

# Hyaluronic Acid Filler Usage and Technique for the Facial Upper Third: A Comprehensive Review

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**Background:** Facial aging entails complex alterations across various tissues, prompting individuals to seek aesthetic interventions. The anatomical complexities of the facial upper third and its proximity to vital vascular structures provide inherent risks. We aim to identify and elucidate the safety considerations and avenues for improvement regarding established injection sites and techniques for hyaluronic acid fillers in this area, encompassing the forehead and temporal region.

**Methods:** We conducted a comprehensive literature search across PubMed, Embase, LILACS, and OpenGrey. Eligible studies were analyzed for injection sites, techniques, safety considerations, and anatomical landmarks. Qualitative synthesis and critical appraisal were used to identify trends, variations, and areas of consensus or controversy. Additionally, medical illustrations were created to deliver a practical overview. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews checklist and the Joanna Briggs Institute's scoping review recommendations.

**Results:** We included 7 studies in the review. Common injection sites included frontal and temporal regions, with variations in techniques noted across studies. Trends in filler placement and techniques were observed alongside several areas of controversy requiring further investigation.

**Conclusions:** We underscore the absence of a standardized approach to hyaluronic acid filler injection sites and techniques for the facial upper third. Integrating anatomical knowledge with empirical evidence will be paramount in developing standardized techniques that prioritize patient safety and enhance treatment efficacy. (*Plast Reconstr Surg Glob Open* 2025;13:e6668; doi: [10.1097/GOX.0000000000000668](https://doi.org/10.1097/GOX.0000000000000668); Published online 28 April 2025.)

## INTRODUCTION

Facial aging encompasses a complex interplay of several facial tissues, including bones, muscles, ligaments, fat, and skin.<sup>1</sup> Each tissue ages independently and at a different rate, yet the visible signs of aging are universally evident. Soft tissue descent, volume loss, skin texture, and color changes drive individuals to seek aesthetic treatments.<sup>2</sup>

Contemporary treatment approaches targeting the midface draw on recent research insights, including concepts involving ligament lines, biomechanics of facial fat

compartments, and facial fascial layers.<sup>3</sup> However, focusing solely on the midface might not yield the most natural aesthetic results, as existing treatment algorithms often overlook the true causes of facial aging. Recently, attention has shifted from addressing the midface directly to other facial areas despite the primary objective of improving midface appearance.<sup>4</sup> The temporal region emerges as a promising area for inducing comprehensive facial effects.<sup>5,6</sup> Aging-related changes in this region, such as volume loss, increased visibility of specific facial structures, and alterations in the upper zygomatic arch, contribute significantly to an aged facial look.

Injection therapies targeting the temple have shown positive results on the forehead and the medial and lateral midface, showcasing the temple as a potent area for overall facial improvements.<sup>7</sup> However, the temple's intricate anatomy has led to the description of various

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injection techniques, each with distinct aesthetic outcomes. Furthermore, the temple's proximity to critical vascular territories, such as the internal and external carotid plexuses, the venous plexus, and the internal jugular vein, contributes to a higher risk of visual complications.<sup>8</sup>

Addressing the forehead and the area between the eyebrows deserves more attention, as their combination can significantly improve the tired and sad appearance often associated with aging. Forehead fillers remain an area that, in our experience, many doctors do not extensively treat, highlighting the need to develop an optimal approach that benefits patients and injectors alike. This article aims to identify and elucidate the safety considerations and avenues for improvement regarding established injection sites and techniques for treating these areas, providing visible benefits to patients while requiring advanced technical skills from the injector.

## METHODS

The study protocol was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews checklist in addition to the scoping review recommendations of the Joanna Briggs Institute.<sup>9,10</sup> It is registered on the Open Science Framework website as "Scientific evidence of hyaluronic acid fillers in anatomical defect correction in upper face: a scoping review."

For inclusion in the review, articles needed to be original research papers, systematic reviews, meta-analyses, posters, or abstracts demonstrating the utilization of hyaluronic acid fillers in the upper facial region. We limited the publication date from 2015 to March 2024 and did not impose any language restrictions. Articles were excluded if they did not correspond with the study's conceptual framework or concentrate on the designated outcomes. Additionally, letters to the editor and editorial comments were excluded.

We conducted a comprehensive retrieval using 3 primary databases and snowball methodology. The search strategies used were as follows: in PubMed, we used the search query ("dermal fillers"[MeSH] OR "hyaluronic acid"[MeSH]) AND upper face AND "injections, subcutaneous"[MeSH]. For Embase and LILACS, the search strategy comprised (dermal fillers OR hyaluronic acid) AND upper face AND injections, subcutaneous. These strategies were tailored to retrieve relevant literature on dermal fillers, hyaluronic acid, upper face treatments, and subcutaneous injections from each database. For study selection, "upper face" was defined as the facial region starting from the hairline superiorly and ending just under the lower eyelid; the lateral borders of the upper face terminate around the temporal region. The upper third of the face contains the forehead, eyes, and temporal region.<sup>11</sup> Three independent researchers conducted the study selection process, and any discrepancies were resolved through consensus discussion with a fourth reviewer.<sup>9,12,13</sup>

## Takeaways

**Question:** What are the established injection sites and techniques for hyaluronic acid fillers in the facial upper third, and what safety considerations and potential areas for improvement do they present?

**Findings:** Considerable variations in injection sites and techniques were noted across studies, underscoring the absence of a standardized approach and the controversy regarding their safety.

**Meaning:** Integrating anatomical knowledge with empirical evidence will be paramount in developing standardized techniques that prioritize patient safety and enhance treatment efficacy.

Once the studies were compiled, duplicates were identified, and references were screened independently based on their titles and abstracts. Studies that fulfilled the inclusion criteria were subsequently reviewed in their entirety. Data were extracted, including author, year, journal, study type, objectives, type of hyaluronic acid and dose, technique, indication, efficacy outcome, and adverse effects. The web application Rayyan was used in the duplicate removal and screening processes.

## RESULTS

Our literature search retrieved 43 studies from the selected database. Seven were duplicates, 21 publications were excluded, and 5 were included (Fig. 1). Additionally, 2 studies were included based on snowball methodology. (See table, Supplemental Digital Content 1, which provides the main findings for each study, <http://links.lww.com/PRSGO/D951>.) These originate from different regions worldwide, mostly comprising literature reviews and narratives where authors propose different functional filler administration techniques in the upper face.<sup>1,2,14–18</sup> Tenderness; bruising; accidental intravascular injections in critical areas, such as the nasal dorsum, leading to skin necrosis; and the risk of permanent blindness were among the most common adverse events.<sup>2,14,16,17</sup> Volumizing techniques in the temple and glabellar region also exhibit distinct risks, ranging from increased venous visibility, potential hematomas, severe arterial injuries, and blindness.<sup>2</sup>

Although there is no standardized administration technique, most of the 7 identified studies emphasize the importance of using proper filler administration techniques in the upper face to prevent and promptly identify adverse events. This underscores the critical role of precise injection techniques and careful filler selection in mitigating such risks. The articles discovered present diverse approaches, summarized as follows.

### Temporal Techniques

Figure 2 presents the skin access points for temporal filler injection techniques.

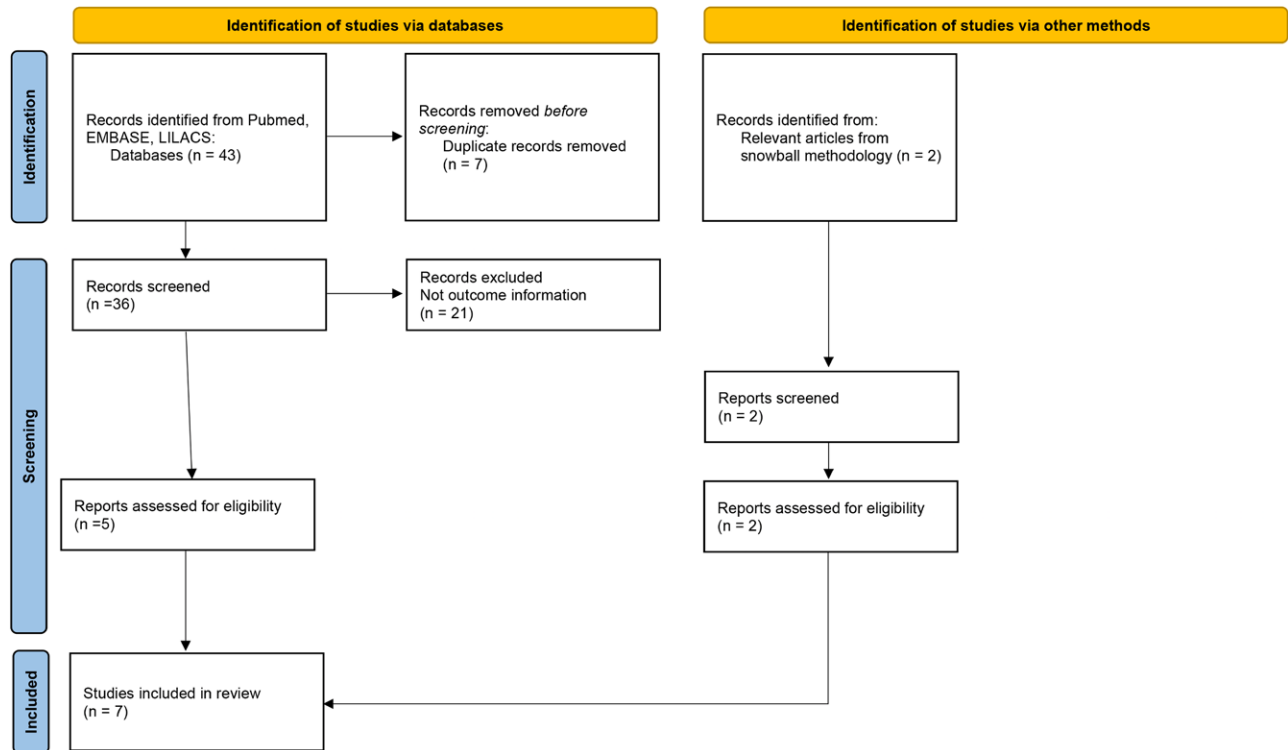


Fig. 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram.

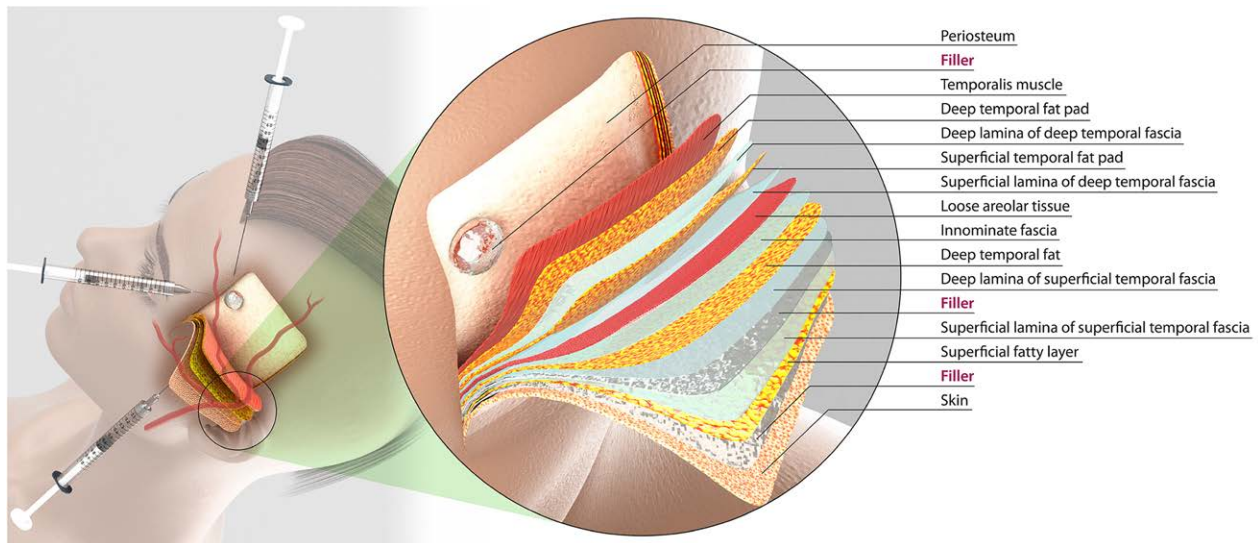


Fig. 2. Skin access points for temporal filler injection techniques.

### Upper Third for Volume Technique

The product should be applied to the superficial fatty layer.

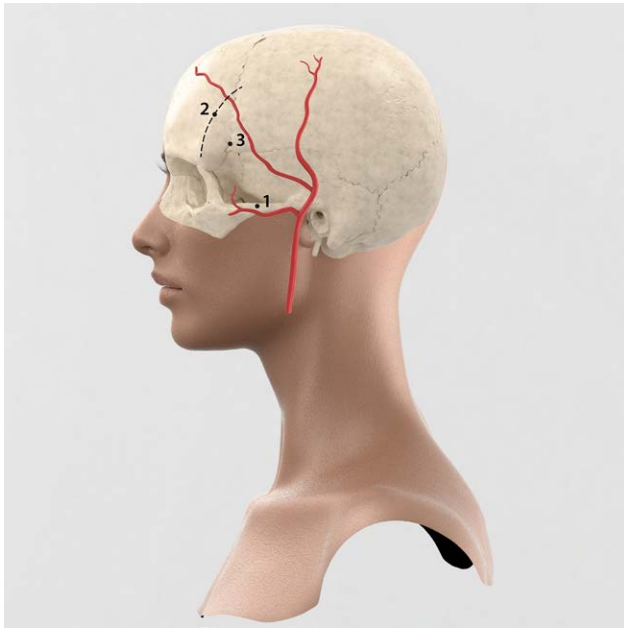
- Clinical indication: Mild volume loss in the anterior temporal region leads to increased temporal crest visibility.
- Procedure: Access point at the medial portion of the zygomatic arch, 22 × 50 cannula, enters in a subdermal plane with retrograde fan-like administration

throughout the area. A low  $G'$  product for medium viscoelasticity and medium cohesiveness is preferred. It is suggested to inject less than 0.7 mL (Fig. 3, number 1).

- Risks: External compression may make veins visible and typically resolves spontaneously.

### Interfascial for Volume Technique

The product should be applied between the superficial and deep laminae of the superficial temporal fascia



**Fig. 3.** Risk areas for filler injection with temporal techniques. Number 1: The presence of the deep anterior temporal artery and multiple periosteal vessels in the suprapariosteal plane of the anterior temporal region poses a risk during injectable procedures due to the potential for inadvertent vascular injury. The suprapariosteal plane, where these vessels reside, is relatively shallow and closely associated with the overlying skin and subcutaneous tissues. Number 2: The anatomical arrangement of the sentinel vein (middle temporal vein) and the superficial temporal artery between the superficial and deep laminae of the superficial temporal fascia poses a risk during injectable procedures due to their vulnerability to inadvertent injury. Number 3: Although providing some degree of protection, the superficial temporal fascia may not be sufficient to shield these vessels from accidental needle penetration, particularly if the injection site is near their emergence points. An inaccurate injection technique or lack of understanding of facial anatomy increases the likelihood of inadvertently puncturing these vessels during the procedure.

of the anterior temporal region; this layer continues with loose areolar tissue of the scalp and forehead.

- Clinical indication: Mild to moderate volume loss in the anterior temporal region with increased visibility of the temporal crest; also capable of lifting the brow tail with this technique.
- Procedure: The access point can be on the forehead, 1 cm below the hairline, 1 cm medial to the temporal crest, or from the scalp. Any position medial to the temporal crest provides access to the deep lamina of the superficial temporal fascia if the cannula tip is in contact with the bone while advancing. The procedure uses a 22 × 50 cannula and retrograde fan-like administration. Entering from the zygomatic arch is not recommended, as it cannot ensure reaching this layer. It is recommended to inject less than 1 cc (Fig. 3, number 2).
- Risks: The sentinel vein (middle temporal vein) and the superficial temporal artery emerge between these layers. If traumatized, it can generate a significant hematoma requiring immediate compression. The

frontal branch of the facial nerve is also located in this plane. There are no reports of nerve damage; however, temporal brow ptosis due to product anesthesia has been observed.

#### *Suprapariosteal Lower for Volume Technique*

The product is applied in the suprapariosteal plane of the anterior temporal region, in the superficial temporal fat pad, as an intramuscular deposit of the product.

- Clinical indication: Moderate to severe volume loss in the anterior temporal region with increased visibility of the temporal crest; also aids in lifting the brow tail.
- Procedure: The access point is identified by locating the supraorbital tubercle, then following the temporal crest 1 cm cranially. From the temporal crest, 1 cm lateral at a 90-degree angle identifies the access point (one up, one over).<sup>15</sup> A 27G needle is inserted perpendicular until it touches the bone. Aspiration is necessary before slowly applying the product. Using less than 1 cc of a high G' product for medium viscoelasticity and medium cohesiveness is recommended. Maintain constant contact with the bone, stabilizing the syringe with the nondominant hand. It is better to have the patient seated and ask them to open their mouth. Patients may experience postinjection headaches and discomfort with chewing (Fig. 3, number 3).
- Risks: The deep anterior temporal artery and multiple periosteal vessels are in this area. Postinjection compression for 1 minute is recommended. Choosing the entry point carefully to avoid the superficial temporal artery is crucial. Reports indicate product migration into the orbit when the access point is too low or anterior. These risks escalate if more than 1 cc is applied.

#### *High Suprapariosteal for Volume Technique*

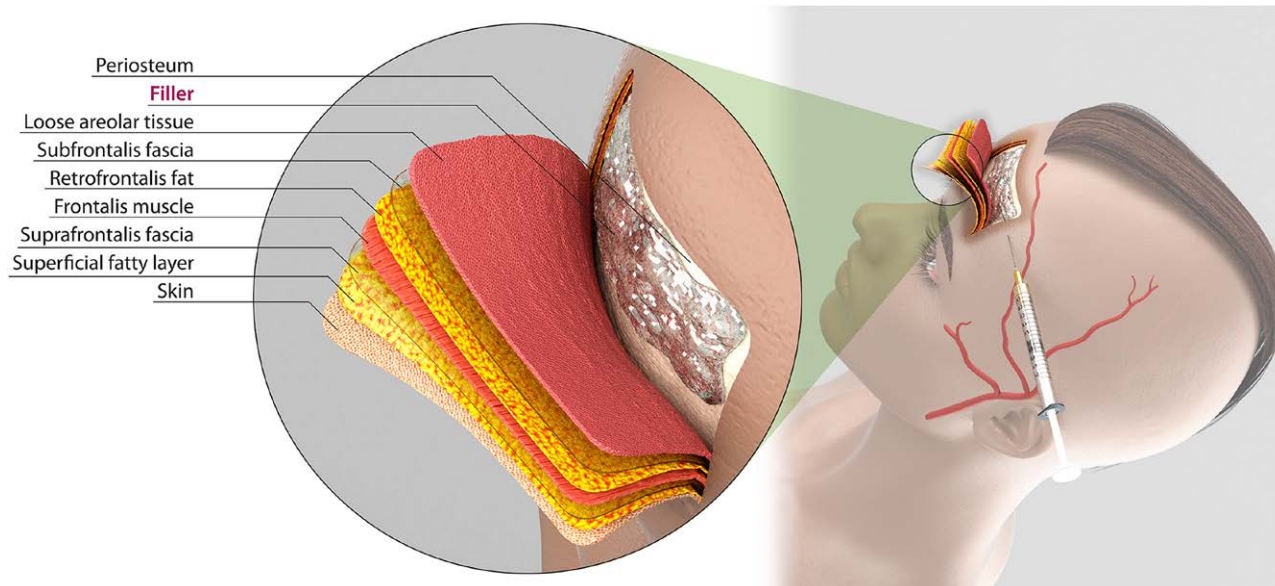
Previously published as part of an aesthetic concept that addresses the entire face with 3 dermal access points (3-point full face).<sup>18</sup>

- Procedure: The skin access point is 1 cm below the temporal crest along a vertical line 1 cm posterior to the lateral orbital rim. A 27G needle is inserted perpendicular until it contacts the bone and then directed cranially at a 45-degree angle. Aspiration is performed, followed by slow application of the product. Less than 1 cc is recommended with a high G' product for medium viscoelasticity and medium cohesiveness, maintaining constant contact with the bone throughout the procedure.
- Risks: The arterial diameter is believed to be smaller in this location.

#### *Frontal Techniques*

Skin access points for frontal filler injection techniques are presented in Figure 4. When using hyaluronic acid fillers to augment the frontal area's fat compartments, the preferred method for the authors is the cannula, although using a syringe is feasible with an understanding of anatomy. Given the area's scant or minimal fat layer, it is





**Fig. 4.** Skin access points for frontal filler injection techniques.

crucial to determine the best approach for safe treatment. It is important to note that after exiting the supratrochlear and supraorbital foramina, the supratrochlear and supraorbital arteries run approximately 1.5 cm deep into the muscle layer before coursing superficially over the muscles, extending to the upper third.

- **Clinical indication:** This technique addresses the frontal area's mild to severe volume loss. It is utilized for both young and mature patients. Women often exhibit convexity in the upper face, providing a natural and feminine appearance. For male patients, the goal may involve reducing concavity in deeper areas that require volume restoration.

#### *Syringe Technique*

**Precision.** The syringe technique enables precise filler placement, which is ideal for intricate work or specific areas.

**Drawbacks.** This method requires a steady hand by the injector to administer the filler as a bolus, followed by massaging the area. Postmassage, slight irregularities may persist, resolving over time, albeit taking longer than with the cannula technique.

#### *Cannula Technique*

**Reduced trauma:** Entry is near the frontotemporal crest next to the eyebrow tail, running perpendicular to vessels and arteries. Cannulas are typically no smaller than 25G × 38 mm; some practitioners prefer larger sizes (22G × 50). The cannula trajectory extends to the mid-frontal area beneath the frontal muscle, reaching the bone. Once positioned, the product is dispersed using a fanning or retrograde technique. According to the authors, this method yields superior and safer outcomes (Fig. 5, number 4).



**Fig. 5.** Risk areas for filler injection with frontal techniques. Number 4: The superficial temporal artery's frontal branch is situated within the suprapariosteal plane of the anterior temporal area. It extends upward toward the frontal eminence of the frontal bone and anastomoses with the corresponding artery on the opposite side.

## **DISCUSSION**

Cosmetic procedures have evolved to offer less invasive options and more natural results.<sup>19</sup> Hyaluronic acid application has established itself as an effective option for improving skin appearance and generating a rejuvenating effect.<sup>20</sup> Given that the face is one of the body parts where aging signs are most pronounced and always visible, its application to the face assumes particular significance. This literature review compiled the available evidence on

the various injectable administration techniques of this component, both in the temporal and frontal regions.

The studies included in this review consisted of 3 narrative reviews, 2 literature reviews, and 2 anatomical studies, which included the indications for hyaluronic acid application and reported adverse effects.

The compiled evidence indicates that different hyaluronic acid application techniques exist, and there is no evidence of a standardized procedure. This is an important finding, as aesthetic procedures are becoming increasingly popular, with an annual increase of 33%.<sup>21</sup> Therefore, it is crucial for aesthetic centers to implement these techniques uniformly, promoting the selection of the most effective and safe procedures for patients.

To minimize risks and increase the probability of a pleasant result for patients, the personnel in charge must consider certain facial areas that can be considered at risk because they are vascularized, and a bad technique can generate adverse effects and an unsatisfactory result. Experts recommend injecting filler into the deep spaces of the face, considering areas at risk of vascular invasion and penetration of nearby anatomical structures.<sup>22</sup> The areas of greatest risk have been identified in the temporal region, glabella, nose, infraorbital region, nasolabial folds and nasal triangle, lips, and chin.<sup>14</sup>

As a result, it is necessary to emphasize the importance for the personnel who apply these injections to consider the depth of the injection and the anatomy of the face, as well as tools that will allow them to choose the technique that generates the best risk-benefit effect. In the temporal and frontal areas, 4 and 2 application techniques were described, respectively. Each of these techniques has different levels of complexity and favorable or unfavorable effects. The choice of technique will depend on several factors: the areas to be treated, the indication for the injection, the supplies required, the risks, and the strategic points to achieve the desired effects; all the above are based on the patient's preferences.

Depending on the area of choice, in the temporal region, it is important to consider that the fascia is thin, and neurovascular risks are configured.<sup>23</sup> Transitory paresthesia has been described in this region,<sup>24</sup> in addition to the presentation of hematomas and obstruction of blood vessels.<sup>25</sup> In this area, it is important to emphasize the importance of taking care of the facial vasculature.

On the other hand, when considering the application of filler to the frontal area of the face, dilemmas arise between using a needle or a cannula. This decision can be based on a variety of factors, including the injection site, the type of filler, the patient's preferences, and the practitioner's skills.<sup>26</sup> Although needles are simple to use, cheap, and offer better results on superficial wrinkles, they can cause tissue injury. Cannulas, however, offer a better safety profile, especially when injected deep into the bone, and can provide a more even distribution of filler material when filling large areas.<sup>26</sup>

The strengths of this literature review are the consolidation of information on the facial application of hyaluronic acid according to different techniques published in the world, offering a reading tool for professionals

interested in this area of aesthetic medicine as a support to improve decision-making in the implementation of injection techniques. One limitation of this study is the inclusion of only 7 studies in the final analysis. This limited number of studies may restrict the generalizability of our findings and highlight the need for further research to corroborate and expand upon our results. The small number of included studies could be attributed to the limited availability of high-quality research on this specific topic. Encouraging the publication of high-quality studies on this topic through academic journals and conferences will contribute to a more robust evidence base for subsequent analyses.

Generally, more research is required to adequately compare these modalities. Physician discretion should guide the choice of procedure until future well-controlled studies can provide standardized results.

## CONCLUSIONS

We examined articles exploring filler utilization in the upper face, observing diverse administration methods proposed globally. Despite the absence of a standardized technique, the focus on precise administration to avert adverse effects was clear. Our study introduces a practical vision outlining our technique, aiming to standardize the procedure. This research offers an approach to administering upper face fillers, highlighting the critical importance of careful considerations for safer and more effective procedures.

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## DISCLOSURES

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## REFERENCES

1. Ingallina F, Alfertshofer MG, Schelke L, et al. The fascias of the forehead and temple aligned-an anatomic narrative review. *Facial Plast Surg Clin North Am.* 2022;30:215–224.
2. Cotofana S, Gaete A, Hernandez CA, et al. The six different injection techniques for the temple relevant for soft tissue filler augmentation procedures—clinical anatomy and danger zones. *J Cosmet Dermatol.* 2020;19:1570–1579.
3. Levesque AY, de la Torre JL. Midface anatomy, aging, and aesthetic analysis. *Facial Plast Surg Clin North Am.* 2015;23:129–136.
4. Trevidic P, Kaufman-Janette J, Weinkle S, et al. Injection guidelines for treating midface volume deficiency with hyaluronic acid fillers: the ATP approach (anatomy, techniques, products). *Aesthet Surg J.* 2022;42:920–934.
5. Casabona G, Frank K, Moellhoff N, et al. Full-face effects of temporal volumizing and temporal lifting techniques. *J Cosmet Dermatol.* 2020;19:2830–2837.

6. Zins JE, Grow J, Cakmakoglu C. Brow anatomy and aesthetics of the upper face. *Clin Plast Surg*. 2022;49:339–348.
7. Goodman GJ, Liew S, Callan P, et al. Facial aesthetic injections in clinical practice: Pretreatment and posttreatment consensus recommendations to minimise adverse outcomes. *Australas J Dermatol*. 2020;61:217–225.
8. Machado RA, Oliveira LQ, Martelli-Júnior H, et al. Adverse reactions to the injection of face and neck aesthetic filling materials: a systematic review. *Med Oral Patol Oral Cir Bucal*. 2023;28:e278–e284.
9. Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169:467–473.
10. The Joanna Briggs Institute. *Joanna Briggs Institute Reviewers' Manual 2015 Methodology for JBI Scoping Reviews*. The Joanna Briggs Institute; 2015. Available at <https://reben.com.br/revista/wp-content/uploads/2020/10/Scoping.pdf>. Accessed August 11, 2023.
11. Nguyen JD, Duong H. *Anatomy, Head and Neck: Face*. StatPearls. 2023. Available at <https://www.ncbi.nlm.nih.gov/books/NBK551530/>. Accessed December 26, 2023.
12. Ouzzani M, Hammady H, Fedorowicz Z, et al. Rayyan-a web and mobile app for systematic reviews. *Syst Rev*. 2016;5:1–10. Available at <https://systematicreviewsjournal.biomedcentral.com/articles/10.1186/s13643-016-0384-4>. Accessed August 11, 2023.
13. Moher D, Shamseer L, Clarke M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev*. 2015;4:148–160. Available at <https://pubmed.ncbi.nlm.nih.gov/25554246/>. Accessed August 11, 2023.
14. Wollina U, Goldman A. Facial vascular danger zones for filler injections. *Dermatol Ther*. 2020;33:e14285.
15. Sykes JM, Cotofana S, Trevidic P, et al. Upper face: clinical anatomy and regional approaches with injectable fillers. *Plast Reconstr Surg*. 2015;136:204S–218S.
16. Juhász MLW, Marmur ES. Temporal fossa defects: techniques for injecting hyaluronic acid filler and complications after hyaluronic acid filler injection. *J Cosmet Dermatol*. 2015;14:254–259.
17. Haiavy J, Elias H. Injectable fillers in the upper face. *Atlas Oral Maxillofac Surg Clin North Am*. 2016;24:105–116.
18. Freytag DL, Frank K, Haidar R, et al. Special topic facial safe zones for soft tissue filler injections: a practical guide. *J Drugs Dermatol*. 2019;18:896–902.
19. Jacobovsky D. Rejuvenecimiento facial. *Rev Med Clin Condes*. 2010;21:99–106.
20. Bravo B, Correia P, Gonçalves Junior JE, et al. Benefits of topical hyaluronic acid for skin quality and signs of skin aging: from literature review to clinical evidence. *Dermatol Ther*. 2022;35:e15903.
21. International Society of Aesthetic Plastic Surgery. Encuesta global anual sobre procedimientos estéticos/cosméticos. 2021. Available at <https://www.isaps.org/media/fkgnkkr/2021-global-survey-press-release-spanish-latam.pdf>. Accessed September 12, 2024.
22. Hong GW, Hu H, Park Y, et al. Safe zones for facial fillers: anatomical study of subSMAS spaces in Asians. *Diagnostics*. 2024;14:1452.
23. Babakurban ST, Cakmak O, Kendir S, et al. Temporal branch of the facial nerve and its relationship to fascial layers. *Arch Facial Plast Surg*. 2010;12:16–23.
24. Othman S, Cohn JE, Burdett J, et al. Temporal augmentation: a systematic review. *Facial Plast Surg*. 2020;36:217–225.
25. Haneke E. Managing complications of fillers: rare and not-so-rare. *J Cutan Aesthet Surg*. 2015;8:198–210.
26. Al-Hage J, Galadari HI. The needle versus cannula debate in soft tissue augmentation. *Dermatol Clin*. 2024;42:69–77.