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A Systematic Review of the Use of Hyaluronic Fillers in Chin Shape Correction in Patients with Maxillofacial Abnormalities

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ABSTRACT

Maxillofacial abnormalities involving chin deformities often lead to significant aesthetic and functional concerns. In recent years, hyaluronic acid (HA) fillers have gained popularity as a non-surgical alternative for chin shape correction. This systematic review aims to assess the efficacy, safety, and patient satisfaction associated with the use of hyaluronic fillers for chin augmentation in patients with congenital or acquired maxillofacial deformities. A thorough search of databases including PubMed, Scopus, Embase, and Cochrane Library was conducted up to July 2025. Inclusion criteria comprised clinical trials, case series, and cohort studies reporting on outcomes of HA filler injection in the chin. A total of 18 studies met the eligibility criteria, involving 729 patients. The analysis revealed that HA fillers provided satisfactory aesthetic improvement, high patient satisfaction, and low complication rates. However, repeated treatments are necessary due to the temporary nature of fillers. Overall, HA fillers offer a safe, effective, and minimally invasive option for selected patients with chin deformities, particularly when surgical interventions are not feasible or desired.

Introduction

Chin abnormalities, whether congenital (e.g., micrognathia, hemifacial macrosomia) or acquired (e.g., trauma, post-surgical deformity), can severely affect facial harmony and self-esteem. Traditional correction often involves orthognathic surgery or prosthetic implants, which are invasive and carry substantial recovery time and risks. In this context, the advent of injectable dermal fillers, particularly hyaluronic acid-based products, has provided a promising, minimally invasive solution for contouring the lower third of the face [1].

Hyaluronic acid (HA) is a biocompatible polysaccharide naturally found in human tissues. When injected as a filler, it provides volume, hydration, and structure, making it suitable for soft tissue augmentation. The use of HA fillers in chin reshaping, especially in patients with mild-to-moderate deformities or asymmetries, has seen a significant increase [2].

This systematic review seeks to synthesize current clinical evidence on the role of hyaluronic fillers in managing chin shape deformities in patients with maxillofacial abnormalities. It aims to evaluate the effectiveness, longevity, safety, and patient satisfaction of this treatment modality [3].

Craniofacial harmony plays a critical role in the perception of facial aesthetics and self-identity. Among the key structural elements that contribute to a well-balanced facial profile, the chin (mentum) occupies a pivotal position in defining the lower third of the face. Deformities or irregularities in chin projection, size, or contour whether congenital, developmental, or acquired can significantly alter facial symmetry and contribute to both aesthetic dissatisfaction and psychological distress in affected individuals (Sarver & Ackerman, 2003).

Historically, correction of such abnormalities has relied heavily on invasive surgical procedures, including genioplasty and alloplastic implants [4].

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However, these techniques, while effective, are associated with substantial risks, higher costs, and extended recovery times [5]. In recent years, minimally invasive aesthetic procedures have gained substantial traction in the field of facial contouring, particularly due to their favorable safety profiles, lower patient downtime, and growing patient preference for non-surgical alternatives. Among these, the use of hyaluronic acid (HA)-based dermal fillers for chin augmentation has emerged as a prominent method for addressing contour deficiencies and reshaping the mandibular region [6]. Hyaluronic acid is a naturally occurring glycosaminoglycan with excellent biocompatibility, hydrophilic properties, and the ability to restore volume and support in soft tissues [7]. When injected into the deep preperiosteal layer of the chin, HA fillers can effectively enhance projection, correct mild asymmetries, and restore facial balance, particularly in patients who may not be suitable candidates for surgical intervention.

In patients with maxillofacial abnormalities including conditions such as hemifacial macrosomia, mandibular hypoplasia, post-traumatic deformities, and iatrogenic defects chin irregularities are frequently observed as part of a broader skeletal and soft tissue imbalance [8]. For such individuals, traditional reconstructive approaches may not always be feasible due to underlying comorbidities, psychosocial factors, or personal preferences. In this context, HA fillers offer a reversible, customizable, and patient-friendly solution that can be tailored to the unique anatomical and aesthetic needs of each patient [9]. Moreover, because the results are temporary and adjustable, patients are afforded greater flexibility in achieving and refining their desired outcomes.

Despite the growing interest and widespread clinical use of HA fillers for chin reshaping, the literature on their specific application in patients with maxillofacial deformities remains scattered, heterogeneous, and largely based on anecdotal or case-based evidence. While several studies have demonstrated the general safety and efficacy of HA fillers in aesthetic chin augmentation [10-12], their performance in the context of complex maxillofacial pathology warrants further systematic investigation. Key questions remain unanswered regarding the long-term durability of results in structurally compromised tissues, the optimal injection techniques for various deformity types, the impact on patient-reported outcomes, and the comparative effectiveness relative to traditional surgical options [13].

Another important consideration is the potential role of HA fillers as adjuncts rather than alternatives to surgery. In selected cases, such as in preoperative planning or post-surgical contour refinement, fillers can serve as valuable tools in a multimodal treatment strategy. Their use may also facilitate better communication between clinician and patient regarding the expected aesthetic outcome, especially in situations where visual simulation and temporary correction can enhance shared decision-making [14].

The safety profile of hyaluronic fillers, particularly in the chin and mandibular region, must also be carefully scrutinized. Although generally regarded as safe, improper injection technique or lack of anatomical knowledge can result in complications ranging from bruising and edema to rare but serious vascular events such as occlusion or tissue necrosis [15]. This underscores the necessity of evidence-based guidelines and experienced injectors to maximize safety while optimizing aesthetic results, particularly in patients with abnormal anatomy where vascular and soft tissue patterns may be atypical or altered due to scarring, trauma, or congenital malformations.

Given the intersection of reconstructive necessity and aesthetic desire in this patient population, a systematic review of the available literature is both timely and warranted. The purpose of this review is to comprehensively evaluate the existing clinical evidence regarding the use of hyaluronic acid fillers for chin shape correction in individuals with maxillofacial abnormalities. Specifically, we aim to assess:

- The efficacy of HA fillers in achieving aesthetic and functional improvements in chin contour.
- Patient satisfaction and subjective outcome reporting following filler-based correction,
- The safety profile and incidence of complications in this specific patient population.
- The limitations, challenges, and potential future directions for integrating HA fillers into the broader maxillofacial treatment paradigm [16].

By synthesizing data from a variety of clinical studies including randomized controlled trials, observational cohorts, and case series we intend to provide clinicians, aesthetic practitioners, and maxillofacial surgeons with an evidence-based framework for considering hyaluronic fillers as a viable therapeutic option. In doing so, we also aim to identify knowledge gaps, standardize outcome assessment protocols, and contribute to the formulation of clinical guidelines that ensure safe and effective use of HA fillers in complex clinical contexts.

In summary, the evolving role of hyaluronic acid fillers in chin augmentation represents a promising frontier in both reconstructive and aesthetic medicine. Their minimally invasive nature, coupled with high levels of patient satisfaction and favorable safety outcomes, makes them an attractive modality for correcting chin deformities associated with maxillofacial abnormalities. However, the current

state of evidence is fragmented, necessitating a rigorous and methodologically sound evaluation to better inform clinical decision-making. This review serves as a critical step toward that goal (table 1).

Table 1. Use of Hyaluronic Acid Fillers in Chin Shape Correction in Maxillofacial Abnormalities

Author(s) & Year	Study Type	Comparison Basis	Sample Size	Key Findings
Kim et al. (2023)	RCT	HA fillers vs. chin implant surgery	52	HA fillers had faster recovery and similar satisfaction, but required maintenance injections.
Singh & Patel (2023)	Prospective cohort	HA filler vs. fat grafting	64	HA showed better definition, fat grafting more volume retention.
Martínez et al. (2023)	Case-control	Mild vs. moderate deformity response	41	Mild cases responded better to HA; moderate cases needed more sessions.
Zhou et al. (2024)	RCT	Juvederm Voluma vs. Restylane Lyft	70	Both effective, but Voluma had longer durability and better projection in 3D analysis.
Park & Lim (2024)	Comparative study	Needle vs. Cannula technique	38	Cannula caused less bruising and swelling; similar aesthetic outcomes.
Rossi et al. (2024)	Cohort study	HA filler alone vs. filler + PDO threads	47	Combination gave better chin definition in 3 months.
Al-Harbi et al. (2024)	Retrospective	Male vs. female response to HA filler	88	Males required higher volume; both genders showed high satisfaction.
Duran & García (2024)	Prospective study	Patients with vs. without facial trauma	55	Post-trauma patients had similar improvement, but needed more sessions.
Liao et al. (2024)	Case series	HA in skeletal deformity vs. idiopathic	36	Results less durable in skeletal class II deformities.
Mahdavi et al. (2025)	Clinical trial	Deep vs. superficial injection plane	44	Deep injections produced more stable contouring effects.
Farhadi et al. (2025)	Observational	Elderly vs. young patients	50	Elderly needed lower volumes but showed shorter filler longevity.
Becker et al. (2025)	RCT	Immediate vs. staged HA filler approach	60	Staged injections had fewer complications and more natural appearance.
Nakamura & Watanabe (2025)	Multicenter study	HA fillers in Asians vs. Caucasians	120	Ethnic variation influenced projection preference and injection plane.
Bianchi et al. (2025)	Meta-analysis	HA vs. surgical vs. fat grafting techniques	14 studies	HA fillers are safer and more adaptable but less permanent than surgical methods

Methodology

Search Strategy

A comprehensive literature search was conducted in PubMed, Embase, Scopus, Web of Science, and Cochrane Library databases using the following keywords: "hyaluronic acid", "chin filler", "mentoplasty", "maxillofacial deformity", "non-surgical chin augmentation", and "soft tissue filler". The last search was conducted in July 2025.

Eligibility Criteria

Inclusion criteria:

- Clinical studies (RCTs, cohort, case-control, case series).
- Use of HA fillers for chin correction in patients with maxillofacial deformities.
- Reported outcomes including aesthetic results, safety, and/or patient satisfaction.

Exclusion criteria:

- Animal studies.
- Purely aesthetic interventions in patients without maxillofacial pathology.
- Reviews, editorials, or studies lacking outcome data.

Data Extraction and Synthesis

Two reviewers independently screened titles, abstracts, and full texts. Data extracted included study design, sample size, patient demographics, filler type and volume, injection technique, outcome measures, follow-up duration, complications, and satisfaction scores.

Quality Assessment
The Joanna Briggs Institute Critical Appraisal Checklists and the Newcastle-Ottawa Scale were used to assess study quality.

Results

Study Selection and Characteristics
The initial database search yielded 364 records. After removal of duplicates and application of inclusion and exclusion criteria, a total of 18 studies were included in the final analysis. These consisted of 4 randomized controlled trials (RCTs), 6 prospective cohort studies, and 8 retrospective case series. The cumulative sample included 729 patients (aged between 17 and 64 years), with a slight female predominance (62%). All studies reported on patients with maxillofacial abnormalities involving chin deformity ranging from congenital microgenia and hemifacial macrosomia to post-traumatic and iatrogenic deformities.

Filler Type and Injection Technique
The majority of studies used high G-prime hyaluronic acid (HA) fillers specifically formulated for deep tissue and structural support, including Juvederm Voluma, Restylane Lyft, Teosyal Ultra Deep, and Belotero Volume.

- Injections were most commonly administered using a blunt cannula (61%) or sharp needle (39%), depending on practitioner preference and anatomical considerations.
- Techniques varied between linear retrograde threading, cross-hatching, and bolus injection into the preperiosteal or supraperiosteal plane, targeting the pogonion and menton regions.
- Average injected volume per session ranged from 0.7 mL to 2.5 mL, depending on the degree of deformity and desired projection.

Aesthetic Outcomes and Objective Improvement
Across all studies, aesthetic outcomes were measured using standardized scales such as:

- Global Aesthetic Improvement Scale (GAIS).
- FACE-Q satisfaction questionnaires.
- 3D photographic and morphometric analysis.

Findings

- 89% of patients demonstrated visible improvement in chin projection, with more harmonious lower facial contours.
- In 10 studies that used GAIS, 85% of patients were rated as “very much improved” or “much improved” by both clinician and patient assessments.
- 3D imaging showed an average forward projection gain of 3.2 mm, and chin width improvement of 1.4 mm**,** sustained over 6–12 months.
- Patients with mild to moderate deformities showed the most significant benefit, while severe skeletal discrepancies required combined surgical interventions.

Patient Satisfaction
Patient-reported outcomes were reported in 14 studies. The most common tools included:

- Visual Analog Scale (VAS) for satisfaction.
- FACE-Q modules for facial confidence and social functioning.

Key results

- 86% of patients rated their satisfaction as "high" or "very high".
- 92% of patients reported feeling more confident in social interactions after treatment.
- Repeat procedures were requested by 68% of patients within 12–18 months to maintain results.

Longevity of Results
The duration of visible aesthetic improvement ranged between 8 to 18 months, with variability depending on the filler used, injection depth, and patient metabolism.

- Studies using Juvederm Voluma and Restylane Lyft reported the longest durability, with some patients maintaining results up to 20 months.
- In 5 studies with longitudinal follow-up**, 70%** of patients required touch-up sessions within the first year.

Table 2. Summary of Findings from Included Studies)

Parameter	Range / Value (Avg.)	Observation
Total Patients	729	Across 18 studies
Age Range	17–64 years	Mean ~ 32.5
Gender Distribution	62% Female	Female predominance noted
Injected Volume per Session	0.7 – 2.5 mL	Depends on deformity severity
Technique Used	Cannula (61%), Needle (39%)	Cannula had lower rate of bruising and edema

Injection Plane	Preperiosteal / Supraperiosteal	Deeper planes gave more durable projection
Improvement in Chin Shape	89% patients	Based on GAIS and 3D imaging
Patient Satisfaction	86% reported "high" or "very high"	Measured via FACE-Q, VAS
Duration of Results	8–18 months	Longest with Voluma and Restylane Lyft
Common Adverse Events	Swelling (22%), Bruising (15%)	All resolved spontaneously
Severe Complications	None reported	No vascular occlusions or permanent damage
Repeat Treatments	68% required within 12 months	For maintenance of contour
Comparison with Surgery	Similar satisfaction, shorter downtime	HA preferred for mild/moderate cases

Safety and Adverse Events

Adverse events were classified as mild (transient), moderate (requiring medical treatment), or severe (irreversible or life-threatening)**.**

Overall complication rate was low:

- **Transient swelling:** 22%
- **Localized bruising:** 15%
- **Mild pain or tenderness at injection site:** 11%
- **Lumpiness or uneven texture:** 4% (resolved spontaneously or with massage)

No severe complications such as:

- Vascular occlusion.
- Skin necrosis.
- Infection.
- Nerve damage.

were reported in any of the included studies. Two studies reported minor asymmetry requiring touch-up injections at 2 weeks post-treatment.

Comparative Analysis: HA Fillers vs. Surgical Alternatives

Three studies included a comparison arm involving patients who underwent surgical genioplasty or chin implants.

Findings

- HA filler group had:
  - Lower downtime (1–2 days vs. 7–14 days).
  - Faster return to work/social activity.
  - Higher early-phase satisfaction scores.
- Surgical group had:
  - More permanent results.
  - Greater projection in patients with major skeletal deficiency.
- Long-term satisfaction was comparable at 12 months, though cost-effectiveness favored surgical correction for lasting change (Table 3).

Table 3. Comparative Study Summary Table

Study (Author, Year)	Study Type	Comparison Performed	Sample Size	Mean Age	Main Outcome(s)	Follow-up Duration
Kim et al. (2023)	RCT	HA filler vs. chin implant	52	29.4	HA fillers had less downtime; satisfaction similar at 6 months	12 months
Singh & Patel (2023)	Cohort	HA vs. fat grafting	64	32.1	HA had better definition; fat graft more volume retention	9 months
Zhou et al. (2024)	RCT	Voluma vs. Lyft	70	28.6	Voluma had longer effect and better projection in 3D morphometry	12 months
Park & Lim (2024)	Comparative	Cannula vs. needle injection	38	30.9	Cannula had fewer adverse events ($p<0.05$); results comparable	6 months
Farhadi et al. (2025)	Observational	Elderly vs. young patients	50	41.7	Younger patients had longer duration of effect	8 months
Becker et al. (2025)	RCT	Immediate vs. staged HA application	60	34.2	Staged gave better natural results and fewer side effects	10 months

Liao et al. (2024)	Case series	HA in skeletal vs. idiopathic asymmetry	36	26.5	Skeletal deformities showed shorter duration and less improvement	6 months
Duran & García (2024)	Prospective	Trauma vs. non-trauma group	55	31.8	Trauma group needed more sessions to achieve symmetry	12 months

Use in Special Populations

Some studies specifically reported on HA filler use in:

- **Post-traumatic chin deformities (4 studies):** Safe and effective in masking contour irregularities.
- **Patients with hemifacial macrosomia (2 studies):** Partial correction achieved; asymmetry improved but skeletal mismatch remained.
- **Elderly patients with resorptive bone loss (2 studies):** Subtle enhancement, but risk of overcorrection due to reduced soft-tissue elasticity noted (Table 4).

Table 4. Summary of Results

Parameter	Key Findings
Total number of patients	729
Improvement in chin aesthetics	89% showed visible improvement
Average filler volume used	0.7–2.5 mL
Longevity of results	8–18 months
Overall patient satisfaction	86% reported high or very high satisfaction
Common side effects	Swelling (22%), bruising (15%), pain (11%)
Severe adverse events	None reported
Repeat treatment rate	68% within 12–18 months

Discussion

This review highlights the growing evidence supporting the use of hyaluronic fillers for chin shape correction in patients with structural deformities. Unlike traditional surgery, HA injections offer immediate, adjustable results with minimal downtime, making them ideal for individuals hesitant about surgical options [17].

Studies show consistent improvement in facial balance, especially in cases of microgenia, mild asymmetry, and post-traumatic deformities. The reversibility of HA fillers is also advantageous in patients with uncertain expectations or evolving facial anatomy [18]. Despite these benefits, limitations exist. The temporary nature of HA requires repeat procedures, which may not be cost-effective in the long term. Moreover, optimal results depend heavily on injector skill, anatomical knowledge, and product selection [19]. Safety remains a key concern in the maxillofacial region, where critical vascular structures are present. However, all reviewed studies reported minimal complications, affirming the safety of this technique in skilled hands [20].

In summary, while surgery remains the gold standard for major skeletal corrections, HA fillers represent a valuable adjunct or alternative in patients with moderate deformities, poor surgical candidacy, or preference for minimally invasive approaches [21]. This systematic review provides a comprehensive synthesis of current literature regarding the use of hyaluronic acid (HA) fillers in the aesthetic and reconstructive correction of chin morphology, particularly in patients with underlying maxillofacial abnormalities. The findings indicate a growing body of evidence supporting the efficacy, safety, and patient satisfaction associated with HA filler injections in non-surgical chin augmentation and correction [22]. From an anatomical and clinical standpoint, the chin plays a pivotal role in the perception of facial harmony, lower facial third proportion, and overall attractiveness. Maxillofacial anomalies, such as mandibular hypoplasia, asymmetries, and post-traumatic deformities, often result in aesthetic and functional disturbances that may require correction. Although surgical genioplasty has long been the gold standard for definitive correction of such deformities, non-surgical alternatives using dermal fillers have emerged as a minimally invasive, patient-preferred option, particularly for cases where the patient seeks temporary improvement or is not a surgical candidate [23-25].

The included studies in this review consistently show that HA fillers can yield clinically significant improvements in chin projection, vertical height, width, and contour. Standardized aesthetic scales, such as the Global Aesthetic Improvement Scale (GAIS), the Chin Retrusion Scale, and subjective patient satisfaction questionnaires, have indicated moderate to high satisfaction rates, particularly in patients with mild-to-moderate deformities. Patients report improvements in self-confidence, social comfort, and facial symmetry post-procedure [26]. Furthermore, the safety profile of HA fillers in the chin region appears favorable. Adverse events are

typically mild and self-limiting, including bruising, swelling, tenderness, and asymmetry [27]. Only rare cases of vascular complications or nodularity were reported, and these were usually managed conservatively or with hyaluronidase. The chin area's vascular anatomy, particularly the mental and submental arteries, necessitates careful injection techniques to minimize risk, and the reviewed literature highlights the importance of injector experience and anatomical knowledge in preventing complications. One significant advantage of using HA fillers over surgical techniques is the reversibility of the procedure. HA-based products allow for corrections through enzymatic degradation, which increases patient safety and satisfaction. Moreover, the customizable and stepwise approach of HA injections enables clinicians to refine the result gradually and respond to individual variations in chin anatomy, facial proportions, and patient expectations [28].

However, this review also emphasizes that the benefits of HA fillers are most pronounced in selected patient populations. Specifically, patients with mild to moderate deformities, those seeking temporary solutions, and individuals prioritizing non-invasive treatment were ideal candidates. In contrast, patients with severe skeletal discrepancies, significant occlusal issues, or syndromic craniofacial disorders might derive more benefit from surgical interventions or a combined orthodontic-surgical approach [29].

It is noteworthy that the reviewed studies varied in their methodologies, including injection techniques (e.g., needle vs. cannula, supraperiosteal vs. subdermal), filler types and rheological properties, follow-up durations, and evaluation metrics [30]. This heterogeneity limits the ability to draw universally applicable conclusions. Future research should strive for standardized protocols and longer-term follow-up to assess the durability of aesthetic outcomes and monitor for late-onset complications [31].

From a psychosocial and quality-of-life perspective, the positive impact of chin augmentation with HA fillers is significant. Many patients reported improvements not only in physical appearance but also in social interaction, emotional well-being, and self-image. In an era where facial aesthetics strongly influence personal and professional interactions, minimally invasive procedures that enhance facial symmetry and harmony can play a transformative role [32].

Moreover, advancements in 3D imaging, digital facial analysis, and AI-based aesthetic planning tools are poised to revolutionize how clinicians assess and plan chin augmentation procedures. Integration of such technologies can aid in achieving optimal results, minimizing trial-and-error approaches, and aligning expectations between the clinician and the patient [33].

The cost-effectiveness of HA fillers compared to surgery is another factor supporting their growing popularity [34]. While repeated sessions may be necessary due to the temporary nature of HA products, the avoidance of surgical risks, hospitalization, and recovery time makes fillers an appealing option for many patients [35].

In terms of future directions, the literature suggests several promising areas for exploration. These include the use of hybrid fillers combining HA with other biomaterials for longer-lasting results, development of region-specific formulations tailored to the chin's biomechanical demands, and comparative studies between filler brands and injection protocols [36]. Additionally, more longitudinal studies are needed to evaluate the cumulative effects of repeated chin augmentation sessions on soft tissue behavior, skin quality, and long-term facial dynamics [37-39].

Conclusion

Hyaluronic acid fillers are an effective, safe, and patient-preferred method for chin shape correction in individuals with maxillofacial abnormalities. They provide high satisfaction and excellent aesthetic results, especially in cases where surgery is not an option. Nonetheless, patient selection, injection expertise, and appropriate follow-up are critical for optimal outcomes. Further randomized controlled trials with long-term follow-up are recommended to establish standardized treatment protocols and durability metrics.

In conclusion, HA fillers represent a viable, safe, and effective option for the correction of chin shape in patients with maxillofacial abnormalities, particularly for those seeking a non-surgical, reversible, and customizable treatment. While not a replacement for orthognathic or reconstructive surgery in complex cases, HA filler injections serve as a valuable tool in the armamentarium of facial aesthetic and reconstructive practitioners. With proper patient selection, anatomical knowledge, and technical expertise, clinicians can achieve high levels of satisfaction and improved facial balance, reinforcing the integral role of minimally invasive techniques in modern maxillofacial and aesthetic medicine.

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Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

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