

The Dual-plane Technique for Correcting Sunken Upper Eyelid Deformity with Hyaluronic Acid Filler Injections

Bulent Bagci, MD

Summary: The dual-plane technique is an effective and safe method that aims to correct sunken upper eyelid deformity by increasing the volume of retro-orbicularis oculi fat, and especially supraorbital fat, through hyaluronic acid filler injection. Filling in the superficial plane allows for a more precise correction of sunken upper eyelid deformity with a smaller amount of filler. Contrary to common knowledge in the literature, this technique—filling the superficial plane with a filler, such as subcutaneous fat—does not lead to irregular filler accumulation and surface irregularity on the skin. Additionally, the risk of complications is much lower compared with techniques that recommend filling the deep plane using a sharp needle. (*Plast Reconstr Surg Glob Open* 2024; 12:e5894; doi: [10.1097/GOX.00000000000005894](https://doi.org/10.1097/GOX.00000000000005894); Published online 11 June 2024.)

Deterioration of upper eyelid fullness, known by various names, such as sunken upper eyelid deformity (SUED), A-frame deformity, upper eyelid hollowing, or superior sulcus deformity, can be seen congenitally due to genetic predisposition, or it may occur as a result of excessive orbital fat resection during blepharoplasty and subsequent volume loss of bone and soft tissue in the periorbital region due to the aging process.^{1,2}

The anatomical location of retro-orbicularis oculi fat (ROOF) and supraorbital fat (SOF) plays a critical role in SUED treatment. The ROOF is a fat layer located between the orbicularis oculi muscle and the orbital septum, bounded by the orbicularis retaining ligament inferiorly, the inferior frontal septum superiorly, and the neurovascular structures (supraorbital artery) originating from the supraorbital foramen/notch medially.^{3,4} The SOF is the subcutaneous fat layer located around the upper orbit from the medial canthus to the lateral canthus, bounded by the orbicularis retaining ligament, between the upper eyelid skin and the orbicularis oculi muscle (Fig. 1).⁵

CASE PRESENTATION

A 37-year-old woman was photographed in an upright position. Based on the evaluation, it was determined that there was a sunken area of similar width and depth on the upper eyelid crease on both the right and left sides. However, skinfold and dermatochalasis were not found. On both sides, the pretarsal skin (m) and preseptal skin (N) were measured as 7 and 4 mm, respectively (Fig. 2).⁶

To standardize the treatment plan, the supraorbital foramen/notch was first palpated. Then, the sunken area was divided into two zones—zone 1 on the medial side and zone 2 on the lateral side. This division was done by drawing a line from the pupil to the supraorbital foramen/notch. In zone 1, where there was no ROOF, the hyaluronic acid (HA) filler was injected only into the SOF. In zone 2, where the ROOF was present, the HA filler was injected into both the ROOF and SOF, with a particular focus on the SOF. The first entry point (A) was located 1 cm lateral and 1 cm superior to the lateral canthus. The second entry point (B) was located at the intersection point of the mid-pupillary line with the superior orbital rim (Fig. 1).

Antisepsis and numbness were applied at the cannula entry points. Monophasic, cross-linked HA (24 mg/mL) was used as the filling material. Adipose tissue grafting was not performed during this procedure. An entry point was first opened with an 18 G needle tip at point A on the left side. The cannula (22 G, 50 mm) was advanced deep into the skin surface at a 30-degree angle, and 0.1 mL of filling material was injected into the ROOF using the retrograde linear threading (RLT) technique. Then, the cannula was drawn slightly backward and

From the Cosmopolitan Aesthetic Dermatology Clinic, Istanbul, Turkey.

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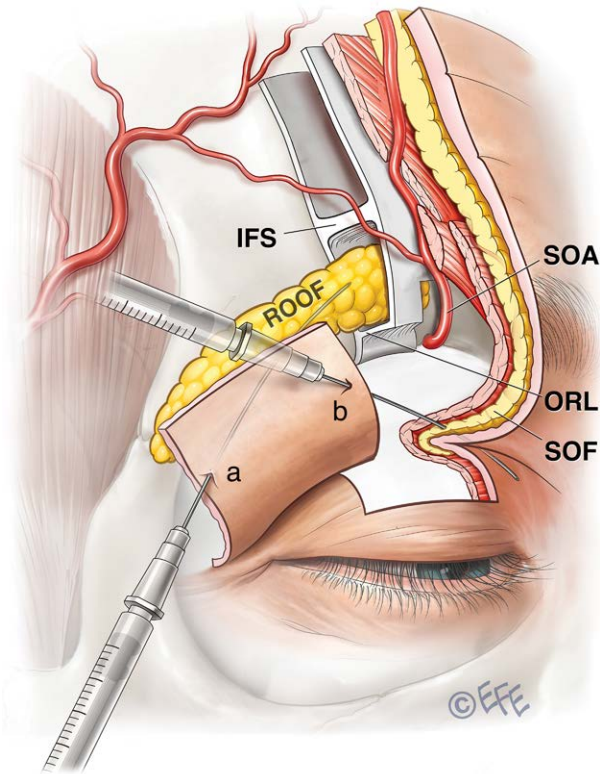


Fig. 1. HA filler injection with a cannula into ROOF and SOF. The first and second cannula entry points are shown as a and b, respectively. IFS, inferior frontal septum; ORL, orbicularis retaining ligament; SOA, supraorbital artery. Illustration by Levent Efe. Used with permission.

moved toward the superficial surface, and 0.05 mL was injected into the SOF with the RLT technique. Similarly, when the other entry point was opened at point B, the cannula was introduced into the skin surface at a 30-degree angle, then advanced toward the medial canthus, and 0.1-mL filler was injected into the SOF using the RLT technique.

The procedure was completed by injecting the same amount of filler on the right side. No complications beyond mild edema were observed during or after the procedure. At the 1-month follow-up visit, measurements of the m and N values on both sides showed an improvement of 3 and 8 mm, respectively (Fig. 2). There were no visible skin surface irregularities, such as lumps, bulges, or linear filler deposition, in the treated areas.

The follow-up ultrasound examination was performed to assess the placement of the filling material. In zone 1, the transverse view showed the HA filler as hypoechoic, located within the subcutaneous fat at a depth of 1.8–4 mm (Fig. 3). The transverse view of zone 2 confirmed the homogenous hyperechoic appearance of the HA filler within the ROOF. These ultrasound findings confirmed the successful placement of the filler at the intended depths in both zones 1 and 2.

DISCUSSION

Several factors contribute to SUEd, which appears between the upper eyelid crease and the superior orbital rim. These factors include bone resorption superomedial to the orbital rim, depletion of volume in the retroseptal orbital fat pad, ROOF atrophy, deflation of subcutaneous fat, and loss of skin elasticity.^{6,7}

The definition of the ideal upper eyelid plays a key role in the treatment of SUEd. The m value of the ideal upper eyelid, measured on the mid-pupillary line, is in the range between 2 and 7 mm and should be equal to half of the N value. In the aging process, this ratio reverses with an increase in m value and a decrease in N value, and SUEd occurs.⁶ In SUEd treatment, filler injection aims to restore the ideal balance between the m and N values ($m/N = 1/2$) by achieving an optimal m value of 3–4 mm. This is accomplished by increasing the volume in the pre-septal area.⁶

Most studies on SUEd treatment recommend autologous fat transfer or HA filler injected with either a sharp needle or a blunt cannula into the deep planes, such as the suprapariosteal plane or the retroseptal plane, accessed by passing through the orbital septum. Filler injection in the superficial plane, such as subcutaneous fat, is not recommended because it increases the risk of developing contour irregularity on the skin, caused by irregular filler accumulation due to the thin nature of the upper eyelid skin.^{6,8–10} Irregular accumulation of filler may appear as lumps, wheals, or linear or multilobular masses, which become more prominent when looking down or closing the eyelids.² Moreover, it must be kept in mind that filling the deep planes with a sharp needle may lead to serious complications, such as orbital bleeding, penetration into the globe, permanent nerve injuries, embolization with

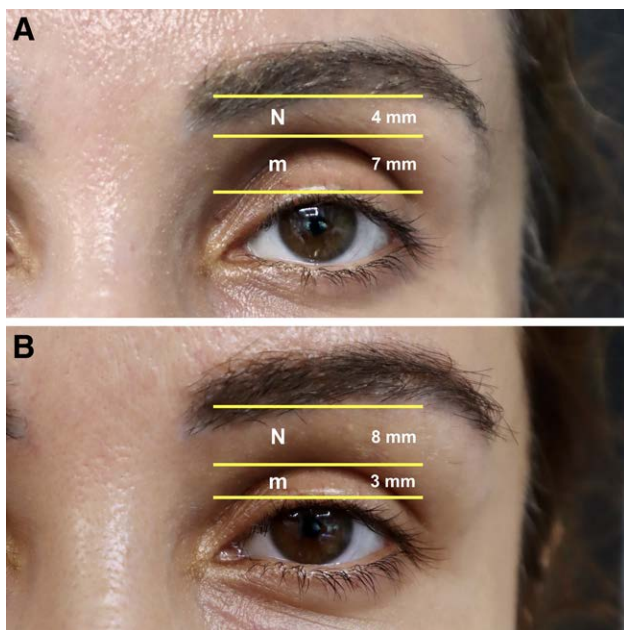


Fig. 2. Changes in m and N values before (A) and after (B) filler injection using the dual-plane technique.

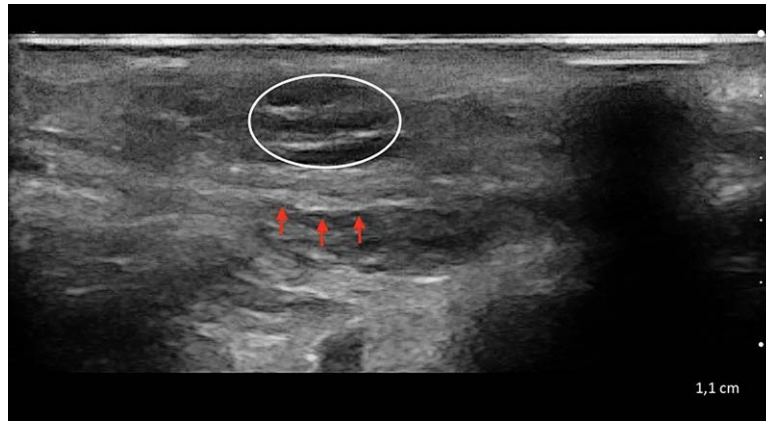


Fig. 3. In zone 1, the white circle indicates the HA filler within the subcutaneous fat, and red arrows point to the orbicularis oculi muscle.

cerebrovascular events, and irreversible vision loss due to intravascular injection.⁸

The dual-plane technique recommends injecting filler into the superficial plane, specifically the subcutaneous fat. This approach allows for precise correction of sunken areas while minimizing filler use and effectively preventing surface irregularities. Furthermore, using a blunt cannula significantly reduces the risk of complications compared with techniques that recommend injecting the deep planes with a sharp needle. However, this technique should not be applied to patients with severe skin folds and dermatochalasis in the upper eyelid.

CONCLUSIONS

The dual-plane technique is a method for more precise correction of the sunken area with minimal filler injection. In addition, it is a safe procedure with high patient satisfaction and a low risk of serious complications.

Bulent Bagci, MD

Cosmopolitan Aesthetic Dermatology Clinic
Levent Nispetiye Caddesi No. 40/1, Besiktas, Istanbul, Turkey
E-mail: estetikkozmetik@gmail.com

DISCLOSURE

The author has no financial interest to declare in relation to the content of this article.

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