

Temporal Fossa Atrophy in Aesthetic Medicine: Anatomy, Classification, and Treatment

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Summary: Hyaluronic acid fillers indisputably represent an important tool for face rejuvenation and volume restoration. The temporal area has recently been considered as a potential site of injection. As it happens in the middle face and in other regions of the face, the temporal fossa changes according to the aging process. In a young person, the temple profile has a fullness aspect, and this contributes to giving the face a beautiful and healthy appearance. With age, the loss of volume leads the bone prominences to be visible. The aim of this article is to classify the temporal fossa atrophy and get better into the anatomy, identifying the ideal plane to inject in, through the use of a safe and reliable technique. Cadaver dissections have been performed to specifically describe the anatomy of the temple layer by layer. The authors' preferred technique, called interfascial by cannula implantation, is discussed. All the treated patients reported a good improvement by survey according to the Global Aesthetic Improvement Scale scale. No major complications were detected. No ecchymosis neither swelling were documented. Although further studies are necessary to broaden the casuistry and better verify the potentiality of this technique, the authors do believe that it could be considered a very reliable procedure with pretty consistent results, if supported by an adequate and imperative anatomical knowledge. (*Plast Reconstr Surg Glob Open* 2020;8:e3169; doi: 10.1097/GOX.0000000000003169; Published online 27 October 2020.)

INTRODUCTION

The fullness of the temporal area is considered a sign of youth and health. As the aging process passes, the temporal fossa tends to lose its typical convex appearance and turns into a depressed area.¹ As a result, the temporal crest and the zygomatic arch become visible, conferring a skeletal aspect to the face.

According to the clinical study of hundreds of patients, 3 grades of temporal atrophy were described, taking into account the relation between the tissues of the temple and the eyebrow tail. Grade 1 indicates an initial change of the shape in the temporal area, which becomes flatter even without the presence of an hollow. In grade 2, an hollow starts to appear, with a distance between 0 and 3mm from the most depressed point of the temporal fossa to the tangent line passing through the tail of the eyebrow. In grade

3, the concavity is further evident with a discrepancy of more than 3mm between these landmarks (Fig. 1).

METHODS

Six fresh-cadaver specimens were dissected to better understand the anatomy of the temporal fossa and to find out an ideal plane of hyaluronic acid (HA) implantation. Proceeding from the skin to the deep layers, 11 layers were identified: (I) skin; (II) subcutaneous fat; (III) superficial temporal fascia; (IV) deep fat; (V) superficial lamina of the deep temporal fascia; (VI) interlamina fat; (VII) deep lamina of the deep temporal fascia; (VIII) temporal extension of the Bichat fat; (IX) temporalis muscle; (X) lateral pterygoid muscle; and (XI) periosteum.

From March 2017 to March 2020, 57 patients were treated. The author's preferred plane of implantation was between the superficial and the deep temporal fascia (layer IV). The product used was a high cohesivity (2.6N.s) hyaluronic acid with a high G' (290 Pa).

In this article, the authors discuss their preferred technique, which consists of HA filler implantation between the superficial and the deep temporal fascia, named "Interfascial by Cannula Implantation" (ICI technique).

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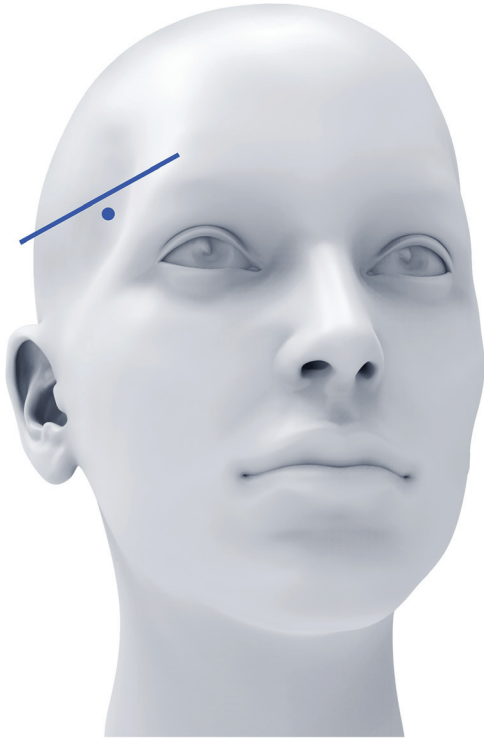


Fig. 1. Classification of the temporal fossa atrophy based on volume loss, measuring the distance between the most depressed point of the temporal fossa (blue dot) and the tangent line passing through the eyebrow tail (blue line). Grade 1: no distance between the blue line and the blue dot is detected. Grade 2: concave aspect of the temple with a 0–3 distance between the blue line and the blue dot. Grade 3: concavity with a distance between the blue line and the blue dot wider than 3 mm.

Several authors have described the above plane as a potential plane for filler injections.^{2,3} Here, the fat and the loose areolar tissue are located in an avascular plane,^{3,4} in a space that was previously described as a smooth gliding plane.⁴

The technique (see [Video \[online\]](#), in which the technical aspects of the described procedure is shown) involves the identification of the entry point just medial to the temporal crest, at least at 2 cm distance from the temporal ligamentous adhesion; a 25-G needle is used till it reaches the bone, and then a 25-G/5-mm cannula is inserted vertically down to the periosteum. Once the plane is achieved, the cannula is turned laterally to pierce the superior temporal septum and enters directly into the interfascial plane of the temporal fossa (between the superficial and the deep temporal fascia). The periosteum represents the continuation of the deep temporal fascia, whereas the frontalis muscle represents the continuation of the superficial temporal fascia.^{3,5} To ensure a safe entrance in the correct plane, it is advisable to move laterally after reaching the periosteum, using a technique much similar to the brow lift procedure. Once entered with the tip into the interfascial plane, a small quantitative of filler is injected; the absence of resistance confirms the correct plane depth. The product should always be injected slowly and steadily without a significant force.

RESULTS

A retrospective study was conducted on 50 patients (7 of them were excluded due to an incomplete photographic documentation). An estimated 35 of the treated patients were classified as grade 2, and 15 of them as grade 3. All the patients reported a high score of satisfaction according to the Global Aesthetic Improvement Scale scale evaluation. No major complications were detected. Neither ecchymosis nor swelling were documented.

In the grade 3 atrophy group, 2 of 15 patients reported a mild pain in the area of injection during the 48 hours post-treatment; yet no analgesics were required. The average amount of filler was 1.5 ml for grade 3 per side, and 1 ml for grade 2 per side. The median follow-up was 14 months and no touch-ups were needed.

DISCUSSION

Based on the anatomical dissections, fat compartments were found in 4 layers (II, IV, VI, and VIII). According to the literature, the nomenclature of these layers is pretty confusing^{5,6} because both the fat in layers II and VI is named “superficial,” and either the fat in layers IV or VIII is named “deep.”

Nonetheless, in our opinion, the use of the adjective “superficial” and “deep” should be solely reserved to layers II and IV because of their relation with the superficial fascia. “Interlaminar fat” is the name suggested for the fat of the layer VI, which is located between the superficial and the deep lamina of the deep temporal fascia. Finally, the last fat compartment (layer VIII) should be named retrozygomatic, due to its anatomical relation with the zygomatic arch. As known, the temporal zone is fraught with vessels⁷; therefore a precise knowledge of the whole vasculature should be acquired before injecting. In the literature, 3 potential planes for safe injection within the temporal fossa are described: subcutaneous, deep to the temporo-parietal fascia, and below the temporalis muscle, on the periosteum.²

Although some authors have not shown any vascular connection between the deep and the superficial temporal fascia,^{4,8} the presence of the medial zygomatico-temporal vein (sentinel vein) was constantly confirmed in all our dissected specimens. If the area close to the zygomatic bone needs to be filled, care should be taken to avoid damages to the medial zygomatic temporal vein, which seems to pierce the deep temporal fascia just behind the frontal-zygomatic suture or the zygomatic tubercle.

The vascular anatomy of the face is very complex. There are no safe areas. Yet, we are able to rely on safe planes. The interfascial plane (Fig. 2) is a rather avascular area, previously used as a reference plane for the surgical brow lift or for head and neck reconstruction procedures. In the literature, it is often described as an excellent dissection plane⁹; being it an avascular plane.⁸

Attention should be paid to avoid injury of the sentinel vein or the frontal branch of the facial nerve, which stands in the context of the temporal fascia^{4,6} on the roof of the injection plane.



Fig. 2. Anatomical view of the pretty avascular plane, which is the authors' preferred injection site.

CONCLUSIONS

To the best of our knowledge, there are no studies related to the classification based on a volumetric evaluation of the temporal atrophy. In the present study, the presence of the lateral pterygoid muscle (Fig. 3) was consistently found on the anteroinferior aspect of the temporal fossa in all the investigated cadavers.

Although the lateral pterygoid muscle does not have an active role in the temporal atrophy process, the authors believe that it should be added to the traditional layer subdivision of the temporal fossa.¹⁰ Hence, a specific and accurate nomenclature is proposed to define the fat layers of the temporal fossa (layer II: superficial fat, layer IV: deep fat, layer VI: interlaminal fat, layer VIII: retro-zygomatic fat).

Although further studies are required to widen the analysis and to better verify the potentiality of the ICI technique, the authors believe that the ICI technique can be considered a reliable procedure with pretty consistent results, when supported by an adequate and mandatory anatomical knowledge. The plane of injection enables a natural reshaping of the temple with a low risk of complications, such as vascular or nerve injuries, surface irregularities, and product migration.

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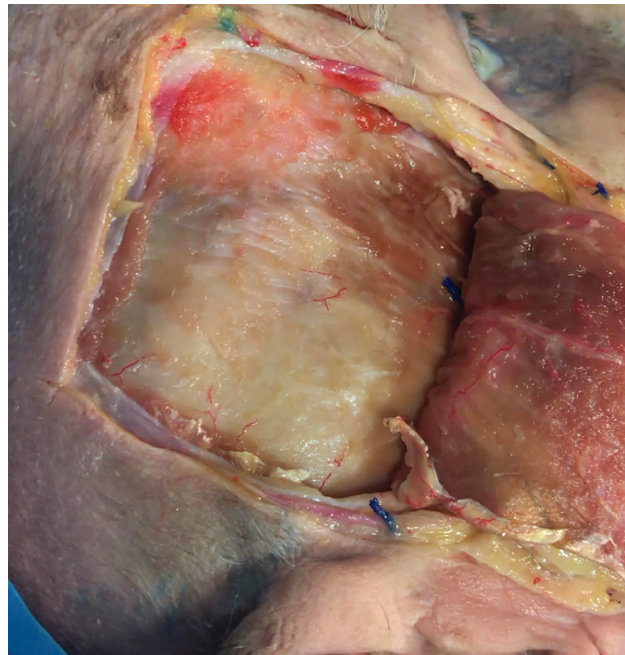


Fig. 3. The presence of the lateral pterygoid muscle on the anterior aspect of the temporal fossa. Our study is the first one in the literature to consider it as a part of the temporal area layers.

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