Extended Lower Eyelid Skin Muscle Blepharoplasty

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ABSTRACT

A patient presenting to a facial plastic surgeon with lower eyelid aging often has accompanying midface descent. Many surgical options exist to address these deformities. Blepharoplasty techniques include both the transcutaneous skin-muscle flap as well as the transconjunctival approach. The midface can be addressed via a multitude of techniques, including percutaneous suspension of the malar fat pad, deep plane dissections, subperiosteal and endoscopic midface lifts, and transorbital approaches. Patients who have some midface ptosis but do not meet the standard criteria for formal midface lifting, or who want to avoid the extended recovery associated with such techniques, could benefit from less invasive procedures. We propose the extended skin muscle blepharoplasty to address midface descent and lower lid aging to patients as an alternative to formal midface lifting. The extended skin muscle blepharoplasty is an excellent technique for patients with orbicularis hypertrophy, skin redundancy, a tear trough deformity, and premalar ptosis, as it addresses each of these deformities with minimal downtime. Results for patients with mild but visible midface descent are gratifying.

KEYWORDS: Lower eyelid blepharoplasty, midface aging, nasojugal fold, tear trough deformity, orbicularis hypertrophy

The evolution of eyelid surgery has its beginnings in the traditions of Greek and Roman medicine. Initial techniques addressed trichiasis, ptosis, and dermatochalasis and were well documented in ancient texts. In the 19th century, increased understanding of eyelid anatomy led to improved surgical techniques. In 1907, Charles Conrad Miller was the first to show the lower eyelid blepharoplasty incision, similar to the subciliary incision used today.[1] The transconjunctival approach was first described by Julien Bourguet in 1924.[2] Modern-day transcutaneous blepharoplasty techniques were first described by Salvador Castanares in 1951, including a detailed anatomic description of the orbital fat compartments.[3] The evolution of lower lid blepharoplasty in the past 50 years has led to additional techniques focusing on orbital fat repositioning with arcus marginalis release, subperiosteal or intra-suborbicularis oculi fat plane midface lifting, as well as midface volume augmentation.[4]

Many options exist for the patient presenting to a facial plastic surgeon with lower eyelid aging. Surgical approaches include both the transcutaneous skin-muscle flap as well as the transconjunctival approach. The surgeon then has to decide whether to remove or preserve and reposition the periorbital fat. Additionally, the patient may have a significant lower lid laxity that, if not addressed, would cause the patient to have a significant likelihood of postoperative lid malpositioning

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Figure 1 (A) Preoperative view of a 40-year-old woman with a tear trough deformity and premalar ptosis with the development of a lateral infraorbital crescentic hollow. (B) Four-month postoperative view after extended skin muscle blepharoplasty.

and ectropion. Each surgical technique has its proponents. The transconjunctival approach has been advocated for its reduced rate of complications and the hidden incision.[5] The primary complications of the transcutaneous approach are lower lid retraction with scleral show, lower lid ectropion, and rounding of the lateral canthal angle,[6] but it provides excellent exposure and can address orbicularis hypertrophy.

Often, midface descent accompanies the aging lower eyelid. A tear trough deformity or a nasojugal fold is created by the inferior descent of the cheek with age or due to an anatomic bony deficiency of the maxilla. Fat repositioning into the nasojugal fold may help prevent the sunken or hollow lid appearance in these patients after a blepharoplasty. The disadvantages of fat repositioning techniques are the steep learning curve and potential complications, such as diplopia, fat granulomas, prolonged edema, and, rarely, soft tissue irregularities.[7] Fat repositioning may also be combined with a subperiosteal midface lift and suborbicularis oculi fat (SOOF) manipulation for complete rejuvenation of the eyelid-cheek region.

Formal midface lifting helps address the tear trough, malar fat pad ptosis, contour changes on the eyelids, and the nasolabial fold. A variety of approaches exist to address the midface, including percutaneous suspension of the malar fat pad, deep plane dissections, subperiosteal and endoscopic midface lifts, and transorbital approaches. Each has its drawbacks. Overall, these techniques are relatively invasive, carry significant morbidity, require more advanced surgical training to accomplish, and frequently result in prolonged healing. Potential complications from midface lifting include temporary or permanent injury to the temporal, zygomatic, or buccal branches of the facial nerve, decreased sensation over the malar region, lateral canthal distortion, lower lid malposition, temporal wasting, incisional alopecia, and prolonged postoperative edema.[8-10]

Patients who have some midface ptosis but do not meet the standard criteria for formal midface lifting, or

who want to avoid the extended recovery associated with such techniques, could benefit from less invasive procedures. We propose the extended skin muscle blepharoplasty to address midface descent and lower lid aging to patients as an alternative to formal midface lifting. The extended skin muscle blepharoplasty is an excellent technique for patients with orbicularis hypertrophy, skin redundancy, a tear trough deformity, and premalar ptosis, as it addresses each of these deformities with minimal downtime. Results for patients with mild but visible midface descent are gratifying (Fig. 1).

ANATOMY AND AGING

The esthetically pleasing lower lid has a smooth appearance that blends into the upper cheek without contour irregularities. The nasojugal fold runs inferiorly and laterally from the inner canthal region along the depression of separation of the orbicularis oculi and the levator labii superioris, forming the tear trough. The malar fold runs inferiorly and medially from the outer canthus toward the inferior aspect of the nasojugal fold. The malar and nasojugal folds represent the cutaneous insertions of the orbitomalar ligament, a distinct bony attachment of the orbicularis oculi[11] (Fig. 2).

The lower eyelid is typically positioned at or close to the inferior limbus. The anterior lamella of the lower eyelid is composed of the skin and the underlying orbicularis oculi. The posterior lamella consists of the tarsus, septum, and underlying conjunctiva. The eyelid skin is extremely thin, and just deep to it lies the orbicularis oculi muscle. This muscle is divided into the orbital portion and palpebral portion, which is further subdivided into the pretarsal and preseptal portions. The medial palpebral portion participates in the function of the lacrimal pump mechanism, and the lateral pretarsal and preseptal portions join to form the lateral canthal tendon.

The orbital septum lies deep to the orbicularis muscle and separates the orbital contents from the

Figure 2 Frontal view of a 57-year-old man with midface descent and a double convexity contour deformity. The lower eyelid shows a herniated orbital fat convexity (a) followed by the cheek convexity (b). The nasojugal fold (wide arrow) runs inferiorly and laterally from the inner canthal region along the depression of separation of the orbicularis oculi and the levator labii superioris, forming the tear trough. The malar fold (narrow arrow) runs inferiorly and medially from the outer canthus toward the inferior aspect of the nasojugal fold. These age deformities would be best treated by a formal midface lift.

preseptal structures. It originates from the arcus marginalis, which arises from the periosteum of the orbital rim. In the lower lid, the septum fuses with the capsulopalpebral fascia 5 mm inferior to the tarsus. It is the weakening of this septum that allows for prolapse of the postseptal fat anteriorly. The inferior postseptal fat is divided into three compartments: the lateral, central, and medial. The central and lateral compartments are separated by the arcuate expansion of the inferior oblique muscle and an extension of the capsulopalpebral fascia. The medial and central compartments are separated by the inferior oblique muscle. With aging, the orbital septum weakens, and the orbital fat pseudoherniates.

The malar prominence is composed of a subcutaneous malar fat pad with underlying orbicularis oculi muscle. The malar fat pad is located between the inferior border of the orbicularis and the nasolabial fold. SOOF lies deep to the orbicularis muscle. SOOF is intimately associated with the periosteum of the infraorbital rim and maxilla as well as with the insertions of the zygomaticus major and minor muscles. The malar prominence descends inferomedially with aging to deepen the nasolabial crease and expose the lateral orbital rim, as well as increase the distance from the lower eyelid to the malar fat pad. There is also loss of malar fullness and the development of a lateral infraorbital crescentic hollow.

The midface changes, accompanied by the pseudoherniation of the orbital fat, cause the development of the classic double convexity of the lower eyelid and cheek complex and prominence of the orbital rim.

PATIENT SELECTION

Choosing the right procedure for the right patient is crucial to the final success of lower lid blepharoplasty. There are certain characteristics that make some patients better candidates for the extended skin muscle blepharoplasty. A physical exam should evaluate for the presence of redundant eyelid skin, excessive fat pads, orbicularis hypertrophy, and lid laxity with presence of rounding, ectropion, or entropion. Patients with significant lid laxity would benefit from a lateral tarsal strip procedure.[12] This can be done with either the transconjunctival or transcutaneous approach. The exam should also evaluate midface laxity or malar deficiency, such as the presence of a double convexity and a prominence of the orbital rim.

Patients with significant lower lid skin excess and orbicularis muscle hypertrophy are excellent candidates for the transcutaneous approach with a skin muscle flap. This approach also allows removal of any herniated fat or fat repositioning in those with a hollow lid appearance. Patients exhibiting a severe tear trough deformity with extension inferolaterally onto the premalar area, secondary to the inferior descent of the cheek, would benefit from formal midface rejuvenation procedures. Those with only mild but visible midface descent would be candidates for the extended skin muscle flap.

There are few absolute contraindications to the surgery, but relative contraindications include inability to temporarily stop anticoagulation treatment and poor general health preventing safe ability to undergo surgery.

TECHNIQUE

Preoperative Events

During the initial evaluation, patients undergo a thorough history and physical examination focusing on the patient's ophthalmologic history, including history of dry eye, glaucoma, or prior ophthalmologic procedures. Patients are also evaluated for their risk for bleeding complications, such as history of easy bruising, frequent epistaxis, and anticoagulant use. Systemic diseases that may complicate healing, such as Sjögren's syndrome, Wegener's granulomatosis, collagen vascular disease, and thyroid disease, as well as use of tobacco, are also identified.

Two weeks prior to surgery, the patient is instructed to stop any medications that have anticoagulant properties, including aspirin, nonsteroidal anti-inflammatory drugs, warfarin sodium, as well as herbal supplements such as vitamin E, ginseng, garlic, ginkgo, St. John's wort, and fish oil. On the day of surgery, a thorough review of the patient's medical history and brief focused exam are performed on the patient.

The patient's face is cleansed with antiseptic soap, and the lower eyelid incision is marked 2 mm below the
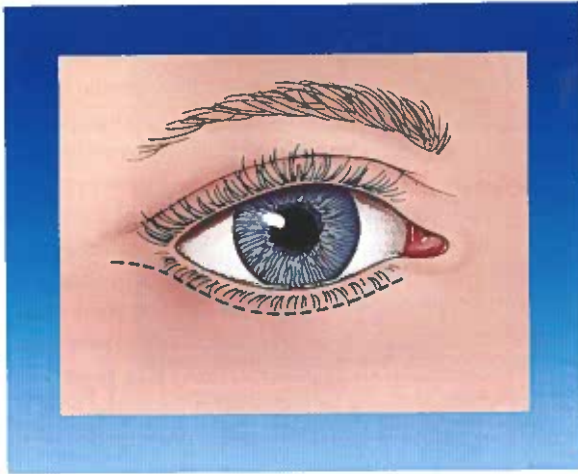
Figure 3   Preoperative incision marking extending from the lower punctum medially to ~6 mm inferolaterally to the lateral canthus.

ciliary line, extending from the lower punctum medially to ~6 mm inferolaterally to the lateral canthus (Fig. 3).

Anesthesia

Lower lid blepharoplasty, including the extended skin muscle blepharoplasty, can be performed with local anesthesia, with or without intravenous sedation. Generally, patients are given a preoperative sedative 30 minutes prior to injection of local anesthesia. Typically, this entails 10 to 20 mg of oral diazepam depending on the patient's habitus and experience with benzodiazepines. If the patient is to receive intravenous sedation, midazolam is administered, and a propofol drip is started. Once the patient is adequately sedated, local anesthesia is infiltrated. Approximately 2 mL of 2% lidocaine with 1:100,000 epinephrine with hyaluronidase at a 9:1 ratio is injected into the proposed incision sites using a 27-gauge needle in the suborbicularis plane.

Operative Technique

Extended skin muscle blepharoplasty is performed through a transcutaneous approach.

Once adequate sedation and local anesthesia is achieved, the patient's face is cleaned with diluted povidone-iodine and sterilely draped. At least 10 minutes should pass before incision is made so that the epinephrine can produce maximal vasoconstriction. A no. 15 blade is used to make a superficial incision ~2 mm below the ciliary line, extending from the lower punctum medially to ~6 mm inferolaterally to the lateral canthus (Fig. 4). Should the patient's condition require further excision, the lateral incision can be extended further laterally in a skin crease. A skin muscle flap is developed deep to the orbicularis and superficial to the orbital septum using a blunt-tipped, fine-curved scissors, such


**Figure 4**   Subciliary incision is made with a no. 15 blade.

as the Kahn dissecting scissors 14 mm (5.5 inches) curved (catalog number 5–266, Miltex Instrument Co., Lake Success, NY), starting at the lateral part of the incision (Fig. 5). As the skin-muscle flap is created, the initially made skin incision is completed making sure to bevel the cut to preserve a strip of the pretarsal orbicularis (Fig. 6). Meticulous hemostasis is achieved using

Figure 5   A blunt-tipped, fine-curved scissors is used to develop the skin muscle flap deep to the orbicularis oculi muscle and superficial to the orbital septum.
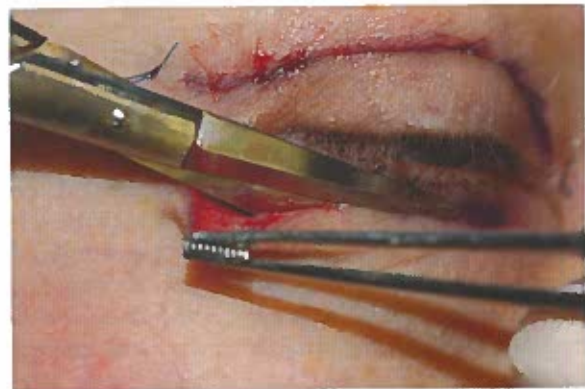
Figure 6   The initially made skin incision is completed with the curved scissors making sure to bevel the cut to preserve a strip of the pretarsal orbicularis.
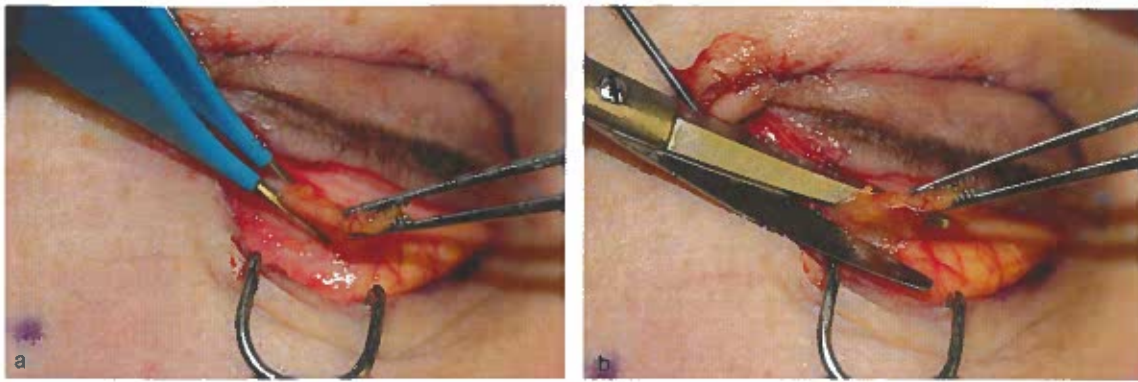
Figure 7 Removal of orbital fat. (A) Cautery is applied to the base of the herniated fat. (B) Conservative removal of the herniated fat is performed.

bipolar cautery. The inferior skin muscle flap is retracted using a Demarres retractor or a double-balled skin hook.

Depending on the individual need of the patient, based on the preoperative evaluation, the fat compartments are addressed. The orbital septum is opened only minimally to allow adequate access to the fat compartment. Cautery is applied to the base of the herniated fat and conservative resection is performed of lateral, middle, and medial fat pads as necessary (Fig. 7).

Attention is now turned to treating the tear trough deformity. Blunt dissection, such as with a cotton-tipped applicator or the back of a knife handle, is carried 6 to 7 mm inferior to orbital rim in the supraperiosteal plane (Figs. 8 and 9). This frees the inferior skin muscle flap from fibrinous attachments and allows an even draping of the skin-muscle flap. Fat repositioning techniques can be used along with this procedure to allow for further smoothing of the infraorbital contours.

If a significant amount of lid laxity exists, as determined preoperatively with the lid distraction and retraction tests, a lateral tarsal strip procedure can be performed. This is done prior to resecting any of the skin muscle flap. A lateral canthotomy is made in an existing
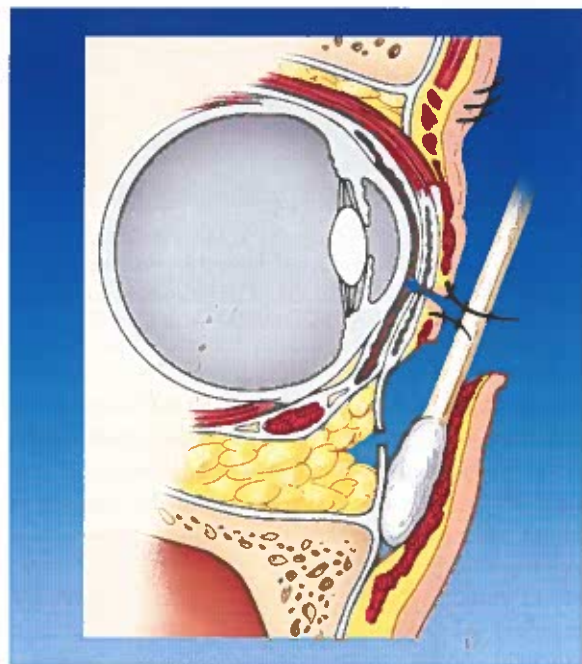
Figure 8 Blunt dissection, such as with a cotton-tipped applicator or the back of a knife handle, is carried 6 to 7 mm inferior to orbital rim in the supraperiosteal plane.
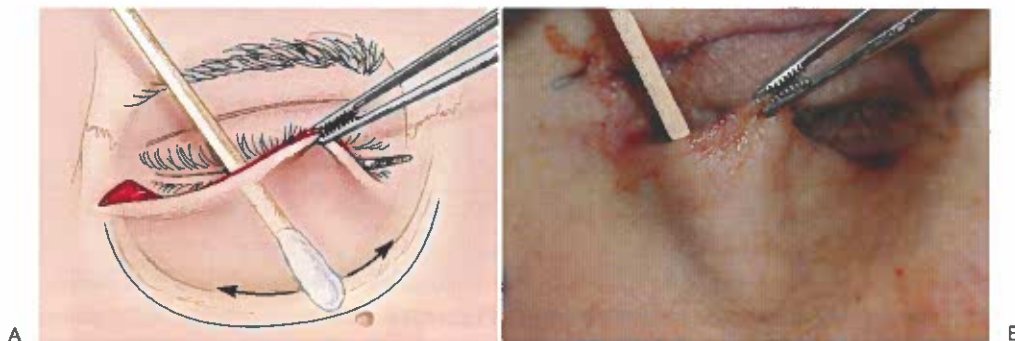
Figure 9 (A and B) Frontal view of blunt dissection 6 to 7 mm inferior to orbital rim in the supraperiosteal plane.
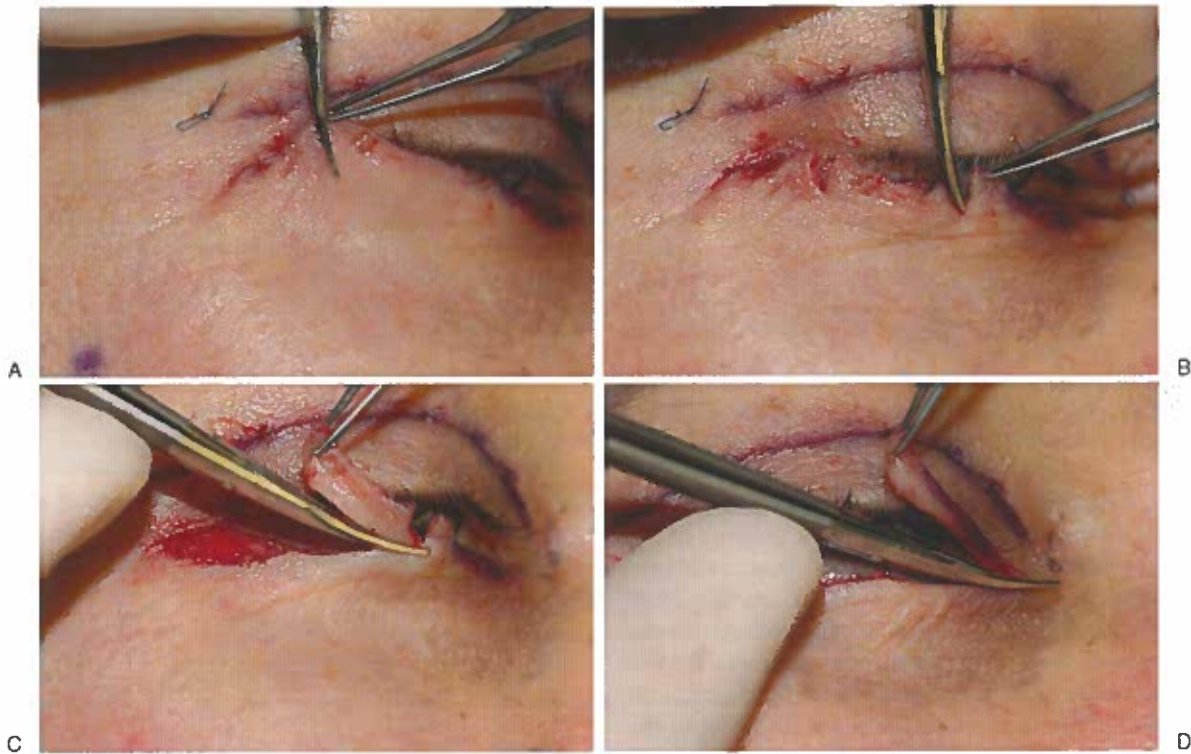
Figure 10   Resection of excess lower eyelid skin. (A and B) The lower lid skin is draped over the lower eyelid, and the excess skin to be removed is delineated with a down cut using a Stevens tenotomy scissors at the level of the lateral canthus (A) and the midpupillary line (B). (C) The excess skin between each down cut is excised with a curved Stevens tenotomy scissors. (D) The remnant excess skin is resected to the medial end of the incision.

rhytid, and the lower limb of the lateral canthal tendon is freed from the lateral orbital rim. The lateral canthal tendon is grasped with a Brown-Adson forceps and pulled in a superolateral direction until the appropriate amount of tension of the lower lid is achieved. The tendon is stripped of its outer layer of skin and its inner layer of conjunctiva. A 5-0 Dexon S suture (Covidien, Mansfield, MA) with an SS2 spatula needle (Covidien, Mansfield, MA) is then placed to secure the lateral canthal tendon to the periosteum of the medial aspect of the lateral orbital rim.

At this time, the surgeon can address the skin muscle flap. Excess skin is excised in a conservative manner to allow apposition to the superior flap without tension (Fig. 10). If excess muscle hypertrophy exists, a thin strip of muscle can be removed with a curved Stevens tenotomy scissors (Fig. 11). Meticulous hemostasis is attained with bipolar cautery. The lateral portion of the orbicularis muscle is sutured to the lateral periosteal orbital rim using a 5-0 Vicryl suture (Ethicon, Somerville, NJ) (Fig. 12). This allows for a superior-lateral suspension

Figure 11   A thin strip of orbicularis muscle is removed with a curved Stevens tenotomy scissors to allow the skin to drape smoothly.
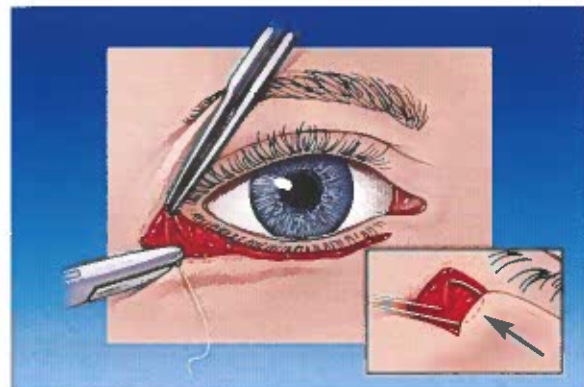
Figure 12   The lateral portion of the orbicularis muscle is sutured to the lateral periosteal orbital rim using a 5-0 Vicryl suture in a horizontal mattress fashion.

Figure 13   The subciliary incision is closed with interrupted 6-0 fast absorbing gut.

and helps prevent postoperative ectropion or scleral show. The subciliary incision is closed with interrupted 6-0 fast absorbing gut (Fig. 13).

At the completion of the case, the lids are cleaned of any blood, and cool compresses are applied.

Postoperative Care

The patient is taken to the recovery area and allowed to recover. The head is kept elevated at 30 degrees. Cool compresses are placed over the eyes and changed every 20 to 30 minutes. Any signs of bleeding complications are aggressively evaluated. Extraocular muscles are evaluated for entrapment, and visual acuity is checked. The patient is discharged to home and is instructed to continue changing the cool compresses continuously

for the first 24 hours. The patient is also instructed to apply a petroleum-based ophthalmic antibiotic ointment to the incision sites 4 times a day and to keep the head elevated. A 7-day course of an oral antibiotic, such as a first-generation cephalosporin, is prescribed. The patient is evaluated again in the office on the first postoperative day and again at 1 week postoperatively. The patient is asked to limit physical activity and to abstain from using aspirin, nonsteroidal anti-inflammatory drugs, or herbal supplements for at least a week after surgery.

COMPLICATIONS

Potential complications of the extended skin muscle flap are similar to those of other lower lid blepharoplasty techniques. These include hematoma, globe injury, infection, incision problems, and lid malposition. Although dry eye is more common after upper lid blepharoplasty, it may occasionally occur after lower lid blepharoplasty secondary to edema. The patient may use artificial tears and ophthalmic lubricants to treat symptoms. If dry eye persists, an ophthalmologic consultation is necessary. The patient can also develop chemosis, which can last 2 to 6 weeks postoperatively.

Complications specific to the transcutaneous approach include persistent irregularity to the incision, especially at the lateral portion. This may be due to a reaction to the sutures and may be treated with subcutaneous injection of triamcinolone 2 weeks postoperatively. The incision may also become hypopigmented. The lower lid may be malpositioned with rounding of the

Figure 14   Preoperative (A) and 7-month postoperative (B) close-up oblique views of a 60-year-old woman who underwent extended skin muscle blepharoplasty, upper blepharoplasty with right levator plication, rhytidectomy, endoscopic forehead lift, erbium:YAG laser skin resurfacing to perioral and lower eyelid areas, and plasma skin resurfacing of face. There is significant improvement in the nasojugal and malar folds.

Figure 15   Preoperative (A) and 2-month postoperative (B) views of a 47-year-old woman who underwent extended skin muscle blepharoplasty, upper blepharoplasty, mini face-lift, endoscopic forehead lift, and superficial musculoaponeurotic system (SMAS) augmentation to nasolabial folds. (A) Preoperative frontal view showing infraorbital rim hollowing, prominent nasojugal fold, and deepening of nasolabial fold. (B) Postoperative frontal view showing improvement in the depth of the nasojugal fold and infraorbital rim hallowing. (C) Preoperative oblique view of the patient in Fig. 15 showing the double contour deformity with significant improvement on (D) the 2-month postoperative oblique view. (E) Preoperative side view of the same patient showing double contour deformity with improvement on (F) the 2-month postoperative side view.

lid and ectropion. Due to the extended nature of the skin muscle approach, the patient may have prolonged weakness to the lower lid, with decreased strength of closure. Rarely, this may persist for 2 to 3 months. In addition, this technique is associated with lingering edema; however, it is not to the extent that formal midface techniques induced.

The extended skin muscle flap is not the procedure of choice on patients who have significant midface ptosis and malar insufficiency, as these patients would have a persistent nasojugal groove after this type of blepharoplasty without formally addressing the midface with traditional midface techniques.

CONCLUSION

The extended skin muscle flap blepharoplasty adds another dimension to the approach to lower lid rejuvenation. It allows for excellent results in patients that have borderline indications for midface lifting with less postoperative morbidity (Figs. 14, 15, and 16). Potential patients are those who have some midface ptosis but do

not meet the standard criteria for formal midface lifting or those who want to avoid the extended recovery associated with such techniques. Patients with significant lower lid skin excess and orbicularis muscle hypertrophy are excellent candidates for the transcutaneous approach with a skin muscle flap. This approach also allows removal of any herniated fat or fat repositioning in those with a hollow lid appearance. Patients exhibiting a severe tear trough deformity with extension inferolaterally onto the premalar area, secondary to the inferior descent of the cheek, would benefit from formal midface rejuvenation procedures and therefore are not good candidates for the extended skin muscle blepharoplasty.

In summary, the extended skin muscle blepharoplasty is an excellent technique for patients with orbicularis hypertrophy, skin redundancy, a tear trough deformity, and mild premalar ptosis, as it addresses each of these deformities with minimal downtime.

Figure 16 Preoperative (A, C) and 2-month postoperative (B, D) views of a 55-year-old woman who underwent extended skin muscle blepharoplasty, upper blepharoplasty, rhytidectomy, coronal forehead lift, rhinoplasty, and SMAS augmentation to nasolabial folds. The postoperative views show improvement in the double convexity deformity and depth of nasojugal fold.

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