Many techniques have been described in the literature to improve nasojugal deformity, also known as tear trough deformity. As is typically the case when there are several different techniques to improve the same problem, none of these approaches has stood the test of time and become favored. The transconjunctival sub-orbicularis oculi fat (SOOF) pad lift blepharoplasty is a new approach that I have used for more than 18 months in 64 patients. The technique has proved reliable and safe and yields excellent results that persist over time. The approach, relative anatomy, and results are presented herein.

**INDICATIONS**

The transconjunctival SOOF pad lift blepharoplasty is appropriate for any patient with a depression along the medial portion of the lower lid that is associated with the normal aging process (Figure 1). For patients with significant early pseudoherniation of orbital fat of the lower lids without a tear trough deformity, a standard transconjunctival blepharoplasty is still used. In patients with additional laxity or rhytidity of the eyelids, laser resurfacing is recommended. In my experience, a patient with festooning is not offered a transconjunctival SOOF pad lift blepharoplasty; I use laser resurfacing unless there is also a nasojugal deformity and/or fat pad herniation. In addition, there are occasional patients with true redundancy of the orbicularis oculi muscle who require a pinch excision of skin and muscle. In the absence of a nasojugal deformity, these patients would not see a significant benefit using the SOOF pad lift blepharoplasty alone. The transconjunctival SOOF pad lift blepharoplasty with minimal fat excision has become my dominant approach for rejuvenation of the lower lid and can be safely performed in conjunction with facial resurfacing, facelift, and/or endoscopic forehead or midfacial surgery.

**ANATOMY**

The technique evolved through a process of intraoperative observation, followed by cadaver dissection. The underlying cause of the tear trough deformity was discovered. This investigation began with an inspection of the anatomy of the nasojugal area in patients with significant pseudoherniation of the orbital fat without a nasojugal deformity. In this group of patients, there was a cushion of fat underneath the orbicularis oculi muscle at the level of the arcus marginalis, along the medial half of the inferior orbital rim. The same analysis was done subsequently in a series of patients with tear trough deformity. It was determined that these patients lacked fat in this same area. The questions then became: What fat is this and what happens to the fat in patients with a nasojugal deformity? Cadaver dissections were subsequently performed with the intent of delineating the regional anatomy.

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The first relationship that needs to be understood is the relationship between the orbicularis oculi and the malar pad (Figure 2). The importance of the malar pad in the aging process has been well described in the literature. Owsley postulated that it is the inferior migration of this structure that results in the develop-
ment of an objectionable nasojugal sulcus. As I have demonstrated in the cadaver and illustrated in this article, the malar pad invests the tissue over the orbicularis oculi. From intraoperative experience, I know that the fat pad that is associated with nasojugal deformity is found underneath the orbicularis oculi.

The next important relationship is between the orbicularis oculi and the SOOF pad (Figure 3). As the name suggests, the SOOF pad lies beneath the orbicularis oculi muscle. This pad facilitates the orbicularis muscle’s sliding over the underlying periosteum. In patients without a tear trough deformity, this structure is attached superiorly at the level of the arcus marginalis. The other relationship that comes into play is that between the SOOF pad and the levator anguli oris muscle (Figure 4). This muscle is anchored to a ridge immediately inferior to the
medial third of the infraorbital rim. The SOOF pad wraps around this muscle in younger individuals. In older individuals with tear trough deformity, the surgeon will frequently identify the SOOF pad below the insertion point of the levator anguli oris. This muscle bisects the inferior orbital nerve (Figure 5), which will be identified occasionally during surgery.

From information gained from the cadaver dissections as well as observations made during surgery, it was surmised that nasojugal deformities were caused by the inferior migration of the SOOF pad. With that theory in mind, a procedure to replace the migrated SOOF pad was devised.

Figure 5. The infraorbital nerve is underneath the levator anguli oris. The muscle is green, and the nerve can be seen between the separated muscle fibers.

Figure 6. Following the red line, the surgeon will initially make an incision beneath the tarsal plate. Using a combination of blunt and sharp dissection, the orbital septum is split to the level of the infraorbital rim.

Figure 7. An incision is then made through the arcus marginalis not including the periosteum along the medial half of the rim (A). Cadaver demonstration shows the location of the incision along the infraorbital rim (B).

Figure 8. The dissection is carried out on top of the periosteum past the level of the tear trough deformity. At this level, the surgeon will find the sub–orbicularis oculi fat (SOOF) pad.

Figure 9. The sub–orbicularis oculi fat pad has been successfully elevated to the level of the infraorbital rim, thereby improving the patient’s nasojugal deformity.
PROCEDURE

The first step is to make a routine incision for a transconjunctival blepharoplasty. It is important to make this incision approximately 1 mm below the caudal margin of the tarsal plate. Making this incision too close to the sulcus could increase the possibility of a contraction scar from the incision to the arcus marginalis. The conjunctival flap is then raised, splitting the fibers of the orbital septum so as to keep the 3 orbital fat pockets contained (Figure 6).

At this point in the surgery the surgeon needs to decide if the patient requires excision of fat. I have found that excising fat in the average patient should be avoided in the medial fat and midfat pockets. Overzealous excision tends to make a patient’s lower lids appear artificially concave. An exception to this rule is patients with exceptional bulging of the fat pockets at a relatively early age (late 20s to early 30s). Another exception is those patients with a dehiscence in the orbital septum that is noted during surgery. The options at that point are to remove fat or to attempt surgical

Figure 10. Patients before (A, C, and E) and after (B, D, and F) transconjunctival sub-orbicularis oculi fat (SOOF) pad lift blepharoplasty. The majority of these photographs were taken 3 months after surgery. Most patients underwent the SOOF pad lift blepharoplasty only, and some also underwent face-lifts.
repair of the septum (a 6-0 braided suture is recommended). The lateral fat pocket seems to fall into a separate category. Failure to excise fat from this pocket in the average patient will result in patients with fullness of the lateral lower lid after surgery.

The next step is to make an incision through the arcus marginalis down to the periosteum along the medial half of the infraorbital rim. The incision is made down to the periosteum but not through this layer (Figure 7). Dissection is then performed on top of the periosteum past the inferior margin of the tear trough deformity (Figure 8). A good portion of this dissection should be performed bluntly, following the initial development of the dissection plane with small scissors. The SOOF pad is then identified. Typically, the SOOF

Figure 11. Patients before (A and C) and after (B and D) transconjunctival sub–orbicularis oculi fat pad lift blepharoplasty 1 year after surgery with maintenance of position.
pad will be found on the inside portion of the elevated flap or wrapping around the levator anguli oris. A horizontal mattress suspension suture from the SOOF pad to the periosteum of the infraorbital rim is performed along the width of the deformity (Figure 9). I prefer to use a 4-0 braided suture for this step. Enough tension must be applied to raise the SOOF pad to the level of the rim. Attention must be paid to the vector applied at the level of the rim to prevent inadvertent tearing of the periosteum.

Once the SOOF pad has been successfully repositioned, a buried single absorbable suture is used to repair the conjunctival incision. This stitch should be placed lateral to the cornea. Any bleeding encountered during the surgery should be controlled with a bipolar cautery. Using a unipolar cautery may inadvertently injure the inferior orbital nerve, the overlying skin, or the orbit.

The results obtained using this procedure in all 64 patients have been good to excellent (Figure 10). There have been no revisions. In several of the initial patients who did not undergo aggressive management of their lateral fat pad, bulging was visible in this area. None of these original patients has requested revision. Since recognizing the need to excise the lateral fat pad, I have had no further problems with excessive lateral fullness in the average patient.

Improvement of nasojugal deformity has stood the test of time. More than a year after surgery, 8 of 17 patients returned for an examination. All sustained improvement in their tear trough deformity (Figure 11). Of the 9 who did not return for their 1-year appointment, 5 were reached by telephone. All these patients professed continued approval of their results.

There have been no significant postoperative complications to date. There is no question that the technique results in an increase in the amount of bruising and swelling that an average patient will experience compared with a classic transconjunctival blepharoplasty. Patients are warned to expect clinically significant bruising and swelling for 7 to 10 days after surgery.

Many articles have been written concerning the correct way to approach rejuvenation of the lower lid. All lower lid blepharoplasty techniques that involve incision and dissection of the lower eyelid skin and/or orbicularis muscle, even under ideal conditions, have the potential to cause rounding of the lower lid leading to scleral show. This result gives the patient an unwanted unnatural appearance. There is also the possibility of frank ectropion in the occasional patient. As all cosmetic surgeons who specialize in facial rejuvenation know well, none of the techniques that approach the lower lid via the skin improve the hollowed-out appearance that accompanies significant tear trough deformity.

Use of the transconjunctival blepharoplasty minimizes the change of changing the position of the lower lid. This approach allows the facial plastic surgeon the ability to improve the relative abundance of fat in the 3 fat pockets of the lower lid with relative ease. Sole use of transconjunctival blepharoplasty often improves the patients’ appearance but unfortunately gives patients a somewhat hollowed-out appearance. In addition, the surgeon has relatively little ability to adequately address redundancy of the lower lid skin and/or the orbicularis oculi muscle. This problem can be adequately overcome in the average patient by performing simultaneous laser resurfacing of the lower lids. Attempts to improve accompanying nasojugal deformities by fat grafting or other means never gained popularity because of inconsistent results.

Use of the transconjunctival SOOF pad lift blepharoplasty with minimal excision of lower lid fat has considerably improved the results in my patients. Patients no longer have a hollowed-out appearance to their lower lids. Combining the transconjunctival approach with the SOOF pad lift blepharoplasty produces an end result that is natural and aesthetically pleasing. As noted herein, in patients with skin laxity I perform concurrent laser resurfacing. An occasional patient had persistent redundancy of the lower lid skin and/or muscle, despite adequate resurfacing, that was noted several months postoperatively. These patients were treated with a pinch excision of lower lid skin with or without muscle, depending on the clinical picture. The final results were excellent in this small group of patients.

Application of the surgical approach reviewed herein improved the overall results and decreased unwanted postoperative sequelae. This new procedure restores a patient’s anatomy to a more youthful position, producing a more natural appearance. Combining surgery with laser resurfacing has proved to be an effective combination for rejuvenation of the lower lid.

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REFERENCES