The Shade Procedure: For Lower Lid Deformities

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Background: Early procedures designed to address fat herniation deformities in the lower lid relied on resection of herniated orbital fat. In some cases, this approach results in an abnormal depression of the periorbital soft-tissue profile and reduced globe prominence. The shade procedure was developed to address these concerns.
Methods: Sixty-five patients underwent lower lid blepharoplasty either alone, in combination with upper lid blepharoplasty, or with face lift using the shade technique over the past 11 years. The shade procedure treats the fat herniation contour change by repositioning the fat as an apron over the orbital rim and elevating depressed midface fat and muscle. Essential components for both efficacy and safety relate to developing a symmetric apron of herniated fat and orbital septum; limited dissection (5 to 10 mm) of an intramuscular pocket at the inferior orbital rim; translocation and fixation of the fat apron over the orbital rim; elevation and secure fixation of the superior quadratus and zygomaticus muscle flap to the medial and lateral orbital periosteum and the normal thickness orbital septum; release of the septum and capsulopalpebral fascia from the tarsus; and lateral canthopexy.
Results: Two patients developed ectropion postoperatively requiring reoperation. No hematomas, facial nerve palsy, or skin slough occurred. An independent lay rater group judged the operative results to be improved in all cases (average, 4.3 on a five-point Likert scale).
Conclusion: The shade procedure should be considered for patients with lower lid fat herniation, particularly when depression at the inferior orbital rim accompanies convex prominence of the lower lid profile. (*Plast. Reconstr. Surg.* 121: 1398, 2008.)

Historically, there have been many technical and conceptual changes that have improved the results from blepharoplasty. Early in the evolution of the management of prominent fat-related contour irregularities in the lower eyelids, the prominent fat was removed surgically. This has successfully reduced some of the prominence of abnormally convex lid contour; however, with aggressive removal of fat, "sunken" or relatively enophthalmic appearing eyes could result. Associated diminished palpebral fissure height further reduced the normal attractive prominence of the eyes. In addition, many of the periorbital anomalies that accompany fat herniation of the eyelids, particularly the depression of the soft-tissue profile at the inferior orbital rim (related to early descent of the sub–orbicularis oculi fat and the malar fat pad), were not addressed by standard blepharoplasty techniques. Subsequently, the rationale for this approach has been questioned. Loeb and others[1–5] offered a different approach to the management of orbital fat herniation in the eyelids, offering the analogy that eyelid fat prominence is related to a thinning and possible dehiscence of the orbital septum (similar to an abdominal hernia). They recommended treatment of protrusive lid deformities with direct suture repair of the dehiscent orbital septum to the capsulopalpebral fascia, rather than fat removal. Subsequently, others agreed. De la

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Plaza and Arroyo[3] recommended that no fat be removed from the lower lids. However, they would approximate the capsulopalpebral fascia to the infraorbital rim periosteum to recreate a fascial barrier to fat herniation. Each of these contributions has improved the results of surgical technique, resulting in a more youthful, rested appearance to the periorbital region. We present a technique that incorporates the previous contributions into a comprehensive approach to blepharoplasty techniques, which we have referred to as the shade procedure.

PATIENTS AND METHODS

Sixty-five patients underwent lower lid blepharoplasty either alone or in combination with upper lid blepharoplasty or face lift. Patients ranged in age from 35 to 84 years; 62 patients were women and three were men.

Indications

The operative indication for the shade procedure is for patients who have a convex profile to the soft tissues of the lower lid associated with weakening and thinning out of the orbital septum, accompanied by a depression at the inferior orbital rim and malar eminence resulting from descent of the suborbicularis and malar fat pads. Patients who do not have this descent may be treated with conventional techniques where orbital fat repositioning over the orbital rim is not necessary.

Note is also taken of symptoms of dry eyes, as an individual with dry eyes is in need of added steps to avoid even minimal corneal exposure. Preoperatively, the lower lid is assessed for laxity of lid tension, prominence (or lack thereof) of the malar eminence, prominence of the globe, in addition to the contour abnormalities in the lower lid.

Operative Technique

After a subciliary incision and submuscular, preseptal dissection to the orbital rim, review of the pathologic anatomy of the lower lid is performed. The orbital septum typically is thinned in the lower half to one-third of the lid, to a point just superior to the level of the infraorbital rim. This area is virtually always the location where orbital fat has herniated outward. The superior portion of the orbital septum (of normal thickness) typically has retracted more cephalad toward the tarsus and lower lid margin. In contrast, the sub–orbicularis oris fat and the malar fat pad have migrated inferiorly from the inferior orbital rim, leaving a depression in contour at that level.

In contrast to previous authors[3] who have attempted to suture the orbital septum and the capsulopalpebral fascia to the orbital rim, we open the orbital septum along the entire inferior orbital rim (Fig. 1), allowing an apron of fat, of approximately 5 to 7 mm height, to displace over the orbital rim (from the medial to the lateral canthus). Optimally, a *symmetric* apron of fat is developed. A subfascial, intramuscular dissection of 5 to 10 mm caudad is then performed in the musculature having its origin at the infraorbital rim (Fig. 2) (i.e., the zygomaticus major and minor muscles laterally, and superior quadratus and nasalis alaeque muscles medially). Care is taken to avoid complete elevation of the origin of any of these muscles, as descent of midface tissues may result. Incomplete elevation of the muscular layer allows for an intramuscular pocket to be developed simulating the normal position of the suborbital fat. This pocket is approximately 5 to 10 mm deep (superoinferiorly). A continuous resorbable suture is started laterally just inferior to the lateral canthus, *in the periosteum*, and continued medially along the inferior orbital rim to just inferior to the medial canthal tendon, drawing inward (caudad) the leading edge of the apron of periorbital fat to the caudal nadir of the muscle dissection (Fig. 3). After this, the *normal thickness* orbital septum is gathered on a return suture layer, beginning with the same continuous suture, attaching to the leading edge of the dissected and elevated muscle fascia of the orbital rim, initially to the medial orbital rim, periosteum, then transversely to the more cephalad displaced *normal thickness* orbital septum, and ultimately to the lateral orbit perios-

Fig. 1. Development of an apron of orbital fat (tip of clamp) from herniated fat at the location of the thinned and attenuated orbital septum, just cephalad to the inferior orbital rim.

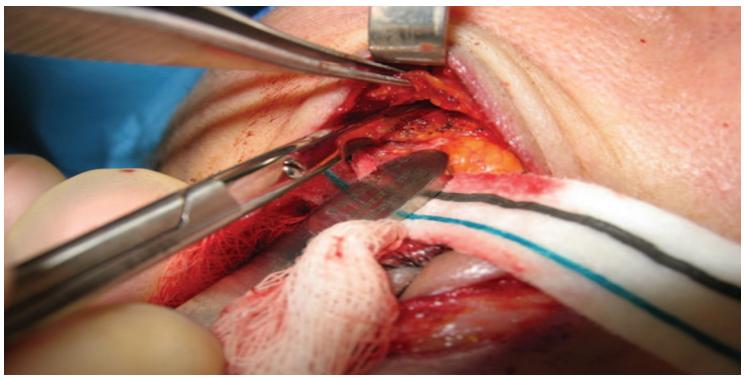

Fig. 2. Development of a muscle flap of superior quadratus and zygomaticus major and minor muscles (forceps), and a pocket along the infraorbital rim (at the scissors tip) approximately 8 to 10 mm deep.

Fig. 3. Diagram of displacement of orbital fat inferiorly into the muscular pocket created by elevation of an intramuscular flap of superior quadratus and zygomaticus muscles. The apex of the fat flap is fixed to the nadir (*arrow*) of the intramuscular pocket by a continuous suture.

Fig. 4. Diagram of elevation and fixation of the muscle flap superiorly with the fat flap advanced over the orbital rim (and fixed by suture); the superior quadratus and zygomaticus muscle flap (open suture) is advanced cephalad to a point of normal thickness of the septum (usually one-third to one-half the distance between the inferior orbital rim and the lower lid free border). The advancement flap is secured to the periosteum in the medial and lateral orbits and to normal thickness orbital septum centrally by continuous suture.

teum (Fig. 4). Importantly, the leading edge of muscle fascia is sutured to the orbital rim periosteum medially and then laterally for further support of the cheek soft-tissue elevation. This maneuver doubles the thickness of the soft-tissue profile at the orbital rim and restores contour to the lower lid at the rim in a more youthful pattern. The securing of the muscle/fascia medially also reduces the tear trough deformity.

Despite a good contour of the eyelid, concern remains about the tension created by the attachment of the orbital rim musculature to the orbital septum and its potential for creating ectropion postoperatively. Therefore, at the point of union between the septum and the capsulopalpebral fascia, at the inferior border of the tarsus, the soft tissue is divided to the level down to the conjunctiva (i.e., cutting the septum, and capsulopalpe-

bral fascia) but preserving the conjunctiva (Fig. 5). This allows for inferior migration of the orbital septum (1 to 2 mm) (like the lowering of a shade) and considerably less tension on the free margin of the lower lid. With this, there is a potential for a small amount of protrusion of soft tissue at the level of the tarsus, as seen in youthful eyes (previously described by Flowers[6]). Because the herniation is located superiorly in the lid (where gravitational pressure is slight), this is a minor convexity.

Depending on the degree of laxity of the lid, skin, and orbicularis musculature, and the prominence of the globe, the palpebral fissure axis, and the malar prominence, a superolateral elevation fixation of the orbicularis oculi muscle[7] and frequently a lateral canthopexy will be performed[8] (Fig. 6). For the canthopexy, the conjoined lateral palpebral ligament is attached to the periosteum on the inner aspect of the orbital rim at Whitnall's tubercle, in a slightly overcorrected (approximately 2 mm) position (again depending on the previous degree of laxity, globe prominence, and palpebral orientation fissure position). After this, the orbicularis muscle, if redundant, is draped upward and laterally to achieve a smooth contour, excising redundant muscle, attaching the superior border of the cut muscle to the periosteum or muscle fascia in the outer surface in the lateral orbit.[7]

Care is taken to avoid excessive tightening with this step to avoid unnatural contour depressions (or "clotheslining") of the lower lid soft-tissue profile. Redundant skin is drawn superolaterally, and conservative trimming of the skin is performed.

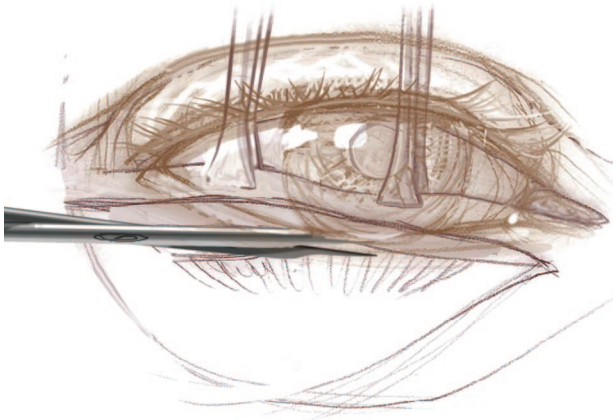

Fig. 5. Diagram of release of orbital septum and capsule palpebral fascia from the tissue to reduce the possibility of postoperation ectropion. The integrity of the conjunctiva is preserved.

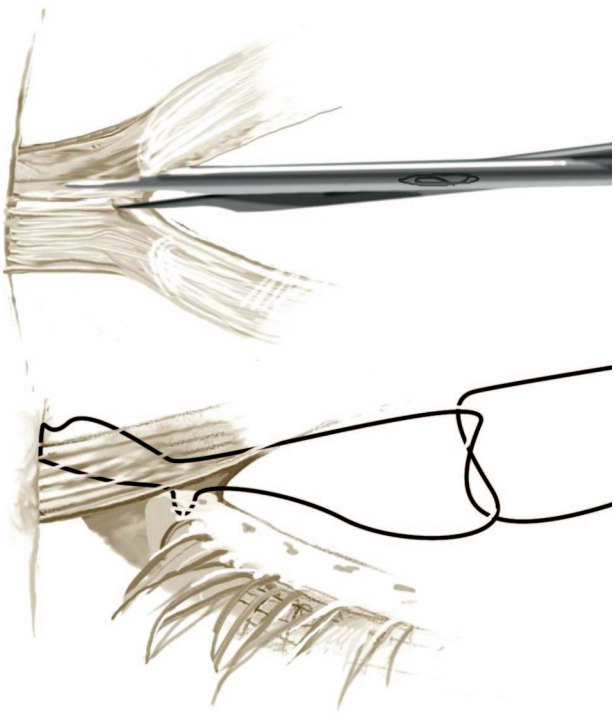

Fig. 6. Diagram of lateral canthopexy showing fixation of lower lid tarsus to periosteum in the periosteum on the internal aspect of the lateral orbit approximately 2 mm above Whitnall's tubercle.

Aesthetic Analysis

Operative change in appearance was evaluated by review of photographs of 12 randomly selected (card-sorting technique) patients preoperatively and postoperatively, by a lay panel of five individuals. The patients were selected randomly by means of the card-sorting technique. The panelists judged the patient's appearance on a five-point Likert scale as follows: 1 = significantly worse appearance than preoperatively; 2 = minimally worse than preoperatively; 3 = no change from preoperative appearance; 4 = improved from preoperative appearance; and 5 = significantly improved from preoperative appearance.

Postoperative Recovery

Changes in periorbital shape in the immediate postoperative period should be anticipated both by the patient and by the surgeon. There is typically more perioperative edema in the cheek, and the palpebral fissure is more obliquely slanted in the early postoperative period when compared with conventional techniques. The swelling also typically lasts longer, 1 to 2 weeks longer, in the periorbital area when compared with conventional blepharoplasty techniques. The obliquity of the palpebral fissure related to the lateral can-

thopexy may persist for 4 to 6 weeks postoperatively. The incidences of chemosis and dry-eye syndrome are largely no different than with any other technique; in fact, the incidence may be reduced by the meticulous attention to release of the capsular palpebral fascia and septum from the tarsus intraoperatively and lateral canthopexy.

The patients undergoing lower lid blepharoplasties with the shade technique generally did very well. Two patients had unilateral ectropion postoperatively treated with a lateral canthopexy surgical procedure under local anesthesia. One additional patient had unilateral ectropion, more evident than the two previous patients (Fig. 7), but because he was asymptomatic, he elected no corrections. There were no hematomas, facial nerve injuries, skin slough, or other major consequences. Some minor asymmetry between the right- and left-sided eyelids was evident, related presumably to incomplete capture of a portion of the orbital septum leading to a weak connection and at the normal thickness, or possible attenuation of the orbital septum to the sub–orbicularis oculi fat advancement flap. This occurred in approximately 10 percent of patients, to the point of clinical recognition. No patients, however, have requested additional surgery to correct this abnormality to date.

RESULTS

The preoperative and postoperative photographs of 12 randomly selected patients were reviewed by a lay panel judging the quality of the changes in appearance on a five-point Likert scale. The average score of the patients' postoperative appearance improvement was 4.3 (improved to significantly improved postoperative appearance).

On April 5, 2002, a patient underwent the shade procedure as described. Preoperative and postoperative results are shown in Figures 8 and 9. Three patients developed postoperative ectropion and two had revisions by repeat lateral canthopexy. The third had the most evident ectropion but was asymptomatic and did not wish corrective surgery. The shade procedure was performed as described previously.

DISCUSSION

Techniques related to lower eyelid surgery have evolved dramatically over the past 20 years.[1–8] Further emphasis has been placed on achieving a more natural and comprehensive rejuvenation of the lower eyelid region, which encompasses the upper portion of the midface. The comprehensive approach as described here (the shade procedure) addresses a number of the specific problem areas. First, the prominent fat pads are reduced by supporting the orbital septum rather than removing fat. Second, the relatively normal superior orbital septum with infraorbital rim muscle fascia is used as a reinforced restraining layer to prevent further fat tissue prominence. Third, the lid margin and tarsus are released at the inferior margin

Fig. 7. (*Left*) Preoperative view of an 84-year-old patient undergoing upper and lower lid blepharoplasty (midline nasal scar is secondary to excision of glabellar in situ melanoma). (*Right*) Postoperative appearance following the shade procedure of the lower lid. Note ectropion of the left lower lid, presumably related to release of attachment of lateral canthopexy to the orbital periosteum.

Fig. 8. (*Above*) Preoperative anteroposterior view of the full face. (*Center*) Preoperative anteroposterior view of the periorbital region. Note fat herniation in the lower lids. (*Below*) Postoperative anteroposterior view 1 year after upper lid blepharoplasty and a lower lid shade procedure.

of the tarsus, resulting in a minor convexity at this level, as typically seen in a youthful eyelid. With this maneuver, the orbital septum displaces inferiorly approximately 2 mm, like the pulling downward of a shade. Fourth, the midface soft tissues, which have descended, are draped upward over the inferior border of the orbital rim, recreating the more normal youthful contour of this region. The orbicularis muscle, if redundant, is shored up by elevation and gently stretching soft tissues to add to the smoother contour. Affixing this muscle to the lateral orbital periosteum limits migration inferiorly subsequently. A lateral canthopexy may be performed to deal with any further laxity of the lower lid. The technique is highly adaptable to variations in severity of lid deformity.

Fig. 9. (*Above*) Preoperative appearance. (*Below*) Postoperative appearance following lower lid shade procedure only (no upper lid blepharoplasty) 2 years postoperatively.

If the patient is a youthful patient with no significant skin excess, this approach can be performed transconjunctivally using a preseptal approach to the orbital rim. The only difficulties are that there is a more restricted view of the extreme medial and lateral aspects of the orbital rim/musculature, and one is unable to elevate dystopic orbicularis oculi muscle.

Elevation of the midface tissues (fat, fibrous tissue, and muscle) is not subperiosteal but rather intramuscular to retain the support of midface soft-tissue attachment to bone at the inferior orbital rim while elevating the more superficial, outer portion of the muscle envelope superiorly. Specific attachment of the midface tissue to the medial and lateral orbital periosteum serves not only as an effective support for cephalad advancement of the midface soft tissue but also to "unweight" the lower lid, which lessens the likelihood of ectropion postoperatively. The essential feature developed to avoid lower lid ectropion, however, is release of the combined septum–capsulopalpebral fascia layer, attachment to the tarsus. In patients without the release, too much cephalocaudal tension is likely within the septum, limiting the upward movement of the lid and possibly resulting in ectropion and corneal damage. The lateral canthopexy also plays a role in lessening the likelihood of ectropion; however, its major role is to provide correct palpebral fissure orientation in most patients.

CONCLUSIONS

The shade procedure has been an effective method of rejuvenating lower eyelids, without significant loss of orbital volume while adding lost normal tissue prominence in the lid and orbital rim. The technique has been used in 65 patients over the course of 11 years, with overall pleasing results.

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