

Correction of tear trough deformity by hyaluronic acid soft tissue filler placement inferior to the lateral orbital thickening

Uwe Wollina¹  | Alberto Goldman² 

¹Department of Dermatology and Allergology, Städtisches Klinikum Dresden, Dresden, Germany

²Department of Plastic Surgery, Hospital São Lucas da PUCRS, Porto Alegre, Brazil

Correspondence

Uwe Wollina, MD, Department of Dermatology and Allergology, Städtisches Klinikum Dresden, Academic Teaching Hospital, Friedrichstraße 41, Dresden, 01067, Germany.
Email: uwe.wollina@klinikum-dresden.de

Abstract

Tear trough deformities can be a sign of facial aging and exert a negative impact in facial attractiveness. Surgical techniques and adipose tissue transfer have been used to improve tear trough deformity. In recent years, minimal invasive procedures such as soft tissue filler injections became more popular. We report a retrospective evaluation of 45 Caucasian female patients ≥ 40 years (mean age of $[58.8 \pm 8.9]$ years). Severity of tear trough was classified according to Hirmand: 3 as grade I, 28 as grade II, and 14 grade III tear trough deformities. We used a monophasic hyaluronic acid, low G prime filler placed inferior to the lateral orbital thickening. On average, 0.4 ml of hyaluronic acid (HA) filler were injected per side. The improvement was I grade 29 patients and II grades in 16 patients. The improvement lasted (10.8 ± 2.3) months. No severe adverse events were noted. Vascular danger zones can be avoided.

KEYWORDS

facial aging, hyaluronic acid filler, lateral orbital thickening, tear trough

1 | INTRODUCTION

Aging of the infraorbital area is characterized by orbital-malar hollow, tear trough, V-frame deformity, malar bags, skin laxity, and periorbital hyperpigmentation. Loss of subcutaneous adipose tissue from superficial nasolabial and medial cheek departments (sub-orbicularis oculi fat or SOOF), bone resorption, loss of elasticity of retaining ligaments, skin atrophy, and pigmentary changes contribute.¹

The suborbital tissue consists of three layers in its medial part, that is, skin, orbicularis oculi muscle, and periosteum. In the lateral part, SOOF is just above the orbicularis oculi muscle leading to a four-layered structure.¹

In the lower lid two major ligaments have been identified: Medially the tear trough ligament (TTL) and laterally the orbicularis oculi retaining ligament (ORL) also known as orbito-malar ligament (OML). These filaments play a critical role in rejuvenation procedures of the lower eyelids. The ORL inserts laterally in the canthal region in the lateral orbital thickening (LOT). The LOT and the caudally located zygomatico-cutaneous ligament (ZCL) are the lateral borders of the

SOOF. The tear trough is the landmark of the medial border of SOOF.²

Tear trough deformities are located between the palpebral and orbital parts of the orbicularis oculi muscle while the nasojugal groove corresponds to the inferior border of the orbicularis oculi. However not all researchers differentiate tear trough deformity and nasojugal groove.³⁻⁵

Minimal-invasive procedures such as soft tissue filler injections have been shown to improve tear trough deformity. V-frame deformity, orbital-malar hollow, and periorbital hyperpigmentation. Different injection techniques have been developed: Linear threading along the tear trough and, microdroplet techniques and bolus injections just above the periosteum. The deep plane injections reduce the risk of irregularities, accidental vascular injections, and ensure a longer persistence of the warranted effects.⁶⁻¹²

Another way is targeting injection points lateral to the line of ligaments. This technique has been shown to reduce the necessary filler amounts.¹³ Here we present a retrospective evaluation of patients treated by filler injections inferior to the LOT to improve tear trough deformity.

2 | PATIENTS AND METHODS

This is a single-center retrospective observations study of the years 2010–2019 for which a positive IRB vote was obtained. We included Caucasian female patients ≥ 40 years of age. They belonged to Fitzpatrick phototype I and II. Exclusion criteria were anticoagulant medications, injection site infections, known allergies to any filler component, and missing consent. Patient with periorbital edema due to underlying disorders were excluded. Only patients with tear trough deformities were considered.

After informed consent was obtained, patients were treated in a sitting position. Ice packs were used before and after injection to reduce pain and bruising. Protective gloves were used throughout the procedure. Skin was disinfected carefully with a solution containing 2-propanol, 1-propanol, biphenyl-2-ol, and hydrogen peroxide. We used Belotero balance with 0.3% lidocaine (Merz, Frankfurt/Main, Germany)—a cohesive polydensified matrix hyaluronic acid (HA)-based filler with a 30 G needle. It is a monophasic HA filler with a G prime of 30 Pa, viscosity of 9217 μ and cohesivity of 5. It contains 22.5 mg HA per ml.¹⁴ The injection point was about 0.5 cm inferior to the LOT (Figure 1). The filler was placed just above the periosteum in a retrograde threadline in slow motion. On average 0.4 ml per site (range: 0.3–0.6 ml) were injected in a single layer. The area of injections was gently massaged.

Tear trough deformities were classified according to Hirmand (2010) into three classes. Class I group includes only tear trough with-

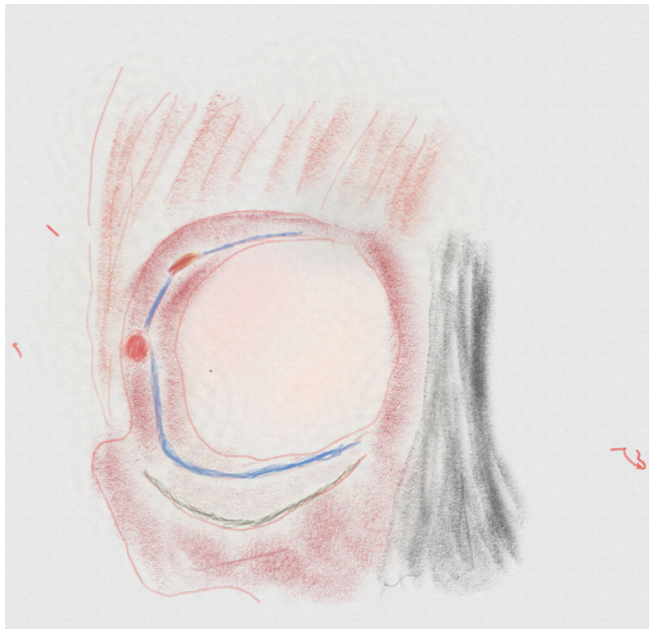


FIGURE 1 Anatomical drawing demonstrating the injection point and periorbital ligamentous structures. LBT, lateral brow thickening of the periorbital septum; LOT, lateral orbital thickening; OML, orbitemalar ligament; ZCL, zygomatico-cutaneous ligament. Arrow, injection point 0.5 cm beneath the LOT

out bulging orbital fat or excess of the lower eyelid skin. Class II includes mild to moderate periorbital volume loss and some flatness of midface. Class III presents with a full depression circumferentially along the orbital rim medially to laterally.⁵ Photo-documentation was performed in sitting position.

Patients were asked about satisfaction with the procedures on a 5-point scale (1, excellent; 2, very good; 3, good; 4, satisfactory; 5, poor) immediately after the procedure and 6–8 months later. Global Aesthetic Improvement Scale (0, worse; 1, unchanged; 2, improved; 3, much improved; 4, greatly improved) was used immediately after the procedure and at follow-up 6–8 months later.

3 | RESULTS

Forty-five female patients were included with a mean age of (58.8 \pm 8.9) years (range 41–78 years). Three patients were classified as grade I, 28 as grade II, and 14 grade III tear trough deformities. On average, 0.4 ml of HA filler were injected per side (range 0.3–0.6 ml). The improvement was I grade 29 patients and II grades in 16 patients. The improvement lasted (10.8 \pm 2.3) months, four patients warranted a touch-up 3 to 5 weeks after the first injection.

No severe adverse events were noted. Mild pain was noted in all patients during the injection. Bruising was seen on one side of the face in four patients. We observed no nodules, infection, periorbital edema, dyschromia, or vascular compromise.

Examples of the outcome are shown in Figures 2–4. On the Global Aesthetic Improvement Scale the immediate and follow-up results were 3.3 \pm 0.7 and 2.7 \pm 0.9, respectively. Patients Satisfaction Scale reached 1.2 \pm 0.8 (immediate result) and 1.4 \pm 1.1 (follow up), respectively. Ninety-five percent of patients rated the improvement good or better, nobody rated the outcome “poor”.

4 | DISCUSSION

Improvement of tear trough and palpebro-malar groove is warranted not only in elderly persons but from the second decade of life. Blepharoplasty and adipose tissue transfer have been used successfully to restore this area to provide a youthful look.^{15,16}

In this study, we concentrated on female patients of 40 years of age or older and soft tissue filler injections. HA fillers but also calcium hydroxyl apatite (CaHA) have been employed for improvement of this area. Most investigators use either microdroplets, linear threading, or a combination of both along the groove with good results and high patient satisfaction rates. Special attention has to be paid in avoidance of intraorbital injection.^{6–12}

The vascular danger zones are angular vein and artery medially, infraorbital artery in the middle and the zygomatico-facial artery laterally. Filler placement should be just above the periosteum.¹⁷



FIGURE 2 Correction of tear trough deformity class I. (A) Before and (B) after hyaluronic acid (HA) injection. Improvement of tear trough deformity, fine wrinkling in the lateral part, and Crow's feet



FIGURE 3 Correction of tear trough deformity class II. (A) Before and (B) after hyaluronic acid (HA) injection. Tear trough deformity was smooth end and fine wrinkling of the lower lid improved



FIGURE 4 Correction of tear trough deformity class III. (A) Before and (B) after hyaluronic acid (HA) injection. Tear trough became less visible, dark circle disappeared, and wrinkling of the lower lid improved as well

Another technique has been developed by Casabona et al. They developed the concept of the “aesthetic G-point” injection superior and laterally from the apex of malar eminence.¹³ Here we used an injection point inferior to the LOT. In contrast to Casabona et al., we employed a filler with low G prime but high viscosity. This allows spreading along the anatomical barriers medially thereby smoothing the infraorbital grooves during the next days. If the lifting aspect is the most desired effect, CaHA is preferred by us.

The single injection point avoids the vascular danger zones and Tyndall effects. No additional injection points have been used in the infraorbital area by us. We used a single layer application because of the high viscosity and high cohesivity of the filler used, a second layer was unnecessary.¹⁸ Patient's satisfaction was high.

On the other hand, we did not perform a direct comparison to other established methods treating the tear trough—which is a clear limitation of this study.

The technical modification of soft tissue filler placement to improve tear trough and palpebro-malar groove has been safe and quick in our hands and avoids facial vascular danger zones.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

AUTHOR CONTRIBUTIONS

Uwe Wollina, Alberto Goldman contributed equally to the publication.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ORCID

Uwe Wollina  <https://orcid.org/0000-0001-5933-2913>

Alberto Goldman  <https://orcid.org/0000-0002-0715-9212>

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