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Case report

Case report: temporal hollowness augmentation with PEGylated fillers

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ABSTRACT

The use of fillers based on hyaluronic acid in correcting deficits in the upper part of the face, especially in the temporal area, can significantly improve the balance and appearance of the face. Such a procedure, apart from unquestionable aesthetic advantages, carries significant risks, including contour irregularities, vascular occlusion, skin necrosis, hair loss, blindness, stroke, and non-thrombotic pulmonary embolism. To increase the safety and precision of the volumization of the temple area, the technique of administration of the preparation, as well as the product itself, should be carefully selected.

INTRODUCTION

The aging process of the face starts with the upper third, including modification of the bone structure temporal muscle, the obvious redistribution of superficial and deep temporal fat pads, and dermal and epidermal changes. The temporal area is an advanced treatable with fillers area, which requires experience and expertise to avoid collateral complications like intravascular penetration or any other adverse effect we want to avoid in our clinical practice. In Spain, many patients come for the mid-third but forget about the temporal area, which gives a skeletonized appearance of the face in many cases.

Temple hyaluronic acid filler volumization can improve the appearance of facial balance quickly, easily, and significantly (1). But as it is well known, unfortunately, it can also cause significant risks, including vascular occlusion, skin necrosis, hair loss, and blindness. To increase the safety and precision of the polymerization of the temple area, the administration of the preparation and the product itself should be carefully selected (2-4). Several methods and anatomic injection targets have been described to lower the risks and optimize aesthetic outcomes, such as supraperiosteal, interfacial, and subcutaneous (5, 6). In addition to mastering the injection methods, selecting the appropriate dermal filler and considering its physicochemical properties and safety profile seem crucial. Hyaluronic acid-based injectable fillers are the most widely used soft tissue fillers to treat facial volume deficits, providing long-term facial aesthetic enhancement outcomes for the signs of aging and/or facial contouring.

Polyethylene glycol polymer (PEG), used as a cross-linking agent in the hyaluronic acid-based fillers used in this, is creating the so-called PEGylation, seems to offer considerable advantages in terms of safety and performance of the HA gel (7-9). Both PEG and HA are polymers, and their cross-linkage allows the creation of matrices with scaffold structure (10-12) as a 3D web constituted by interpenetrated knots and links, thus offering a better filler integration into the connective tissue. Because of the PEGylation, the filler presents excellent adaptation and integration to the injected areas and anatomic structures. The filler appears uniformly distributed, with no segregation or encapsulation of cells and other structures (13).

The filler gives volume and support to the connective tissue as an injected substance. Still, due to the high content of polar groups and the molecular structure, it also has a positive associated effect linking an extraordinary quantity of water molecules (14). In this way, high hydration of the extracellular matrix of the connective tissue is increased and maintained, thus enhancing extracellular matrix permeability and the diffusion of nutrients from blood vessels to the whole skin as an organ, epidermis included, in a renewed homeostatic balance. At the same time, PEGylated hyaluronic acid has demonstrated a very low risk of immune-mediated adverse effects (15). This could be needed in our case because the patient was diagnosed with hyperthyroidism.

CASE REPORT

We describe a case that reported beneficial results with hyaluronic acid filler hydrogel crosslinked with polyethylene glycol diglycidyl ether in treating moderate temple hollowing loss. Following the principles of the Helsinki Declaration, the patient received information about the product and procedure and signed an informed consent form for the procedure and use of her data for scientific purposes.

- Healthy 47-year-old woman with the indication of moderate loss of the temple hollow.
- In March 2016, the patient was diagnosed with hyperthyroidism.
- In February 2018, after exacerbation of the disease, she underwent another treatment cycle until September 2020.
- In 2018, the patient suspended Tiamazol (Metimazol) oral treatment under the supervision of a specialist. She was also under the guidance of a medical team for homeopathic and natural treatments to control the disease and avoid further evolution.
- No further pathologies or alterations at the moment, and her disease is under control.
- In 2020, the patient underwent her first aesthetic procedure: botulinum toxin injections and treatments with dermal filler based on BDDE cross-linked hyaluronic (RHA technology) and injectable tissue filler based on calcium hydroxyapatite.
  According to the doctor and the patient, the durability of the treatments was very short and unsatisfactory.
- In 2022, two years after the first aesthetic treatment (middle and lower third), it was decided to focus on the upper third of the face, temporal and periorbital areas, to prevent the signs of aging and ensure a good-looking, harmonized natural effect.

In this case, it was decided to restore and correct moderate aging of the temporal area, with a very heavy loss of volume in the anterior area, a need for the contour of the lateral tip of the eyebrow, and the obvious need for temporal hollowness augmentation.

Products used

Neauvia Intense Flux (Matex Lab, Switzerland)
Neauvia Intense LV (Matex Lab, Switzerland)

Technique

Sandwich technique - infiltration of the temporal bone with 0.25 left side, 0.3 ml on the right side with Neauvia Intense LV, then Neauvia Intense Flux between layers 1-3 (superficial subdermal, 0.6 ml right side, 0.4 left side Cotofana anatomy distribution).

With 2 different products and a total of barely 1.5 ml, restoration, enhancement, and correction of the temporal area was achieved. With only 1 ml from Neauvia Intense Flux & Neauvia Intense LV 0.5 ml - a sandwich technique was applied, with good aesthetic effect - assessed by both the doctor and the patient (Fig. 1 and 2). Neauvia Intense LV 0.3 ml was used with gunshot technique on the right side and 0.25 ml on the left side. Additionally, to obtain an even better aesthetic effect and a holistic approach to the face, the remaining 0.25 ml of Neauvia Intense LV was used on the right side to increase, restore, and correct the

cheek augmentation and the fat compartments aging loss, the same we did on the left side using only 0.15 ml of the product.

Of course, a follow-up session would be highly appreciated, but the aesthetic results are very satisfactory with 1 session and less than 2 ml used for the entire treatment.

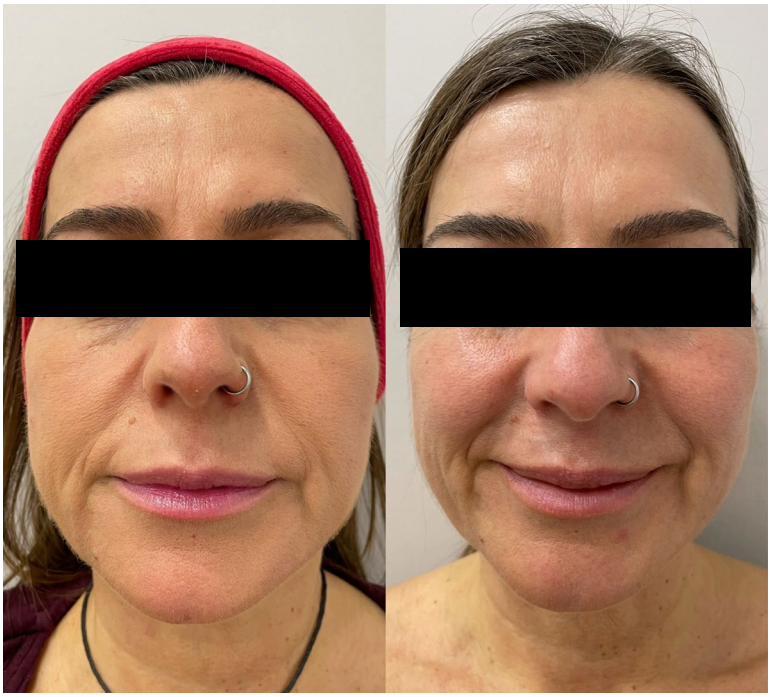

Fig. 1. *From left: before and one month after injecting a total of 1 ml of Neauvia Intense Flux and 0.5 ml of Neauvia Intense LV. The temporal was restored and corrected, and volume was restored in the cheek area.*

Fig. 2. *From left: before and 1 month after injecting only 1 ml from Neauvia Intense Flux & 0.5 ml of Neauvia Intense LV. The temporal area has been restored and corrected; additionally, volume was restored in the cheek area.*

DISCUSSION

The history of the patient and the concomitant hyperthyroidism autoimmune disease drew my attention to the problem of using fillers based on hyaluronic acid. Heydenrych et al. (16) point out that all injected dermal fillers, despite their composition, can indicate an immune response. This occurs because the immune system cannot enzymatically degrade or phagocytose the foreign body. Due to the probably increased immune response among patients with autoimmune diseases, such treatments are contraindicated (16). At the same time, the publication by Zerbinati et al. (15) demonstrated that hyaluronic acid cross-linked with PEG can modulate PMN functions, resulting in anti-inflammatory effects, and carries a very low risk of immune-mediated adverse effects. The high safety profile of PEGylated hyaluronic acid was confirmed in a 3-year retrospective clinical study, where no granuloma, foreign body reaction, or other complications were reported (16). Further confirmation of the high safety profile and high biocompatibility of such fillers, which was particularly important for the described case, was demonstrated among patients diagnosed with autoimmune thyroid diseases, as shown by histological and in vitro tests (18).

PEGylated hyaluronic acid fillers used in our case report differ regarding rheological properties. Neauvia Intense LV, with high cohesivity and high viscosity but very plastic and elastic, is ideal for this area to correct the profound tissues and restore the volume loss. Neauvia Intense Flux is a very malleable filler for the superficial compartment of the anterior temporal area, also correcting the visibility of the vessels and optimizing the result.

CONCLUSION

Suppose we understand the anatomy, the division, and how the temporal area ages, combined with a profound understanding of the rheology of used products, biomimetics, biointegration, and safety profile. In that case, we can approach and optimize results with a smaller quantity of product, natural-looking results, and making our patients happy (15, 19, 20). It's essential to understand fillers in general and, in particular, the rheology of the Neauvia portfolio and their biointegration, as PEGylated fillers cannot be compared to BDDE cross-linked fillers. Being very aware of the anatomy of the temporal region, we will be able to optimize results with fewer products and avoid complications in the future. Polyethylene glycol (PEG) as a crosslinker used in the Neauvia HA filler has shown a high safety profile (18, 21).

Our case report of a patient in whom PEGylated hyaluronic acid fillers were used for temporal hollowness augmentation proved to be effective and safe, with no side effects reported during the one-month follow-up. With 2 different products and a total of 1.5 ml, the temporal area was restored and corrected, and volume was restored in the cheek area. Both the visual result and the patient satisfaction after the treatment were very high.

Informed Consent Statement

The subject involved in the case report gave informed consent, and the patient gave written informed consent to publish this paper. The case report was conducted in accordance with the Declaration of Helsinki.

Conflicts of Interest

The author declares no conflicts of interest.

REFERENCES

1. Van Loghem J, Sattler S, Casabona G, Cotofana S, Fabi SG, Goldie K, Gout U, Kerscher M, Lim TS, de Sanctis Pecora C, Sattler G, Trindade de Almeida A, Wanitphakdeedecha R, Werschler P, Pavicic T. Consensus on the Use of Hyaluronic Acid Fillers from the Cohesive Polydensified Matrix Range: Best Practice in Specific Facial Indications. Clin Cosmet Investig Dermatol 2021; 14:1175-1199. doi: 10.2147/CCID.S311017. PMID: 34526796; PMCID: PMC8435881.
2. Kim S, Matic DB. The anatomy of temporal hollowing: the superficial temporal fat pad. J Craniofac Surg 2005; 16(5):760-3. doi: 10.1097/01.scs.0000180010.83480.10. PMID: 16192853.
3. Casabona G, Frank K, Moellhoff N, Gavril DL, Swift A, Freytag DL, Kaiser A, Green JB, Nikolis A, Cotofana S. Full-face effects of temporal volumizing and temporal lifting techniques. J Cosmet Dermatol 2020; 19(11):2830-2837. doi: 10.1111/jocd.13728. Epub 2020 Oct 5. PMID: 32946624.
4. Sykes JM, Cotofana S, Trevidic P, Solish N, Carruthers J, Carruthers A, Moradi A, Swift A, Massry GG, Lambros V, Remington BK. Upper Face: Clinical Anatomy and Regional Approaches with Injectable Fillers. Plast Reconstr Surg 2015; 136(5 Suppl):204S-218S. doi: 10.1097/PRS.0000000000001830. PMID: 26441101.
5. Desyatnikova S. Ultrasound-Guided Temple Filler Injection. Facial Plast Surg Aesthet Med 2022; 24(6):501-503. doi: 10.1089/fpsam.2022.0176. PMID: 36351192; PMCID: PMC9700375.
6. Suwanchinda A, Webb K, Rudolph C: The posterior temporal supraSMAS minimally invasive lifting technique using soft-tissue fillers, J of Cosm Dermatol 2018; 17(4):617-624.
7. Roberts MJ, Bentley MD, Harris JM. Chemistry for peptide and protein PEGylation. Adv Drug Deliv Rev 2002; 54:459-76.
8. Park YD, Tirelli N, Hubbell JA. Photopolymerized hyaluronic acid-based hydrogels and interpenetrating networks. Biomaterials 2003; 24(6):893-900. doi: 10.1016/s0142-9612(02)00420-9. PMID: 12504509.
9. Jin R, Moreira Teixeira LS, Krouwels A, Dijkstra PJ, van Blitterswijk CA, Karperien M, Feijen J. Synthesis and characterization of hyaluronic acid-poly (ethylene glycol) hydrogels via Michael addition an injectable biomaterial for cartilage repair. Acta Biomater 20l0; 6:l968-77.
10. Leach JB, Schmidt CE. Characterization of protein release from photocrosslinkable hyaluronic acid-polyethylene glycol hydrogel tissue engineering scaffolds. Biomaterials 2005; 26(2):125-35. doi: 10.1016/j.biomaterials.2004.02.018. PMID: 15207459.
11. Hassan W, Dong Y, Wang W. Encapsulation and 3D culture of human adipose-derived stem cells in an in-situ crosslinked hybrid hydrogel composed of PEG-based hyperbranched copolymer and hyaluronic acid. Stem Cell Res Ther 2013; 4(2):32. doi: 10.1186/scrt182. PMID: 23517589; PMCID: PMC3707066.
12. Aurand ER. The characterization of hyaluronic acid and polyethylene glycol hydrogels for neural tissue engineering. Neuroscience and Biomedical Engineering Thesis, University of Colorado, Denver, Anshutz Medical Campus 20l4. l72 pages; Publ. #3622545.
13. Zerbinati N, D'Este E, Farina A, Rauso R, Cherubino M, Calligaro A; Morphological evidences following pegylated filler treatment in human skin; J Biol Regul Homeost Agents 2017; 31(2 Suppl. 2):79-85.
14. Chong BF, Blank LM, Mclaughlin R, Nielsen LK. Microbial hyaluronic acid production. Appl Microbiol Biotechnol 2005; 66(4):341-51. doi: 10.1007/s00253-004-1774-4. Epub 2004 Nov 13. PMID: 15599518.
15. Marino F, Cosentino M, Legnaro M, Luini A, Sigova J, Mocchi R, Lotti T, Zerbinati N. Immune profile of hyaluronic acid hydrogel polyethylene glycol crosslinked: An in vitro evaluation in human polymorphonuclear leukocytes. Dermatol Ther 2020; 33(3):e13388;
16. Heydenrych I, Kapoor KM, De Boulle K, Goodman G, Swift A, Kumar N, Rahman E. A 10-point plan for avoiding hyaluronic acid dermal filler-related complications during facial aesthetic procedures and algorithms for management. Clin Cosmet Investig Dermatol 2018; 11:603-611. doi: 10.2147/CCID.S180904. PMID: 30538521; PMCID: PMC6257077.
17. Rauso, R.; Nicoletti, G.F.; Bove, P.; Rauso, G.M.; Fragola, R.; Lo Giudice, G.; Zerbinati, N. Clinical Experience with PEGylated Hyaluronic Acid Fillers: A 3-year Retrospective Study. Open Access Maced. J Med Sci 2021; 9: 1168–1173.

18. Kubik, P.; Gallo, D.; Tanda, M.L.; Jankau, J.; Rauso, R.; Gruszczyński,W.; Pawłowska, A.; Chrapczyński, P.; Malinowski, M.; Grzanka, D.; et al. Evaluation of the Safety of Neauvia Stimulate Injectable Product in Patients with Autoimmune Thyroid Diseases Based on Histopathological Examinations and Retrospective Analysis of Medical Records Gels 2023; 9:440. doi.org/10.3390/gels9060440
19. Nicola Zerbinati, Maria Chiara Capillo, Sabrina Sommatis, Rheological Investigation as Tool to Assess Physicochemical Stability of a Hyaluronic Acid Dermal Filler Cross-Linked with Polyethylene Glycol Diglycidyl Ether and Containing Calcium Hydroxyapatite, Glycine and L-Proline Gels 2022; 8(5):264.
20. Zerbinati N, Sommatis S, Maccario C, Capillo MC, Di Francesco S, Rauso R, Protasoni M, D'Este E, Dalla Gasperina D, Mocchi R. In Vitro Evaluation of the Effect of a Not Cross-Linked Hyaluronic Acid Hydrogel on Human Keratinocytes for Mesotherapy. Gels 2021; 7(1):15. doi: 10.3390/gels7010015. PMID: 33557183; PMCID: PMC7931045.
21. Decates T, Kadouch J, Velthuis P, Rustemeyer T. Immediate nor Delayed Type Hypersensitivity Plays a Role in Late Inflammatory Reactions After Hyaluronic Acid Filler Injections. Clin Cosmet Investig Dermatol 2021; 14:581-589. doi: 10.2147/CCID.S312198. PMID: 34103958; PMCID: PMC8178514.