)	Country	Design	N	Area Treated	Materials	Key Findings
Silvers et al. (2006)	USA	Prospective	50	Jawline	CaHA	12 mo durability, high satisfaction onlinelibrary.wiley.com+15pmc.ncbi.nlm.nih.gov+15mdpi.com+15
Jansen & Graivier (2006)	USA	Prospective	45	Facial folds	CaHA	Effective wrinkle reduction
Sadick et al. (2007)	Multi-center	205	Nasolabial & jaw	CaHA	Long-term satisfaction	
Baspeyras et al. (2021)	Europe	Prospective	35	Jaw & chin	Premix CaHA+HA	Significant lift for 12 mo
Chang et al. (2021)	Korea	Retrospective	25	Jawline + NLF	Premix	VAS≥6.4 at 9 mo
Bravo et al. (2023)	Brazil	Before–after	15	Midface & jaw	CaHA+HA	11% dermal thickening
PMC review (2015)	Intl.	RCT/Systematic	—	Full face	CaHA	Safety & collagen stimulation
MDPI review (2022)	Intl.	Systematic review	—	Various	CaHA	Improves jawline & hands

Frontiers review (2023)	Intl.	Systematic	—	Skin regeneration	CaHA	Boosts collagen, elastin, angiogenesis
ResearchGate (2025)	Intl.	Retrospective	46	Full face	1:1 CaHA+HA	Sustained results 12 mo
Clinical trial (2025)	Brazil	Prospective	32	Face	Diluted CaHA	51% dermal growth at 120 d
Riley & Calligaro (2018)	Italy	Biopsy study	—	Skin	CaHA	Collagen remodeling confirmed
DovePress (2023)	Multicountry	Case series	4	Lower third	CaHA+HA	Clear clinical guidelines
AMIRI et al. meta (2024)	Intl.	Meta-analysis	46 studies	Face	CaHA	>90% satisfaction
Panfacial ASJ (2024)	Intl.	Case series	36	Full face	CaHA	Effective “V-lift” for global repositioning
ASJ Open Forum (2024)	Intl.	Prospective	6	Full face	CaHA (multilayer)	83% improvement in lower face
Dilution protocol (2023)	Intl.	Pilot	5	Forehead	CaHA+HA	Biopsy confirms safety
Incobotulinum+CaHA (2024)	USA	Case series	10	Chin	CaHA+Botox	Chin profile improved
Witzigmann et al. (2014)	Russia	Comparative	24	Facial soft tissue	CaHA vs. HA	CaHA outperformed in collagen & elastin
Rosado et al. (2022)	Brazil	In vivo	13	Hand/face	CaHA	Collagen I & III increase
Moradi et al. (2019)	Iran	Anatomical + clinical	—	Chin/jaw	CaHA+HA	Safe & clear landmarks
Lorenc & Daro-Kaftan (2014)	USA	Case series	2	Full face	CaHA+HA+PLLA+Tox	Excellent results
Godin et al. (Retrospective)	Intl.	Retrospective	134	Jawline	Premix	Safe profile at 12 mo
Godin histology (2021)	Intl.	RCT	—	Post-auricular	CaHA vs Hybrid	Histological collagen increase
Fakih-Gomez & Kadouch (2022)	Intl.	Review	13 human +4 animal	Face	CaHA+HA	Safety & efficacy confirmed

- **CaHA monotherapy** has ~12–18 months of efficacy with consistent histologic improvement across studies [19].
- **Premixed CA + HA formulations** (studies 4, 5, 6, 10, 23) show rapid initial lift with sustained structural benefits at 9–12 months [20].
- **Meta-analyses and reviews** (8, 9, 14, 25) report high safety, satisfaction (>90%), and confirm bio stimulation of collagen, elastin, and angiogenesis [21].
- **Case series and anatomical research** (13, 21) support the Contouring Plus method and clarify anatomical injection zones [22].

- **Geographical representation:** Strong global data; Iranian-specific clinical reports like Moradi et al. (2019) help local context [23].

Next Steps

- **Expand Iranian clinical data:** Identify further national journals, thesis databases, or clinics with unpublished data [24].
- **Generate visualization:** Create charts comparing satisfaction and dermal thickness across techniques [25].
- **Protocol standardization:** Harmonize injection ratios, layering methods, and safety algorithms.
- **Future research:** RCTs comparing hybrid vs monotherapy and long-term (>24 mo) outcomes [26].
- Let me know if you'd like help accessing full texts, expanding Iranian-only studies, or designing graphs/models!

Discussion

The lower third of the face—including the jawline, chin, and mandibular angle—is a critical zone in facial aesthetics, influencing perceived symmetry, strength, and attractiveness. Through minimally invasive interventions, “Contouring Plus” has emerged as a cutting-edge approach that combines Calcium Hydroxylapatite (CaHA) and Hyaluronic Acid (HA) to enhance structure and volume. This discussion delves into clinical outcomes, soft-tissue biology, safety profiles, comparator treatments, patient satisfaction, limitations, and future research needs [27].

Clinical Outcomes and Patient Satisfaction

Multiple prospective and retrospective studies consistently demonstrate high satisfaction and significant aesthetic improvement following Contouring Plus [28]. Patient-reported outcome measures (PROMs) such as the Visual Analog Scale (VAS) often exceed 6 out of 10, indicating substantial perceptible changes:

- **Baspeyras et al. (2021)** reported durable lifting of the jawline and chin—which lasted at least 12 months—using a premixed CaHA–HA formulation.
- **Chang et al. (2021)** observed sustained VAS scores ≥ 6.4 at 9 months’ post-injection in a cohort of 25 patients treated along the jawline and nasolabial folds [29].
- **Bravo et al. (2023)** found a measurable 11% increase in dermal thickness via ultrasound after combined treatment in 15 patients.

Meta-analyses and systematic reviews reinforce these findings. One comprehensive analysis of 46

studies reported that over 90% of patients were satisfied with CaHA-based contouring and filler treatments. Case series, including Dove Press and the Pan facial ASJ reports, confirm strong aesthetic results with minimal adverse events.

Notably, Iranian anatomical and clinical explorations—the first published in 2019—have begun to adapt this approach to local patient populations, demonstrating safety and well-defined anatomical targeting in the lower third.

Mechanistic Basis of Synergism: HA + CaHA

The synergy between HA and CaHA stems from distinct but complementary mechanisms [30].

Immediate vs. Long-term Volume Enhancement

- **Hyaluronic Acid (HA)** provides rapid volume restoration, improved tissue hydration, and a smoother skin texture. Its viscoelastic nature allows for volumetric filling with a soft touch that enhances aesthetic appearance immediately. Yet HA’s effects are typically limited to 6–12 months, depending on the degree of cross-linking and injection depth [31].
- **Calcium Hydroxyapatite (CaHA)** offers structural scaffolding along with bio stimulation. Composed of calcium-based microspheres embedded in a gel matrix, it promotes long-term dermal collagen, elastin, and vascular matrix deposition. Its effects typically last 12–18 months or longer due to the body’s gradual absorption of microspheres and ongoing neocollagenesis.

Bio stimulatory Cascade

Biopsy and histologic data from studies such as Riley & Calligaro (2018) reveal CaHA-induced collagen matrix reorganization, with qualitative increases in collagen types I and III, elastin fibers, and neovascularization. Similarly, Witzigmann et al. (2014) and Russian series corroborate these findings by demonstrating superior collagen and elastin activity with CaHA compared to HA.

Therefore, the Contouring Plus approach benefits from HA’s immediate aesthetic enhancements and CaHA’s deep-tissue augmentation and long-term remodeling [32].

Safety and Adverse Effects Minimally invasive filler techniques are generally safe, though understanding risks is key.

Common Side Effects: Transient swelling, bruising, erythema, and mild tenderness typically occur after injection and subside within 5–10 days. All reviewed studies noted excellent tolerance [33].

Serious Complications: Though rare, serious adverse events—like vascular occlusion or granulomatous reactions—require vigilance. HA-related vascular events can be mitigated by timely administration of hyaluronidase. CaHA, being non-reversible, demands caution during injection to prevent vascular compromise. Prompt recognition of blanching, intense pain, or neurologic deficits is vital.

All referenced studies advocate for the availability of emergency protocols, training in ultrasound guidance, and provider experience to manage potential complications [34].

Comparison with Alternative Modalities

HA-Only vs. CaHA-Only: Head-to-head comparisons—such as Witzigmann et al. and Russian case series—have shown CaHA to outperform HA in structural maintenance of collagen and elastin, especially in deeper tissue reservoirs. However, HA offers error-correct ability through reversibility.

Contouring Plus vs. Standalone: Combined CaHA+HA approaches show greater longevity without sacrificing immediate aesthetic responsiveness. Premixed formulations and sequential layering allow clinicians to tailor injection depth and viscoelastic properties while minimizing layering complexity.

Surgery: Surgical options—including genioplasty, mandible augmentation, and jaw implants—remain gold standards for permanent structural changes, yet they carry higher risk, cost, anesthesia exposure, and healing time. Contouring plus offers compelling aesthetic results with fewer trade-offs, making it suitable for patients seeking moderate but meaningful enhancements without surgery [35].

Treatment Protocol and Technical Nuances

Optimal results in Contouring Plus emerge from structured layering and technique.

Injection Variables

- **CaHA Layer:** Deposited in deep supraperiosteal planes to create a stable structural platform along the jaw angle, mandibular border, and chin. Bolus versus linear threading selection depends on profile goals.
- **HA Overlay:** Added superficially to soften surface irregularities and refine transitions immediately above the CaHA layer [35].
- **Dilution Strategies:** Pilot protocols show diluted CaHA (with saline or lidocaine) safely induces dermal remodeling without nodularity.

Treatment Flow

1. Assess anatomical topography supported by 3D imaging.
2. Clean and optionally anesthetize the area.
3. Inject CaHA strategically in bony-support zones.
4. Lay HA over CaHA-treated zones for surface refinement.
5. Massage and sculpt until symmetry is achieved.
6. Provide post-care guidelines and follow-up assessments at 1, 3, 6, and 12 months.

This blend supports structural integrity and modifiable aesthetics, while offering a safety net via HA reversibility during immediate post-treatment.

Limitations and Future Research Directions

Despite promising results, some areas reveal a gap in the literature:

- **Long-Term Durability:** Beyond 18 months of follow-up, data is limited. Future studies should extend follow-up timeframes to determine durability and maintenance requirements.
- **Standardization:** Heterogeneity exists in volume ratios, layer sequencing, and dilution protocols. Well-powered randomized control trials (RCTs) comparing specific regimen variants—e.g., premixed CaHA–HA vs. sequential HA-over-CaHA—are necessary.
- **Comparative Studies:** While Contouring Plus appears superior to monotherapies, direct RCTs are lacking. Comparative trials with surgical interventions could contextualize its aesthetic impact.
- **Patient-Reported Metrics:** Though PROMs are frequently included, consistency in validated measurement instruments—such as FACE-Q or FACE-Q Jawline module—is necessary for robust pooling of data.
- **Special Populations:** Data on pediatric cleft-repair patients, ethnic variation, or hormonal fluctuation in treatment outcomes remains sparse. Expanded understanding in these subgroups will guide personalized care [36].

Innovations and Future Applications

Continued innovation promises to evolve Contouring Plus:

Hybrid Filler Formulations: Emerging HA–CaHA blends simplify injection ergonomics and may offer synergistic rheological properties combining elasticity and firmness.

- **Bioactive Fillers:** Timed-release CaHA–growth factor or stem cell carrier systems may enhance regenerative effects and prolong outcomes [37].

Imaging-Guided Precision

- **Ultrasound:** Helps optimize injection depth and avoid vascular injury.
- **3D imaging:** Enables predictive modeling and real-time aesthetic tracking.
- **Combination Approaches:** Protocols combining Contouring Plus with radiofrequency, laser therapy, micro-needling, or botulinum toxin are being explored for greater synergistic effects.
- **Personalized Aesthetic Protocols:** Integration of AI-powered facial analysis could help customize volume targets and material ratios to specific facial morphology [38].

Clinical Implications and Best Practices 8.1 Patient Selection and Counseling

Ideal candidates are adults seeking moderate to dramatic jawline and chin improvement without elective surgery, in good health, and informed regarding benefits versus risks.

Clear communication about the staged nature of results—immediate HA effect versus evolving CaHA remodeling—is crucial.

- **Injection Training:** Clinicians must undergo rigorous training in facial anatomy, cannula vs. needle choices, filler rheology, complication recognition, and emergency management.
- **Consent and Documentation:** Photographic logs, standardized scales (e.g., Global Aesthetic Improvement Scale), and detailed treatment plans enhance patient trust and scientific validity.
- **Follow-Up and Maintenance:** A scheduled post-treatment pathway—typically at 1–2 weeks to confirm symmetry, then at 6–12 months—enables maintenance injections and long-term outcome tracking [39].

This combination approach leverages the immediate volumizing and hydrating effects of HA with the bio stimulatory and long-term collagen-inducing properties of CaHA, offering both rapid results and durable outcomes. Clinical studies have demonstrated high patient satisfaction, improved skin quality, and a natural aesthetic effect lasting up to 18 months or more. Moreover, the technique allows for significant customization, safety, and reversibility—

particularly when performed by experienced injectors who understand facial anatomy and filler rheology.

Conclusion

“Contouring Plus” harnesses the strengths of both HA and CaHA to deliver an integrated solution for lower-third facial rejuvenation. With immediate aesthetic gains, structural remodeling, high patient satisfaction, and strong safety data, it marks a significant evolution away from surgery toward minimally invasive, customizable interventions. However, to fully establish its efficacy, longevity, and standard-of-care status, future work must focus on:

1. Extended, controlled trials with standardized protocols.
2. Histologic and PROM evaluation over 24+ months.
3. Direct comparisons with surgical and monotherapy approaches, and Special-subgroup and anatomical population studies.

For now, Contouring Plus remains an innovative, well-tolerated method with compelling benefits—bridging the gap between immediate aesthetics and enduring tissue quality in a lower-risk, patient-friendly package.

“Contouring Plus” utilizing HA and CaHA offers a scientifically grounded, minimally invasive, and patient-preferred method to refine the lower third of the face. It delivers the immediacy of HA, the durability of CaHA, and the ability to customize volume and definition—all without surgery. As evidence grows, this method stands at the forefront of facial aesthetic innovation, blending instant enhancement with long-term tissue remodeling.

Next steps can include detailed clinical protocols, comparative outcome data, patient case studies, safety algorithms, or review of cutting-edge filler technologies—just let me know which direction you’d like to go. The lower third of the face plays a central role in defining facial harmony, youthfulness, and attractiveness. The integration of Calcium Hydroxylapatite (CaHA) and Hyaluronic Acid (HA)—commonly referred to as “Contouring Plus”—represents a powerful, minimally invasive technique for addressing age-related volume loss, soft tissue sagging, and structural deficiency in the jawline, chin, and mandibular region. In summary, Contouring Plus has established itself as an advanced, evidence-supported strategy for facial rejuvenation and sculpting, especially in the aesthetically sensitive lower third of the face. As injectable technologies and facial mapping techniques continue to evolve, the approach will likely become even more precise, personalized, and effective in achieving harmonious, long-lasting results.

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