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CASE REPORT
Cosmetic

"Walk the Rim, Feel the Bone" Technique in Superior Sulcus Filling

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Summary: Superior sulcus filler injection is a nonsurgical method to rejuvenate the upper face. Blindness and stroke are devastating complications of facial filler injection. This study describes an injection technique that minimizes the risk of blindness and includes a case study demonstrating the cosmetic benefits of this procedure. To avoid retrograde injection of filler embolus into the ophthalmic artery, we advocate a "'walk the rim, feel the bone" approach. Small boluses of hyaluronic acid filler are given in preperiosteal plane, avoiding the superior orbital foramen. *(Plast Reconstr Surg Glob Open 2015;3:e592; doi: 10.1097/GOX.0000000000000517; Published online 23 December 2015.)*

Facial aging is contributed by soft-tissue volume loss, bony resorption, and redistribution of subcutaneous fullness.[1] The loss of skin elasticity, soft-tissue atrophy, and gravitational effects of aging can lead to the appearance of a deep superior sulcus. Upper eyelid filler injection has previously been described as a nonsurgical method to rejuvenate the upper face.[2,3]

Filler injection is a relatively safe office procedure, but complications do occur. These include bruising, swelling, Tyndall effect, nodules, infection, activation of herpes simplex, and granulomatous inflammation.[4] Devastating complications such as blindness, stroke, and skin necrosis have also been documented.[5–10] To avoid these complications, several measures have been advocated, including slow low-pressure injection using small-bore needles and smaller volumes of filler with each injection.[8,11]

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In this study, we describe a technique of superior sulcus filler injection that minimizes the risk of intravascular injection, which can lead to central retinal artery occlusion or cerebrovascular events. We highlight a case report utilizing this technique and the results achieved.

METHODS

Injection Technique

After topical anesthetic application with eutectic mixture of local anaesthetics 5% cream (Lidocaine/prilocaine, AstraZeneca, Karlskoga, Sweden) for 20 minutes, the area was cleaned with chlorhexidine 0.05%. We used Juvederm Ultra XC (Allergan, Irvine, Calif.) in the case we described below. We recommend using the provided 30-gauge needle and 1-mL syringe. The injection was performed by "walking the rim, feel the bone": a finger was used to feel the superior orbital rim to obtain a mental image of the rim and location of the supraorbital notch, if present. This is known to be located at the medial one-third junction of the rim. This was followed by the placement of the needle tip on the bony rim. Once a "hard stop" was felt, the needle was withdrawn slightly to the preperiosteal space just superficial to the bone (Fig. 1). A small amount of filler

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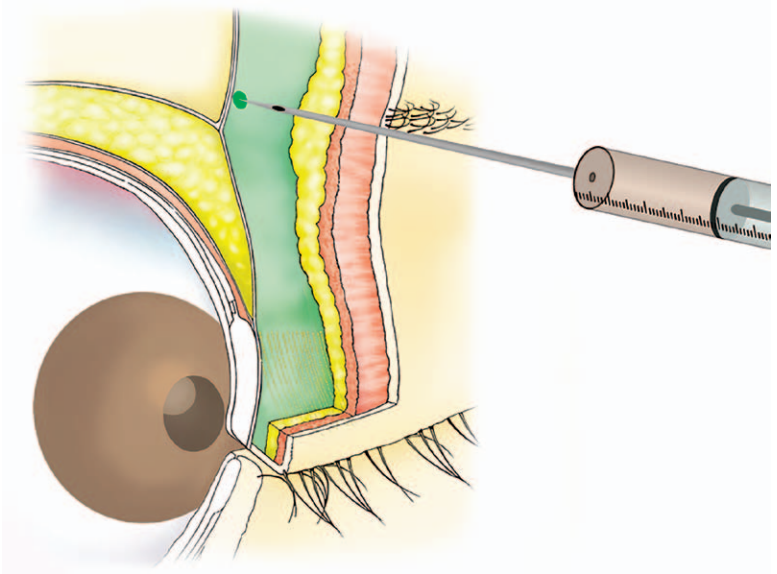

Fig. 1. Small amount of filler should be deposited in the preperiosteal space just superficial to bone.

was injected till the soft tissue was seen to lift just slightly. Small multiple injections were given along the superior orbital rim rather than a bolus dose at a single location. Care was taken to avoid the supraorbital and supratrochlear vessels, keeping in mind the surface landmarks of these structures (Fig. 2). A total volume of 0.1–0.2 mL of filler per sulcus was sufficient. A smaller amount was used in the lateral half of the rim. After injection, the area was massaged to achieve a smooth surface contour.

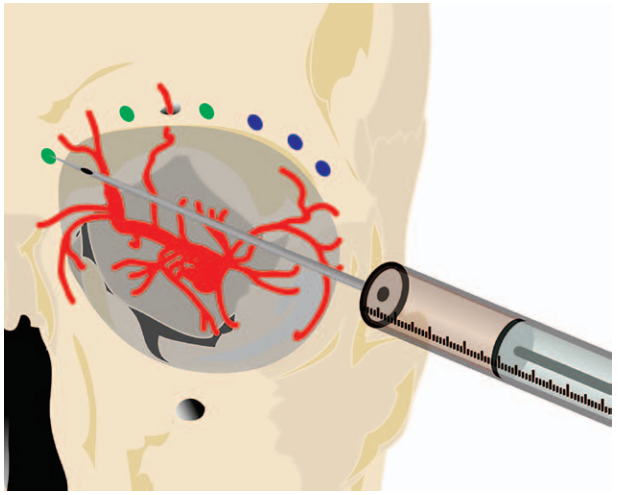

Fig. 2. Multiple small volume filler injection at superior orbital rim, avoiding the supraorbital foramen transmitting supraorbital artery (SO), which lies at medial one-third of the rim, and the supratrochlear artery (ST), which is medial to it. Filler should be injected medially first (green dots) and depending on the sulcus deformity, additional filler may be injected laterally (blue dots).

RESULTS

Case Study

A 29-year-old woman of Korean ancestry with history of previous upper blepharoplasty complained of hollowing of the left upper eyelid sulcus and too high a left eyelid crease (Fig. 3A). 0.2 mL of hyaluronic acid filler was injected. She achieved a good reduction of the sulcus deformity and lowering of the eye-

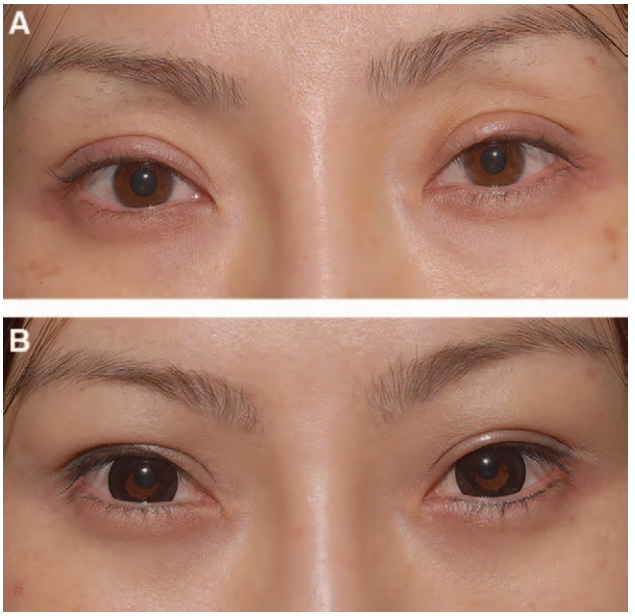

Fig. 3. A, Before treatment, patient had hollowing of left upper sulcus and higher left upper lid crease. B, Filler treatment to both upper sulci shows improved symmetry and reduction of upper sulcus deformity.

lid crease. Five months later, the patient requested for the right upper eyelid sulcus to be treated and she felt the superior sulcus defect was getting deeper. This was performed uneventfully with good cosmetic result (Fig. 3B). The patient defaulted follow-up and returned 4 years later, requesting a repeated procedure. She reported that the filler effects lasted for 2.5 years. The filler injection was again repeated uneventfully on both sides.

DISCUSSION

Filler injection is effective in correcting volume deficiency in upper sulcus deformities. The results can be excellent as demonstrated in our patient. Advantages of filler injection over surgery include its reversibility, convenience, and shorter downtime.

Filler injection in this region, however, must be performed with utmost care, as it can result in serious complications such as retinal artery occlusion and stroke.[5–9] This happens when the filler is inadvertently injected into a distal branch of the ophthalmic artery, such as supratrochlear or supraorbital artery. Depending on the volume injected, the filler material passes proximally in the ophthalmic artery, and possibly the internal carotid artery, and then travels forward in the retinal or ciliary arteries or to the middle cerebral artery (if the internal carotid artery is involved) when the plunger is released. The risks of retrograde embolization of filler are higher if excessive force is used or larger volumes are injected.

Table 1 summarizes the reports of severe ocular complications after filler or fat injection into the face. The patients usually report almost immediate loss of

Table 1. Review of Literature on Severe Ocular Complications after Facial Filler or Fat Injection

No.	Reference	Injection Substance	Injection Site	Diagnosis	Associated Ocular Symptoms and Other Complications
1	Kim and Choi[5]	Calcium hydroxyapatite	Nasal region	Bilateral Ophthalmic artery occlusion	Ptosis, total ophthalmoplegia, skin necrosis, anterior segment ischemia
2	Park et al[6]	(a) Autologous fat (7)	(a) Glabellar (7)	(a) Ophthalmic artery occlusion (7)	Ophthalmoplegia (6)
		(b) Hyaluronic acid (4)	(b) Nasolabial (4)	(b) Central retinal artery occlusion (2)	Stroke (2)
		(c) Collagen (1)	(c) Glabellar and nasolabial (1)	(c) Branch retinal artery occlusion (3)	Ptosis (4)
3	Roberts and Arthurs[7]	Poly-(L)-lactic acid (PLLA)	Lateral nasal and periorbital area	Ophthalmic artery occlusion	Ophthalmoplegia
4	Lee et al[8]	Autologous fat	Periocular area	Ophthalmic artery occlusion	Middle cerebral artery infarct
5	Park and Kim[9]	Autologous fat	Glabellar	Central retinal artery occlusion	
6	Kim et al[10]	Hyaluronic acid	Nasal tip and bridge	Central retinal artery occlusion	Anterior segment ischemia, ophthalmoplegia, hypotony, skin necrosis
7	Sung et al[12]	Calcium hydroxylapatite	Nasal region	Anterior segment ischemia	Oculomotor nerve palsy, skin necrosis
8	Kwon et al[13]	Collagen	Anterior nasal septum	Branch retinal artery occlusion	Ptosis, ophthalmoplegia, middle cerebral artery infarct
9	Park et al[14]	Autologous fat	Nasolabial fold	Ophthalmic artery occlusion	Ptosis
10	Peter and Mennel[15]	Hyaluronic acid (Restylane)	Glabellar and cheek	Branch retinal artery occlusion	
11	Silva and Curi[16]	Polymethyl-methacrylate (PMMA)	Glabellar	Central retinal artery occlusion	Total ophthalmoplegia
12	Apte et al[17]	Intradermal dermal matrix (Cymetra)	Forehead	Ophthalmic artery occlusion	
13	Danesh-Meyer et al[18]	Autologous fat	Nasal bridge	Ophthalmic artery occlusion	Middle cerebral artery infarct, skin necrosis
14	Feinendegen et al[19]	Autologous fat	(1) Nasolabial fold	(1) Retinal artery occlusion	(1) Middle cerebral artery infarct
			(2) Periorbital	(2) Ophthalmic artery occlusion	(2) Watershed zone infarct
15	Lee et al[20]	Autologous fat	Nasolabial groove	Central retinal artery occlusion	Thalamic infarct
16	Egido et al[21]	Autologous fat	Glabellar	Ophthalmic artery occlusion	Middle cerebral artery infarct infarct
17	Dreizen and Framm[22]	Autologous fat	Glabellar	Ophthalmic artery occlusion	Ptosis, proptosis
18	Teimourian[23]	Autologous fat	Glabellar	Central retinal artery occlusion	

vision after filler injection, and other associated ocular symptoms including ptosis and ophthalmoplegia may develop. Park et al[6] reported 12 patients who had retinal artery occlusion after facial filler injections, and visual prognosis is poor. Autologous fat injection had worse visual outcomes compared with hyaluronic acid or collagen injections. There is no established treatment for this complication, and only one study that used hyaluronic filler injection reported complete recovery of vision after immediate administration of acetazolamide.[15] Lee et al[8] reported a patient who experienced loss of vision and 2 hours later developed neurological symptoms. Early recognition and prompt treatment directed at lowering intraocular pressure[24] and allowing more distal embolization of the filler material are crucial for the remote possibility of recovery.

As the peripheral arteries of the face are small and collapsible, blood may not appear in the delivering syringe during aspiration, despite the needle puncturing and entering an arterial lumen.[14] This makes aspiration before injection less helpful. Injecting local anesthetic with adrenaline in the area before filler injection has also been suggested as a safety measure but distorting the sulcus makes it difficult to titrate the amount of filler required.

The key to safe injection in this area is to bear in mind the surface landmark of the supraorbital foramen or notch and to keep the injections that are sited away from the foramen at a preperiosteal plane, which is devoid of larger bore arterial branches. Depositing multiple small boluses of hyaluronic acid filler along the superior orbital rim in the preperiosteal plane has allowed prominent deep superior sulcus deformities to be dealt with safely, yielding a desirable aesthetic outcome.

CONCLUSIONS

Filler injection is an effective nonsurgical method for improving superior sulcus hollowing. With "walk the rim, feel the bone" approach, one can minimize the risk of blindness and stroke.

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PATIENT CONSENT

The patient provided written consent for the use of her image.

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