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Research Article

An Effective Technique for Improving Orbital Contour

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ABSTRACT

Dark circles are a common aesthetic concern, often associated with genetic factors, aging and insomnia. Hyaluronic Acid (HA), due to its moisturizing and plumping properties, has emerged as an option for improving the appearance of dark circles. We described the technique for structuring the orbital retaining ligament and cutaneous zygomatic ligament with high "G" prime HA filling and using a 25G cannula. We evaluated how many pertuits and the filling volumes will be used. This technique described four pertuits. The first pertuit is carried out to structure and volumize mainly below the Orbital Retaining Ligament (ORL) and Zygomatic Cutaneous Ligament (ZCL). The second, we have carried out laterally to the first pertuit, aimed to approach the central region of the ORL and ZCL. Third, the lateral and medial three-dimensionality of the orbit is improved. Fourth, we can also access the lateral orbital region to promote refinement.

Keywords: Dermatology; Dermal fillers; Hyaluronic acid; Skin aging hyperpigmentation

INTRODUCTION

Changes in the infraorbital region are one of the first recognizable signs of aging. These are common complaints in aesthetic medicine, and many treatment options are available [1]. Narurkar et al., assessed the preferences of women with aesthetic orientation, and most respondents considered tear troughs as one of the facial areas that bothered them the most. Tear troughs were also ranked as the second and third facial area most likely to be treated in the 30-34 age group [2]. Periorbital hyperpigmentation, also known as periocular hyperpigmentation, periorbital melanosis, dark circles, infraorbital darkening, infraorbital discoloration, or idiopathic cutaneous hyperchromia of the orbital region, is a common condition encountered in dermatologic practice [3-5]. The histologic features of infraorbital darkening suggest that it is caused by multiple etiologic factors that include dermal melanin deposition, post inflammatory hyperpigmentation secondary to atopic or allergic contact dermatitis, periorbital edema, superficial location of the vasculature, and shadowing due to skin sagging [6].

MATERIALS AND METHODS

Treatment options include lower eyelid blepharoplasty with fat transposition or fat injections, laser and light treatments, radiofrequency treatments, topical agents, chemical peels, and fillers [7]. The art of facial rejuvenation has changed dramatically in the past decade, evolving from the isolated treatment of superficial rhytids to an approach that focuses on revolumization, mainly due to a broader and more complete understanding of the bony and soft tissue changes that occur in the facial aging process. In recent years, injectable fillers have become an integral part of cosmetic therapy, but they have also progressed to become a durable but non-permanent product that is well tolerated, providing results that are subtle, natural, and potentially reversible in the event of adverse clinical events [1,8,9].

HA filler injections have become common because they are minimally invasive and provide long-term patient satisfaction. HA fillers can be easily administered for immediate results, dissolved with hyaluronidase as needed, and injected [7,8,10]. If necessary, multiple repeat applications have reported HA fillers'

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safety and efficacy for infraorbital hollow rejuvenation [11-15]. The rheology of HA fillers is complex, and differences in laboratory measurements may not translate into clinical differences. However, the "G" of a product can be used to describe its firmness or ability to "lift" tissue. A product with a high "G" will require more applied tension to deform it, while a product with a low "G" will deform with little applied tension [16]. Non-animal, bacterially derived, stabilized HA fillers containing 0.3% lidocaine are indicated for infraorbital volumization to minimize procedural discomfort when injecting using pre-packaged 27G needles and avoiding topical anesthesia. Volumes of 0.4 to 1.0 mL per side are used, depending on the product and the extent of volume loss. Gentle digital massage of the area helps to settle the product into place [17].

The filling procedure was performed with Yvoire Contour® HA (LG Chem Ltd, Seoul, Korea). The gel is composed of cross-linked HA. Yvoire Contour is an absorbable implant for use in adults. It is intended to augment facial tissue typically used to treat extreme facial wrinkles and folds, replace volume defects and facial lipoatrophy, and improve facial contour deformities by injection into the face's subcutaneous and supra periosteal layers. The device acts by causing tissue expansion through the space occupied by the filler material.

Technique description

The procedure began with the patient supine position, and the entire face was cleaned with chlorhexidine. The morphology of the lower eyelid was assessed, and the openings were planned. An anesthetic button was not required to introduce the micro cannula through the skin. The skin opening was entered with a 25G needle up to the subcutaneous layer.

The first pertuit was made to structure and volumize mainly below the ORL and CZL (Figure 1).

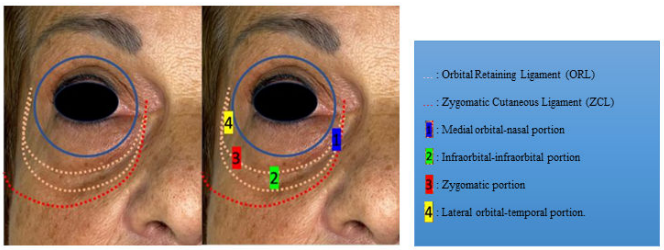

Figure 1: Ligaments of the infraorbital region.

Its insertion point was at the lower apex of the triangle that limits the lacrimal duct and the lateral nasal region, distancing itself from the lacrimal trough by the size of the cannula itself, which was a maximum of 5 cm from the pertuit to the lateral orbital region (Figure 2A). Then, the micro cannula, 25G thick and 50 mm long, was inserted. HA is injected in retroinjection until just before the micro cannula is removed or in a region lacking volume. Perform the retroinjections in sequence from the lower to the upper portions. When the area is filled, proceed to the next opening. It is worth remembering that the objective of filling is always to make the lower region more voluminous than the upper region, as this will create an appearance of convexity, continuity and illumination; on the contrary, it will create a "bag" effect with a shadow below (Figure 2).

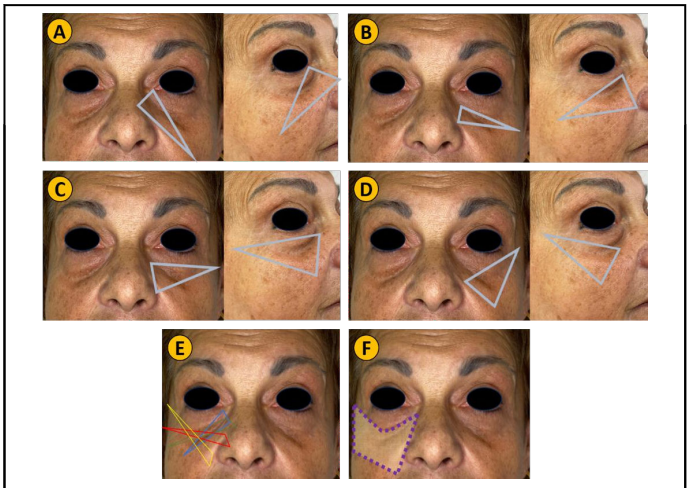

Figure 2: Location of the pertuit. **Note:** A) First pertuit; B) Second pertuit; C) Third pertuit; D) Fourth pertuit; E) 1st pertuit-blue/2nd pertuit-green/3rd pertuit-red/4th pertuit-yellow; F) Area covered by all pertuit.

The second incision was made laterally to the first incision and aims to better address the central region of the ORL and CZL (orbital region 2) (Figure 2B). Light retroinjections of a maximum of 0.05 mL are performed from the medial portion of the lacrimal trough (orbital region 1), with delicate retroinjections being preferred to avoid product accumulation. In each retroinjection, the cannula must pass through the ligament, leveling the skin. With incision 3, we improve the lateral and medial three-dimensionality of the orbit, an important step to maintain naturalness (Figure 2C). We can also access the lateral orbital region (orbital region 4) through the fourth pertuit to promote refinement (Figure 2D). Light retroinjections are performed in all ports, with the 25G cannula (Figure 2E) forming the treated area (Figure 2F). Finally, the area is massaged gently and firmly when removing the microcannula.

The application in the pertuit depends on the Haideh hirmand classification [18]. Where the volumetric evaluation pattern of the orbital region is classified into three classes: Class I patients presented volume loss in the Naso Jugal Sulcus (NJS). In Class II, there is volume loss in the lateral and medial orbital area with flattening of the anterior malar region. At the same time, Class III has total depression of the medial and lateral sulci with advanced volume deficiency in the anterior malar region and malar eminence (Figure 3).

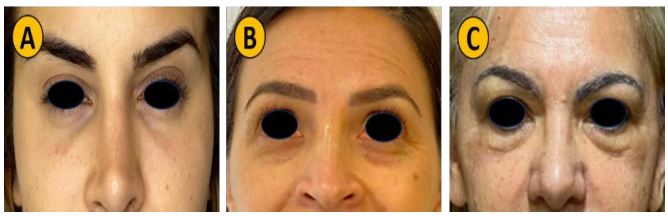

Figure 3: Haideh Hirmand classification. **Note:** A) Class I patients presented volume loss in the Nasojugal Sulcus (NJS); B) Class II there is volume loss in the lateral and medial orbital area with flattening of the anterior malar region; C) Class III there is total depression of the medial and lateral sulcus with advanced volume deficiency in the anterior malar region and malar eminence.

The author will use the base classification to evaluate and indicate the appropriate approach. Therefore, patients who fall into Class I are advised to choose at least two pertuit to deposit the material in the proper regions, aiming for ideal ergonomics for each injector. It is important to note that in the dissection of the tissue, a new virtual space is formed by simply passing the cannula, where the filler will possibly settle. This means that we must be careful with the place where we want to dam the filler to achieve the expected result and avoid passing the cannula through regions that do not need to be overcorrected. The author suggests first volumizing. After structuring below the ligament, a small volume can be placed in this same orifice, always less than 0.05 mL per retroinjection above the ORL. In Class II, the approach is similar, although to reach the region above the NJS, a third pertuit must be included, through which we will also have access to the lateral orbital region. In Class III, the approach prioritizes structuring the zygomatic-cutaneous ligament and caution is exercised with retroinjections. Pertuits 1, 2 and 3 are maintained with the possibility of performing a fourth pertuit to refine the lateral orbital approach. Choosing the location for the pertuit is essential for the procedure's success, and the injection must be performed in retroinjection to ensure uniform distribution of the HA and minimize the formation of nodules or irregularities. Within the technique described above, the use of the holes aims to facilitate access to the correction sites and does not cause harm to the patient or their treatment. The three-dimensional approach these accesses allow leads us to a successful treatment-remembering the importance of correcting and choosing the appropriate material for the region, avoiding complications.

RESULTS AND DISCUSSION

Correcting dark circles and swollen eyelids is technically challenging, mainly due to its multifactorial nature. The compact bone-cutaneous and vascular anatomy makes this area highly susceptible to bruising, swelling and contour irregularities, while the visible nature of this area makes suboptimal results unacceptable [19]. The appreciation of professionals dedicated to studying the region in depth and developing new techniques that optimize and simplify the procedure is necessary.

The arterial vascularization of the orbit is practically entirely dependent on the ophthalmic artery, the first major branch of the internal carotid artery, which is the primary source of irrigation for the orbital region. It is responsible for the blood supply to the orbital structures [20]. The Suborbicular Ocular Fat (SOOF) is located on the lower portion of the body of the zygomatic bone and below the orbicular muscle. A thin orbital and malar septum separate it from the periorbital fat. When fillings are performed in the lacrimal groove or laterally, attention to the medial and lateral palpebral ligaments. The lateral ligament acts as a barrier, preventing the dispersion of the filler beyond it [21]. In a systematic review, Trinh et al, describe that the main application techniques are serial puncture, microbolus, anterograde and retrograde injection techniques. These are the most commonly used [22]. The advantage of retroinjection is that this technique allows a more homogeneous product distribution, which can be observed with improved skin and mobility of the treated area while preserving its natural appearance. Thus, when describing the technique of the present study with filling with a 25G cannula in retroinjection, in addition to the advantages of the acquired naturalness, we also reduce the risk of ischemic events that may occur.

Previous studies have reported that HA is a safe and effective filler for improving the appearance of dark circles. However, choosing the type of HA and the application technique is essential to obtain satisfactory results [23,24]. The use of high G prime HA, such as Yvoire Contour used in this study, is unprecedented and was chosen because it has been associated with a lower swelling factor, which may be especially beneficial for areas with sagging [25], and also with a more excellent filling and support capacity using less material and presenting better results in the case, ensuring the naturalness of the skin texture after treatment.

Traditional non-surgical treatments using HA fillers focus on filling the depth of the cavity and placing volume in the pre-periosteal plane to smooth the deformity of the tear trough. However, the cavity of the tear trough, particularly its superomedial aspect, can be challenging to manage due to the thin skin and loss of subcutaneous volume above the tear trough [19]. This means that injectors need to have anatomical knowledge associated with rheological knowledge to achieve satisfactory and complication-free results.

Yvoire Contour, produced by LG, which developed the High Concentration Equalized (HICE) technology [26,27]. It is a product with large particles, high molecular weight 3MDa, low HA concentration (20 mg/mL) and consequently low swelling factor, has a high degree of cross-linking proportion by 1,4-Butanediol Ether (BDDE) (30%), enhancing the adhesion between HA molecules and reducing the need for a high degree of BDDE to increase the particle or G', therefore it has a low degree of modification (2.0%), thus being a material with a high degree of purity and low incidence of ETIP's [28]. Due to the low swelling factor of the material associated with the technique, this filler provides safety and predictability. It is also essential to highlight the importance of choosing a high G' filler (elastic and structuring) to lead to adequate local structuring, presenting better results by applying less material to volumize the area.

However, as it is a material with great volumizing potential, caution is required when retroinjecting with a small extrusion volume and placing it primarily in the malar region, following the ascending sequence of holes to deposit the product three-dimensionally, creating continuity between the structures, stretching the skin, improving shadows and avoiding supra-ligamentous edema. Still on the three-dimensional technique of filling dark circles, it is essential to emphasize that part of the result proposed by the method is the choice of applying a filler in the orbital region with high G', low concentration of HA, the large and chemically stable particle that has a lower swelling factor, and therefore is the most indicated for this region, differently from what is recommended by the pharmaceutical industry and the techniques currently described in the literature.

Commonly reported adverse events associated with HA filler treatment in the periorbital region include pain, erythema, swelling/bruising, orange-brown discoloration, postoperative hyperpigmentation, Tyndall effect, infections, nodules, lower eyelid edema, vascular occlusion (15). Although most adverse events resulting from HA fillers are mild and transient, serious adverse events can occur regardless of the area treated [29]. Because the periorbital area is supplied by numerous arterial branches, vascular complications such as retinal artery occlusion may result from the migration of a filling embolus [30]. Loss of vision or stroke resulting from an embolus can be one of the most devastating complications. A clear understanding of the periorbital anatomy and the injection of small aliquots are essential to avoid such tragedies [30,31]. Acute and mild edema, which may occur within 30 days after injection and generally does not require intervention, may be related to inadequate injection technique or inadequate filler selection, such as choosing products with a high swelling factor that may cause persistent edema, since these materials are hygroscopic [32].

Furthermore, materials with smaller particles have a larger contact surface and, therefore, more chemical exchanges, increasing water retention in the application region. Generally, smaller particles are also related to products with lower G', which would be described as low G prime materials, which are mostly the traditional indications of the industry for treatment of the orbital region. On the other hand, corroborating the technique cited here, the authors have already performed descriptions of the relationship between high G' and lower swelling factor [33].

Another important characteristic that needs to be related to the lower swelling factor would be the larger and more chemically stable particle, as it has less contact and, therefore, less hygroscopy, which is also associated with a lower concentration of HA in the HA gel. This group of chemical characteristics gives the authors the confidence that is a precise material for this region, and with the report of this study, we are confident in recommending this technique and product. Also based on chemical principles such as particle size, stability, contact surface, and HA concentration, this is an innovative way of providing safe, satisfactory results without obvious complications after the procedure, making this the new way of treating the region. Based on this evidence and clinical practice, the authors of this article feel confident in using Yvoire Contour for this treatment.

CONCLUSION

Filling the NJS with high-G-prime HA with retroinjection and a 25G microcannula is an innovative and safe three- dimensional technique for correcting this delicate and vascularized area close to the eyeball. The method can be considered a viable and safe option for professionals who wish to correct volumetric loss and discontinuity in the lower orbital portion with high G prime HA.

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AUTHOR'S CONTRIBUTIONS

JVMPN: Conceptualization, methodology, execution, writing, review. GDM: Methodology, execution, writing, review, editing. MPM: Execution, writing, review, editing. MCV: Execution, statistical analysis, writing, review. All authors approved the final version of the article.

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