CME

Simplifying Blepharoplasty

Christopher I. Zoumalan, M.D.
Jason Roostaeian, M.D.
Los Angeles, Calif.

Learning Objectives: After reading this article, the participant should be able to: 1. Identify pertinent eyelid and periorbital anatomical structures when evaluating a patient for blepharoplasty. 2. Adequately evaluate a patient by performing a focused history-taking and medical examination tailored for the aging eyelid patient. 3. Identify the aging changes that have occurred, and determine the particular changes that will be addressed surgically. 4. Determine a safe and effective surgical plan.

Summary: Blepharoplasty remains one of the most common aesthetic procedures performed today. Its popularity stems partly from the ability to consistently make significant improvements in facial aesthetics with a relatively short operation that carries an acceptable risk profile. In this article, the authors attempt to simplify the approach to both upper and lower lid blepharoplasty and provide an algorithm based on the individual findings for any given patient. The recent trend with both upper and lower lid blepharoplasty has been toward greater volume preservation and at times volume augmentation. A simplified approach to upper lid blepharoplasty focuses on removal of excess skin and judicious removal of periorbital fat. Avoidance of a hollow upper sulcus has been emphasized and the addition of volume with either fat grafting or fillers can be considered. Lower lid blepharoplasty can use a transcutaneous or a transconjunctival approach to address herniated fat pads while blending the lid-cheek junction through release of the orbitomalar ligament and volume augmentation with fat (by repositioning and/or grafting) or injectable fillers. Complications with upper lid blepharoplasty are typically minimal, particularly with conservative skin removal and volume preservation techniques. Lower lid blepharoplasty, conversely, can lead to more serious complications, including lid malposition, and therefore should be approached with great caution. Nevertheless, through an algorithmic approach that meets the needs of each individual patient, the approach to blepharoplasty may be simplified with consistent and predictable results. (*Plast. Reconstr. Surg.* 137: 196e, 2017.)

The goal for aesthetic upper and lower lid surgery is to perform a procedure that rejuvenates the patient's appearance in a natural fashion, minimizes risks, and provides a lasting result that both the surgeon and patient are content with. Upper lid blepharoplasty is one of the most common aesthetic operations performed. According to the American Society of Plastic Surgeons, blepharoplasty is the third most common plastic surgery procedure performed in the United States, with over 216,000 eyelid operations performed in 2013, which was a 6 percent increase from the previous year.[1] The popularity of the procedure is a testament to its ability to provide a rejuvenated appearance that is long-lasting in the properly selected patient. Upper lid blepharoplasty attempts to restore the upper lid fold to rest at or above the pretarsal plate

From the Division of Oculoplastic Surgery, Department of Ophthalmology, Keck School of Medicine of the University of Southern California; and the Division of Plastic Surgery, David Geffen School of Medicine, University of California, Los Angeles.
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and remove any contour deformities created by herniated fat compartments or a ptotic lacrimal gland. Brow position can also be addressed concomitantly through various techniques, including coronal, temporal, endoscopic, browpexy, and direct brow lifts, all of which have been thoroughly described in previous publications.[2–6] Ultimately, the result should address as many age-related changes as possible and still minimize the risk for complications.

PERTINENT UPPER AND LOWER LID ANATOMY

Upper Lid Anatomy

It is important to first understand the anatomy to properly execute a surgical plan for patients undergoing aesthetic eyelid surgery. Prior publications have thoroughly described periorbital anatomy.[7–11] Briefly, the upper lid structures going from superficial to deep include the skin and orbicularis muscle. The orbicularis layer is segmentalized into three layers: pretarsal, preseptal, and orbital layers. The pretarsal orbicularis is an important structure for lid closure and involuntary blink. Sparing of the orbicularis can help reduce postoperative issues such as dry eyes and lid closure and also maintain or even restore the fullness to upper lid/brow junction.[12,13] The next layer deep is the orbital septum, which is a fibrous avascular tissue that extends from the orbital periosteum to the superior tarsus and encloses the orbital contents. Just deep to the upper orbital septum are the upper lid fat compartments, of which there are two, the nasal and central.

With aging, the nasal fat pad is most frequently herniated and prominent, often requiring some amount of debulking intraoperatively. The central fat pad is also known as the preaponeurotic fat compartment; it is less often herniated and typically does not require debulking unless there is clear herniation seen preoperatively. The nasal fat pad can be identified by its pale yellow or even white hue in comparison with the more yellow fat of the central compartment.[14] Historically, many surgeons would aggressively debulk the upper lid fat compartments and cause superior sulcal hollowing and/or an A-frame deformity, leading to a more aged appearance.[13] Therefore, in recent years, the pendulum has shifted toward greater preservation of fat, particularly with regard to the central compartment. Deep to the central fat compartment is the levator muscle, followed by the Müller muscle, both of which attach to the tarsal plate. Both muscles are responsible for lid excursion and are separated from each other by a vascular plexus. The levator muscle also has adhesions onto the pretarsal lid, which essentially helps create the lid crease in those patients that have a present lid crease. Patients that have a dehisced levator muscle present with a variable amount of ptosis and often an elongated, or even absent, upper lid crease.

Lower Lid Anatomy

The lower lid, similar to the upper lid going from superficial to deep, has a thin layer of skin and the underlying orbicularis muscle that constitute the anterior lamella. Below the pretarsal orbicularis layer spans the lower lid tarsus which, like the upper lid, is approximately 1 mm in thickness but spans only 3 to 4 mm in height (versus 8 to 10 mm in height for the upper lid tarsus). In a fashion similar to the upper lid, the lower lid retractors insert onto the inferior tarsal plate. In contrast, however, the lower lid retractors are not as anatomically distinct as the upper lid retractors and are clinically identified as one anatomical unit. The capsulopalpebral muscle and the inferior tarsal muscle are the lower lid retractor counterparts to the upper lid levator muscle and Müller muscle, respectively.

The lateral and medial upper lids fuse together to form commissures. The commissure is essentially a blending of lid attachments from the orbicularis, tarsus, and other fascial attachments to create both a medial and lateral canthus that fuses onto the orbital periosteum. The terms “canthal tendon” and “canthal ligament” have been used interchangeably. Although the canthal attachments are neither one specifically, we will refer to them as “canthal tendons” in our article for consistency. In contrast, the lateral retinaculum usually refers to structures that coalesce approximately 5 mm behind the lateral orbital rim at the lateral orbital tubercle (Whitnall tubercle) and include the lateral canthal tendon, lateral horn of the levator muscle, the check ligaments of the lateral rectus, fibers of the orbicularis oculi, and the lateral aspect of the Whitnall (upper eyelid) ligament and the Lockwood (lower eyelid) ligament.[11,15–17] In cases of lower lid shortening or tightening procedures, the inferior canthal tendon is accessed through a lateral canthal incision or an upper lid incision and resuspended appropriately through a canthopexy or a canthoplasty as needed.

UPPER LID AGING CHANGES

The aging upper eyelid generally undergoes the following changes:

1. Subcutaneous brow fat volume loss.
2. Increasing laxity of the skin.
3. Enlargement or atrophy of the central fat compartment (preaponeurotic fat).
4. Enlargement of the nasal fat compartment.

The surgeon should evaluate for the presence and extent of the above changes in every patient to determine the appropriate and customized surgical plan.

Subcutaneous Brow Fat Volume Loss

Depending on the amount of brow fat pad volume loss, patients can present with brow ptosis or just a deflated brow with secondary dermatochalasis of eyelid skin (Fig. 1). A wide variation of brow position exists; thus, premorbid photographs are useful in determining the individualized aging changes that have occurred with the brow and its position. In general, the highest peak of the brow is usually seen at the junction of the middle and lateral thirds of the brow, which is at the level of the lateral corneoscleral limbus. In women, a youthful brow usually rests 0.5 to 1 cm above the orbital rim. In men, in contrast, a youthful brow usually rests at or slightly above the orbital rim and with a gentle peak to the arch. Significant lateral hooding of the upper lid can often be secondary to brow ptosis, and when present, upper lid blepharoplasty alone will worsen the ptotic brow. A combined brow lift along with the upper lid blepharoplasty should be considered in such instances (Fig. 2).

Brow-Lifting Procedures

Although various approaches toward accomplishing brow elevation have been described, some of the more commonly used techniques include the coronal and endoscopic brow lifts. Both of these procedures allow for elevation of the brow and also enable the surgeon to improve forehead and glabellar rhytides through direct muscular excision. A temporal brow lift can be performed alone or in conjunction with an endoscopic lift. A temporal brow lift elevates the lateral tail of the brow and improves the lateral orbicularis rhytides. Direct brow lifts (suprabrow or mid-forehead incisions) are usually reserved for patients with severe brow ptosis in which the incisions are made within rhytides and usually heal quite well when carefully planned. Browpexy procedures are usually performed in mild cases of brow ptosis to help stabilize the brow position.[2–6,18–20]

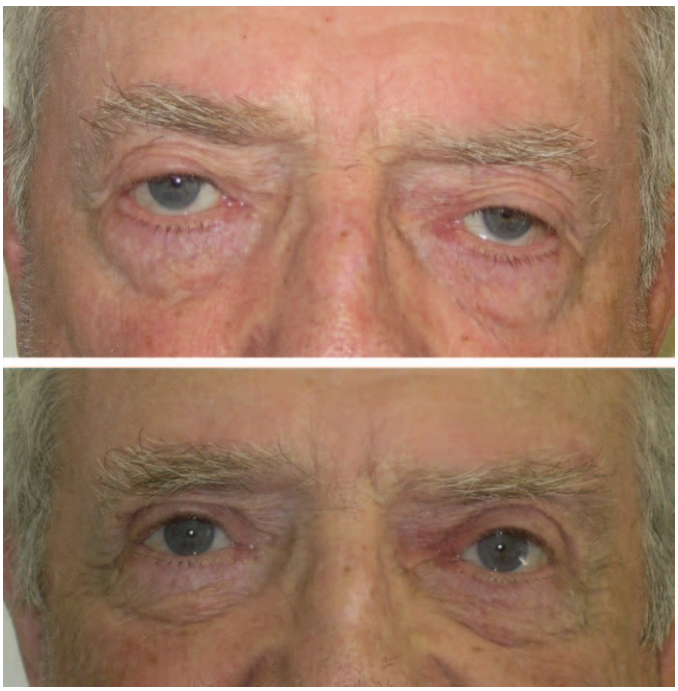

Fig. 1. (*Above*) Preoperative photograph of an elderly man presenting with left brow ptosis, bilateral dermatochalasis, and bilateral moderate lid ptosis. (*Below*) Postoperative photograph taken 6 months after undergoing bilateral upper lid ptosis repair, bilateral upper lid blepharoplasty, and direct left browpexy.

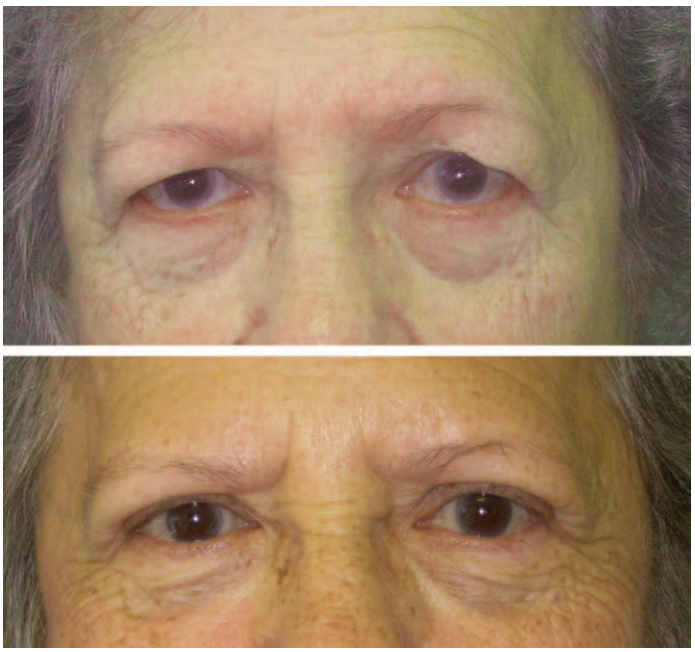

Fig. 2. (*Above*) Brow ptosis, right greater than left. (*Below*) Six-month postoperative result following bilateral upper lid blepharoplasty and right direct lateral brow lift.

Excess Laxity of the Upper Lid Skin

Excess upper lid skin is the most common complaint a patient will describe with regard to the aging upper eyelid. Loss of elasticity results in increased skin folding over the lid crease. This is seen clinically as lash hooding where the skin overhangs and conceals the lid crease and, in severe cases, can even obstruct the visual field.

Premorbid Photographs

Evaluating patient photographs from their youth can often reveal the lid changes that occurred over time and aid surgical planning. In cases where the patient had low-set eyelid folds (i.e., little to no pretarsal show) even at a young age (i.e., twenties), the surgical plan should still respect the patient's unique premorbid appearance. In such instances, an appropriate amount of skin should be excised but not enough to result in a visible or hollowed-out superior sulcus (Fig. 3). In cases where the patient had a high lid crease with a visible superior sulcus at a younger age (according to premorbid photographs) but now has excess skin and hooding, an upper lid blepharoplasty to restore the patient's premorbid appearance is appropriate, provided that the markings are performed appropriately to prevent complications with lid closure (Fig. 4). Patients with significant hollowing of the superior sulcus but without any associated dermatochalasis are typically not blepharoplasty candidates. These patients have volume loss and should be evaluated for possible ptosis and periorbital volume augmentation.[21]

Patient Examination

A detailed medical and focused ophthalmic history must be obtained before any cosmetic eyelid operation. Previous CME articles on blepharoplasty thoroughly review preoperative workup with regard to history and physical examination findings.[22,23] Patients with lid ptosis should undergo a thorough evaluation as discussed in prior literature.[24,25] Combined ptosis and blepharoplasty surgery should be considered in those patients with concomitant ptosis and dermatochalasia. It must be stressed, however, that patients with active dry eye symptoms and/or recent corneal refractive surgery (i.e., laser-assisted in situ keratomileusis) within the past 6 months are not suitable candidates for blepharoplasty. This patient population is at risk for worsening of both dry eye symptoms and keratopathy.[26–29] Patients with active dry eye symptoms should undergo further ophthalmologic evaluation before any surgical intervention.

Incision Marking

Incision markings should be uniquely designed based on each patient's individual examination and the goal of the procedure. Markings should be made with the patient in the upright

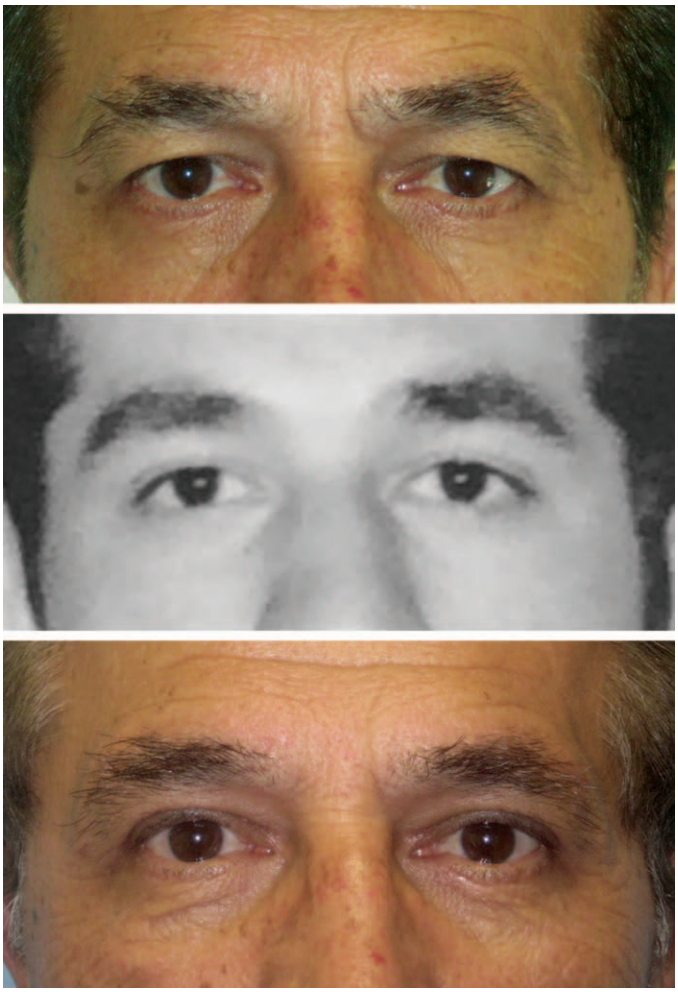

Fig. 3. (*Above*) A 65-year-old man with bilateral lash hooding obstructing visual fields. (*Center*) Premorbid photograph taken when the patient was in his early thirties showing minimal pretarsal show in his upper lids. (*Below*) Postoperative photographs taken 6 months after undergoing skin-only bilateral upper lid blepharoplasty. Note the preservation of his upper lid fold with mild pretarsal show.

position to help factor the role of gravity on eyelid and brow position. (**See Video, Supplemental Digital Content 1**, which demonstrates preoperative marking of excess skin in upper lids before performing an upper lid blepharoplasty. This video is available in the "Related Videos" section of the full-text article on PRSJournal.com or at ***http://links.lww.com/PRS/B531***.)

The natural upper eyelid crease is first identified if present. If the brow and upper lid excess skin are blocking the direct view of the upper lid crease (which is often the case), the surgeon uses his or her nondominant hand to elevate the lateral brow. In cases where the patient is undergoing a combined brow lift and blepharoplasty procedure, a conservative amount of eyelid skin should be removed to reduce the incidence of lagophthalmos. When marking the amount of eyelid skin to be removed during a combined brow lift and blepharoplasty procedure, the surgeon should first elevate the brows to the intended postsurgical position so that the amount of skin that is marked takes into account the higher brow position. The lid crease should follow an elliptical shape that mimics the contour of the upper lid (Fig. 5). In cases where there are several visible static rhytides in the upper lid pretarsal area (especially in those with significant dermatochalasis), levator excursion can help identify the true lid crease through dynamic action.

The medial edge of the lower incision markings does not go past the superior punctum. Laterally, the lid incision slopes downward toward the

Fig. 4. (*Above*) This patient desired upper lid blepharoplasty. The patient had minimal dermatochalasia, with some hollowing in her superior sulcus, along with a moderate amount of pretarsal show. Premorbid photographs confirmed she has always had some hollowing in her superior sulcus since youth. (*Below*) One-year postoperative result following a conservative, skin-only bilateral upper lid blepharoplasty. A lower lid blepharoplasty was also performed.

lateral canthus to a point approximately 5 mm above the lateral canthus. If there is visible lash hooding laterally, the marking is taken laterally usually to no more than the extent of the orbital rim (or within 10 mm past the lateral canthus)

Video 1. Supplemental Digital Content 1 demonstrates preoperative marking of excess skin in upper lids before performing an upper lid blepharoplasty. This video is available in the "Related Videos" section of the full-text article on PRSJournal.com or at ***http://links.lww.com/PRS/B531***.

but curving in a graded upward angle within the patient's crow's feet rhytides.

The superior extent of the incision is then marked. The authors prefer performing this while the patient is sitting up in primary gaze position. If there is minimal medial upper lid dermatochalasis, a sharp ellipse is drawn medially; however, if there is excess skin medially, which requires more than an elliptical marking, the superior medial marking takes a more oval or rounded shape.

Nontooth forceps are used before the injection of local anesthesia to help determine that the amount of skin marked is not going to result in excessive lash eversion or lagophthalmos. Approximately 20 mm of skin should be left between the lower edge of the eyebrow and the lid margin (Flowers' rule). Alternatively, others have recommended following the contour of the brow and providing at least 10 mm between the inferior edge of the brow and the superior marking. Both of these techniques can often generalize the procedure and provide a result that may not be individualized to the patient. However, they do provide good general guidelines, particularly for the novice surgeon.

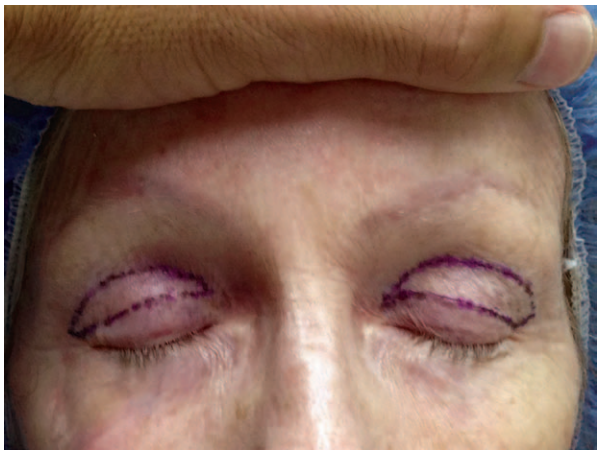

Fig. 5. Preoperative markings for upper lid blepharoplasty. Patients that have prominent nasal (medial) dermatochalasia benefit from more oval marking medially rather than a traditional ellipse as shown in this example.

Anesthesia

Upper lid blepharoplasty is generally performed under local anesthesia or intravenous sedation, whereas lower lid blepharoplasty is typically performed under intravenous sedation or general anesthesia. Various factors play a role in anesthesia selection, some of which include length of case and surgeon preference. The authors typically use 2% lidocaine with 1/100,000 units of epinephrine mixed in a 9:1 concentration of sodium bicarbonate, which acts as a pH buffer. Hyaluronidase (0.1 to 10 ml of local anesthetic) may also be added to help diffuse the local anesthetic through the subcutaneous layer.

Upper Lid Blepharoplasty Procedure

The skin markings are incised with a no. 15 blade. The authors typically preserve the orbicularis layer unless some redundant orbicularis muscle is present. Herniated nasal fat pads are removed if they are noted to be prominent preoperatively. Central fat pockets are generally left preserved to maintain fullness to the upper lid. Care is taken to avoid excessive cauterization of the orbicularis muscle. The wound is then carefully closed with either interrupted, simple running, or running subcuticular closure.

LOWER LID BLEPHAROPLASTY

Ongoing debate continues regarding the "ideal" approach to lower lid blepharoplasty. There are two main approaches to lower lid blepharoplasty. The first is a transcutaneous approach where a skin incision is made externally to address excess skin while accessing the underlying fat compartments and orbicularis muscle. The second is a transconjunctival approach that enables the surgeon to avoid the anterior and middle lamellae while accessing the fat compartments.

Transcutaneous lower lid blepharoplasty has been used for several decades and can effectively address lower lid skin excess, ptotic orbicularis, and herniated fat pads.[30,31] Within the transcutaneous approach, there are variations such as the skin-only flap, the skin-muscle composite flap, and the separate skin and muscle flap. With any transcutaneous approach, lower lid ectropion and retraction has become the main feared complication. The occurrence of lid malposition, however, seems to have become less frequent with the incorporation of concomitant canthal suspension and lid shortening techniques.[15–17,32–35]

Attempts to reduce the rate of lower lid malposition popularized the transconjunctival approach over the past few decades.[36–39] With traditional lower lid transconjunctival blepharoplasty techniques, herniated fat compartments were debulked, and any excess skin was addressed with either a skin pinch, an ablative laser, or chemical peels. Proponents such as Zarem and Resnick idealized the ability to avoid the middle lamella with such techniques.[37,38] The results initially were satisfactory in most patients; however, with both approaches, there remained a tear trough deformity that compromised the postoperative result.

Evolution of the Infraorbital Rim Hollow and Volume Preservation in Lower Lid Blepharoplasty

Loeb is credited with introducing the concept of repositioning orbital fat along the medial infraorbital rim to address the tear trough deformity.[40,41] Hamra later described the lower lid septal reset technique that he often incorporated with his deep plane rhytidectomy. The septum and the herniated fat pockets were redraped over the maxilla through a subperiosteal plane following release of the arcus.[42,43] Barton et al. further discussed the importance of septal reset, and showed that it could dramatically improve the tear trough deformity with consistency and low complication rates.[44]

Goldberg later published a modified technique to reposition lower lid fat compartments subperiosteally through a transconjunctival approach.[45] Since then, others have described repositioning of orbital fat subperiosteally or supraperiosteally through various approaches and anchoring techniques. Although the subperiosteal plane allows for better visualization of the infraorbital foramen

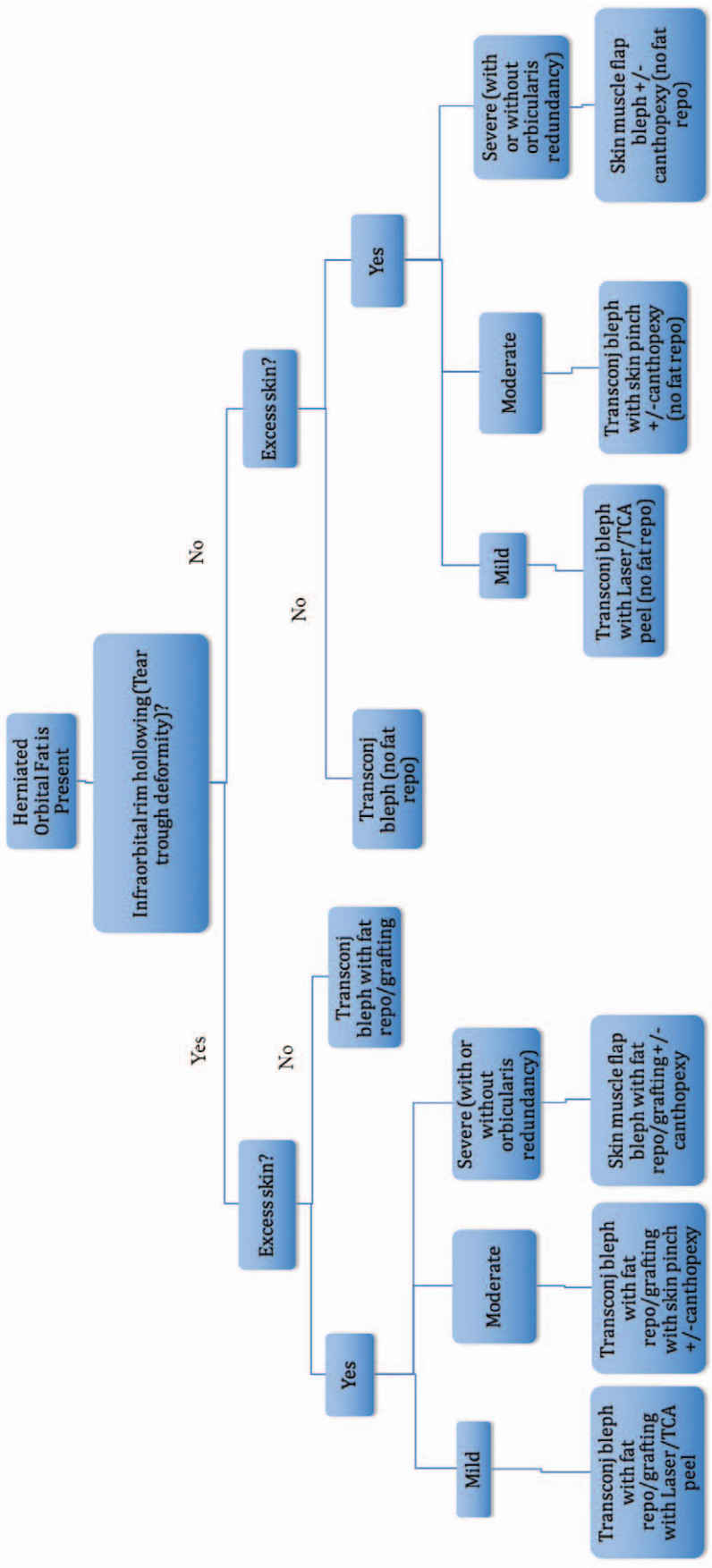

Fig. 6. Algorithm for lower lid blepharoplasty. This algorithm can be used as a general guideline in surgical planning for lower lid blepharoplasty. Figure 6 demonstrates the section of the algorithm for those patients with visible herniated orbital fat on examination. Figure 7 demonstrates the section of the algorithm for those patients with no visible herniated orbital fat on examination. Note that the surgeon's experience, the individual patient findings, and the particular expectations from surgery will ultimately dictate which technique is best suited for the aging eyelid patient. Patients with moderate to severe lid laxity may require a lid shortening canthoplasty or a canthopexy. Care should be taken when excising skin in patients with a negative vector. Caution should also be taken when performing skin resurfacing (chemical peel or laser) in those with a Fitzpatrick score of 4 or greater.

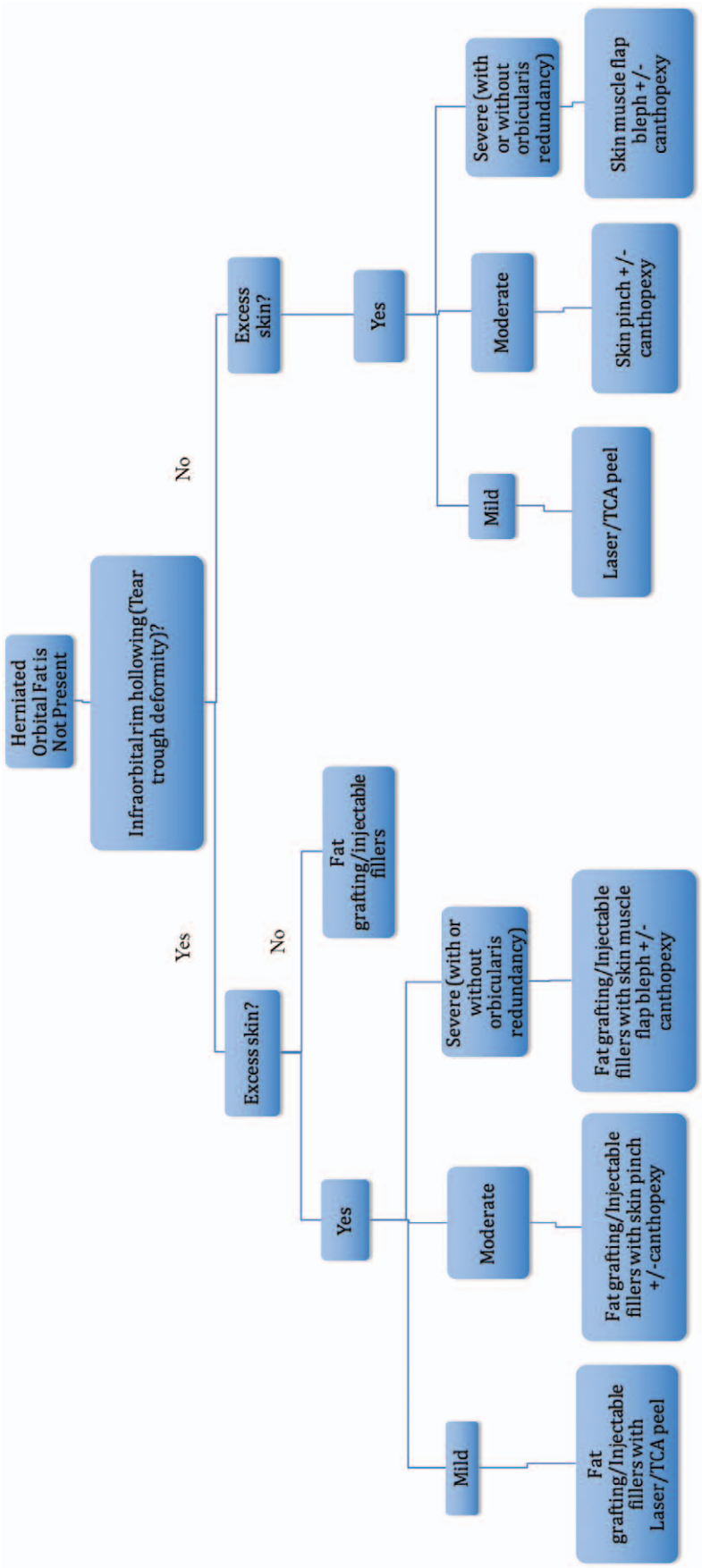

Fig. 7. Algorithm for lower lid blepharoplasty. This algorithm can be used as a general guideline in surgical planning for lower lid blepharoplasty. Figure 6 demonstrates the section of the algorithm for those patients with visible herniated orbital fat on examination. Figure 7 demonstrates the section of the algorithm for those patients with no visible herniated orbital fat on examination. Note that the surgeon's experience, the individual patient findings, and the particular expectations from surgery will ultimately dictate which technique is best suited for the aging eyelid patient. Patients with moderate to severe lid laxity may require a lid shortening canthoplasty or a canthopexy. Care should be taken when excising skin in patients with a negative vector. Caution should also be taken when performing skin resurfacing (chemical peel or laser) in those with a Fitzpatrick score of 4 or greater.

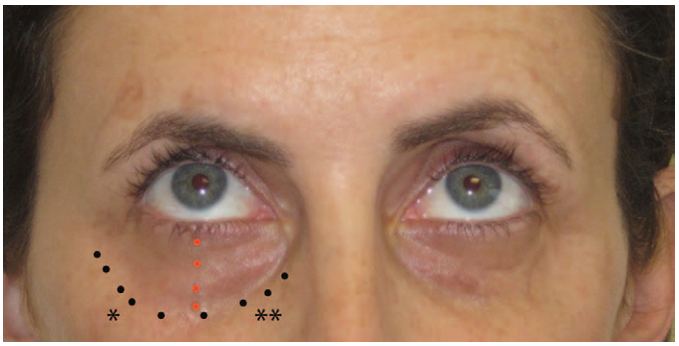

Fig. 8. The *curved black dotted line* demonstrates the infraorbital rim hollowing in this 45-year-old patient. The midpupillary line is denoted by the *red dotted line*. The tear trough deformity comprises the medial portion of the infraorbital rim hollowing (area above the *double asterisks* just medial to the midpupillary line), and the lid/cheek junction comprises the lateral extent of the infraorbital rim hollowing (area above the *single asterisk* lateral to the midpupillary line). Mild orbital fat prolapse is also noted above the tear trough deformity. These findings can exist together or independently in the aging eyelid.

through a fairly avascular plane, current studies argue that repositioning fat in the supraperiosteal plane is technically easier to perform, with cosmetic outcomes that are as good if not better.[46,47]

Recent Trends in Lower Lid Blepharoplasty

Although there remains a role for debulking fat compartments, there has been a trend toward greater preservation and even augmentation of volume during lower lid blepharoplasty. Herniated orbital fat compartments can be repositioned along the infraorbital rim to allow for an improvement in infraorbital hollowing. Fat repositioning, however, has its limitations and may at times be inadequate for full correction of infraorbital hollowing. In such instances, autologous fat grafting to the deep malar cheek pads and the remaining periorbital area has gained popularity.[48,49] Fat grafting can allow for comprehensive augmentation of the periorbita and address midface volume loss that is commonly found alongside the aging eyelid.[7–9]

Patient Examination

An algorithmic approach to evaluating the lower eyelid can help determine the appropriate procedure that will address the deformity and minimize complications (Figs. 6 and 7).[50] When evaluating a patient for lower lid blepharoplasty, it is important to identify the aging changes that have occurred. Every examination should evaluate the following:

1. Presence and extent of herniated orbital fat pads.
2. Presence and extent of infraorbital rim hollowing (which includes the tear trough deformity).
3. Degree of skin excess.
4. Presence and extent of midface volume loss.
5. Fitzpatrick score (in cases where skin resurfacing will be considered).
6. Eyelid-cheek vector.
7. Lid tone.

Presence and Extent of Herniated Orbital Fat Pads

Recent studies have supported age-related enlargement of orbital fat, which can result in the herniation of orbital fat pads along the lower lid with increasing age.[14,51,52] Fat pads that are herniated anterior to the orbital rim should be addressed surgically. Significant orbital fat herniation will require debulking and/or repositioning, depending on the amount of orbital fat present and the extent of volume loss along the infraorbital rim. Herniated fat pads provide valuable vascularized fat that would have otherwise been removed. One may consider a septal reset in patients with severe tear tough deformities that require extensive repositioning of fat to fill the tear trough deformity. The septum provides a fibrous tissue layer that serves as an ideal carrier for orbital fat contents and that may at times allow for better purchase for

Fig. 9. Lower lid aging. (*Above*) Patient with tear trough deformity, but with no skin excess or herniation of orbital fat pads. She is a candidate for injectable fillers to the tear trough area. (*Below*) The patient demonstrates improvement in her tear trough deformity following injectable fillers with hyaluronic acid.

the suture and more secure repositioning below the infraorbital rim. Of note, a recent study found better clinical results in patients that underwent septal reset versus fat pedicle repositioning.[53] At times, further volume augmentation of the periorbita is necessary, and injection with synthetic fillers and/or fat grafting may be performed as needed during or following surgery.

Presence and Extent of Infraorbital Rim Hollowing

Age-related subcutaneous volume loss along the infraorbital rim is well documented and is often seen concomitantly in patients with herniated fat pads. The medial infraorbital rim hollowing is also termed tear trough deformity or a nasojugal groove.[44] It usually spans from the medial canthus toward the midpupillary point along the infraorbital rim. Anatomical studies have shown that the subcutaneous thinning of the eyelid skin medially results in a tear trough deformity.[54,55] Extending laterally from this plane along the infraorbital rim is another hollowing termed the palpebromalar or lid-cheek junction. Infraorbital rim hollowing can occur along the entire lower lid rim (Fig. 8). In cases that involve infraorbital rim hollowing with little to no fat prolapse or excess skin, injectable filler treatment to augment the volume loss without surgery should be considered (Fig. 9).[56,57] However, if there is concomitant orbital fat pad herniation that would still be present despite infraorbital rim volume augmentation, lower lid blepharoplasty with fat repositioning is recommended.

Eyelid/Cheek Vector

The surgeon should always examine the position of the globe relative to the infraorbital rim/maxilla. Jelks and Jelks have described vector assessment in prior literature.[58] Patients with a negative vector are at a higher risk for lower lid malposition following lower lid blepharoplasty. Efforts to avoid skin excision and preserve lower lid volume and/or even increase midface volume should be considered in such cases.

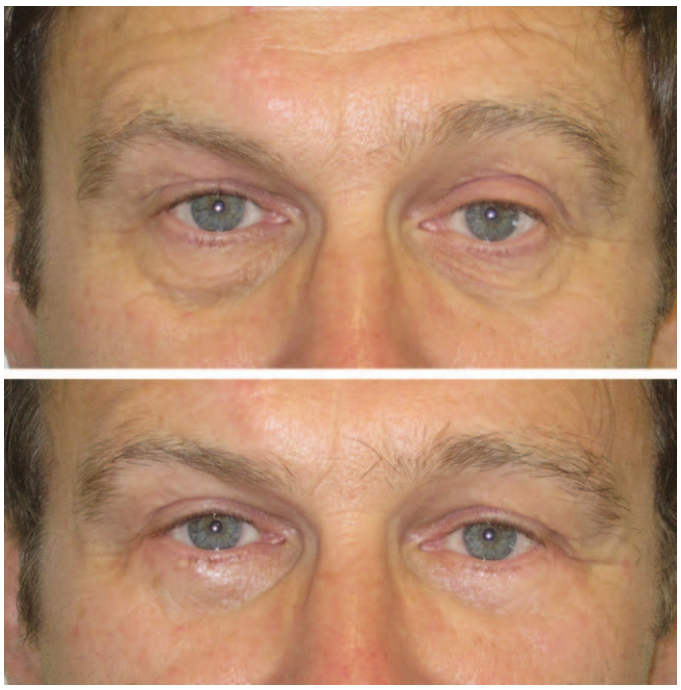

Fig. 10. Lower lid aging. (*Above*) Moderate to severe lower lid skin excess is demonstrated, with some redundant orbicularis muscle and no orbital fat prolapse. (*Below*) A skin-muscle flap blepharoplasty was performed with canthopexy. The patient did not have adequate orbital fat for repositioning and did not wish to have any autologous fat grafting, which would have further improved his infraorbital hollows.

Amount of Skin Excess

A critical decision in lower lid blepharoplasty is whether skin needs to be removed, and how much should be removed to optimize the patient's result. Redundant skin that creates folds in the lower lid typically requires skin excision. In cases where there is predominant lower lid skin excess with little to no fat prolapse, a transcutaneous incision enables removal of the excess skin. If there is some redundant orbicularis muscle present, a skin-muscle flap blepharoplasty can be performed to resuspend the lower lid orbicularis to allow for better lower lid rejuvenation and support[35,59] (Fig. 10). In cases where there is excess skin, herniated orbital fat pads, and infraorbital rim hollowing, volume preservation lower lid blepharoplasty with fat repositioning can reduce the amount of skin that should be removed. Mild rhytides and skin excess that may be present following volume preservation lower lid blepharoplasty can benefit from ablative skin resurfacing techniques (<2 mm of skin excess) (Fig. 11). If there is moderate excess skin present after a volume preservation lower lid blepharoplasty, a skin pinch can be performed at the same time in select cases.[48,60–62] More severe skin excess may benefit from skin flap elevation and excision, particularly to address skin excess that extends along the entire length of the lower lid.

Ablative Skin Resurfacing

Ablative laser or chemical peels can help improve the lower lid rhytides in patients that undergo a transconjunctival blepharoplasty. Ablative procedures are generally reserved for patients with Fitzpatrick skin type III or lower, and caution is used in those with type IV skin or higher because of increased risks of pigmentary changes. Pretreatment with a 4- to 6-week nightly regimen of topical retinoin (0.05% to 0.10%), hydroquinone (4% to 8%), and alpha hydroxyl acid (4% to 10%) up until 1 week before treatment is recommended.

Trichloroacetic acid ranging from 20% to 35% provides a satisfactory result in patients with mild rhytides.[63,64] Facial ablative resurfacing with lasers is performed typically with carbon dioxide and erbium:yttrium-aluminum-garnet lasers.[64] Traditional ablative platforms are very effective but carry

Fig. 11. Lower lid aging. (*Above*) This patient had moderate herniation of the lower lid fat pads, tear trough deformity, and mild skin excess. (*Below*) Eight-month postoperative result following bilateral transconjunctival lower lid blepharoplasty with fat repositioning and 30% trichloroacetic acid chemical peel.

a risk for prolonged healing time, erythema, edema, and risk of hypopigmentation. In contrast, fractionated ablative platforms can help lead to faster reepithelialization and thus quicker healing times.[65]

Lid Tone

Lid tone should be evaluated in every patient. There is invariably some element of lid laxity in most elderly patients. Caution should be exercised with skin excision when a poor snap-back test or distraction of greater than 6 mm of lid from the globe is found. Conservative excisions, particularly medially, should be performed in such cases. A concomitant lid resuspension technique such as canthopexy should also be considered in cases with mild to moderate lid laxity, particularly when performing any skin removal.[15] Canthopexy procedures can be performed either through an open lateral canthal incision or through an upper lid crease incision. In both techniques, the lateral canthal tendon is grasped and secured to the Whitnall tubercle inside the orbital rim, at the appropriate vertical height for adequate resuspension. However, a canthopexy does not shorten the lower lid. In contrast, tarsal strip canthoplasty is a lid-shortening technique and should be reserved for cases with severe lid laxity (i.e., >6-mm distraction, poor snap-back test) and/or preoperative ectropion.[35,66]

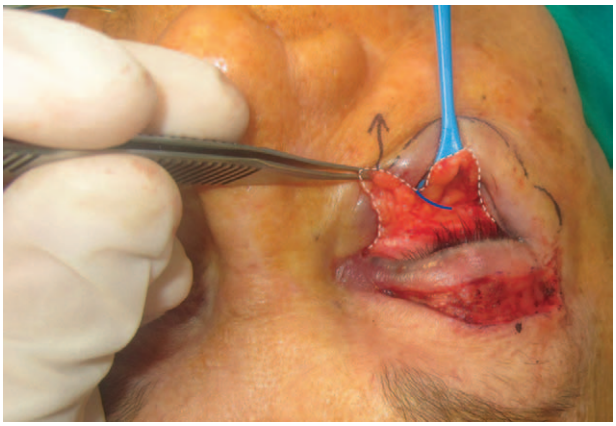

Fig. 12. Intraoperative view of the medial and central fat pedicles before preparation for debulking and fat repositioning of the right lower lid. The *white dashed line* demarcates the border of the medial and central fat pedicles (going from left to right, respectively). The *blue line* outlines the location of the inferior oblique muscle, which is seen here between the medial and central fat pedicles.

TRANSCONJUNCTIVAL BLEPHAROPLASTY

The transconjunctival incision allows the surgeon direct access to the lower lid fat compartments. The incision is typically 4 to 6 mm below the inferior tarsal plate to detach the lower lid retractors away from the inferior tarsal plate. The

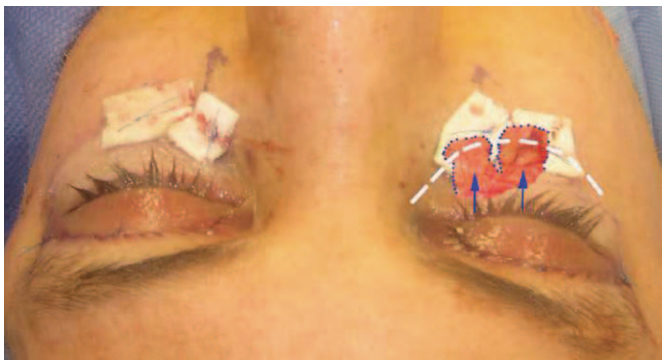

Fig. 13. Location and extent of the repositioned medial and central fat pedicles over the orbital rim using digital enhancement. The author has digitally transposed fat pedicles from a prior intraoperative photograph onto the current image taken at the end of a lower lid blepharoplasty operation that incorporated subperiosteal fat repositioning using percutaneous bolsters. The *blue dotted line* indicates the extent of the medial and lateral fat pedicles that are being repositioned below the infraorbital rim hollow (outlined in *white*).

incision spans the puncta medially and just adjacent to the lateral canthus laterally.

The three orbital fat pads are identified through a postseptal or preseptal approach, medial first, followed by central, then lateral. If fat repositioning is going to be performed, both the medial and central fat compartments are typically repositioned and the lateral fat compartment is debulked to the level of the orbital rim (Fig. 12). The lateral aspect of the infraorbital rim has been shown to be rejuvenated best with autologous fat grafting and/or postoperative synthetic subdermal fillers as opposed to redraping techniques.[48]

Video 2. Supplemental Digital Content 2 demonstrates the essential steps involved in performing an upper lid blepharoplasty and a lower lid transconjunctival blepharoplasty with lower lid fat repositioning and application of 30% trichloroacetic acid. This video is available in the "Related Videos" section of the full-text article on PRSJournal.com or at ***http://links.lww.com/PRS/B532***.

Once an adequate amount of fat has been prepared for repositioning, dissection is performed along the orbital rim through a subperiosteal or supraperiosteal approach (Fig. 12). The authors prefer externalizing a percutaneous suture that secures the fat pedicles subperiosteally using a 5-0 polypropylene suture both medial and lateral to the infraorbital nerve (Figs. 13 through 15). Other authors have described repositioning using buried, absorbable sutures.[47,67,68] The sutures are tied over a bolster and removed on postoperative day 6. Our preferred technique is shown in our accompanying video. (**See Video, Supplemental Digital Content 2**, which demonstrates the essential steps involved in performing an upper lid blepharoplasty and a lower lid transconjunctival blepharoplasty with lower lid fat repositioning and application of 30% trichloroacetic acid. This video is available in the "Related Videos" section of the full-text article on PRSJournal.com or at ***http://links.lww.com/PRS/B532***.)

SKIN MUSCLE FLAP BLEPHAROPLASTY

Although there exists several variations to the technique, the skin-muscle flap blepharoplasty has been well-described by Codner et al.[35] In summary, the surgeon first elevates a skin-muscle flap through a subciliary incision while preserving 3 to 4 mm of underlying pretarsal orbicularis muscle. The preseptal portion of the orbicularis muscle is

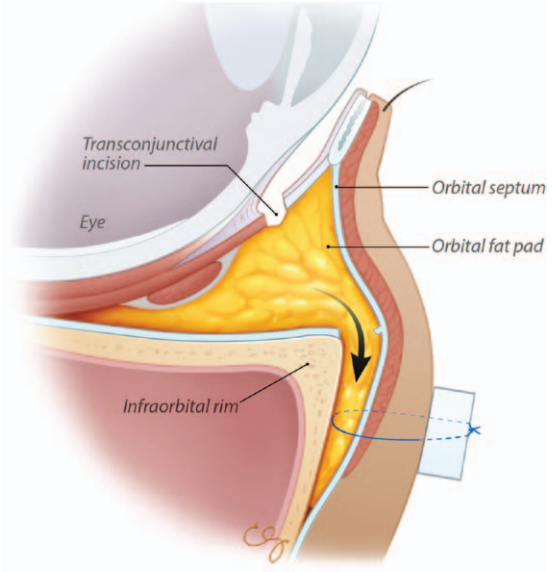

Fig. 14. Illustration of the lower lid and periorbital structures. Sagittal view of a subperiosteally repositioned fat pedicle below the infraorbital rim that is secured in place with a percutaneous bolster.

included in the skin-muscle flap, which is carefully created inferiorly toward the infraorbital rim. A selective release of the orbicularis retaining ligament supraperiosteally can be performed to help improve the appearance of the lid-cheek junction. Herniated orbital fat is visualized through septal incisions, and the fat pads are either debulked and/or repositioned along the infraorbital rim subperiosteally with or without a septal reset procedure as described above. To help preserve orbicularis innervation, the lateral dissection should not go past the lateral orbital rim. A lateral canthopexy is then performed as mentioned previously.[15,35,69] The skin muscle flap is then elevated in a superotemporal direction and trimmed as needed. The orbicularis is then resuspended along the lateral orbital rim. Excess skin is then excised conservatively and the incision is closed carefully.

Fig. 15. Illustration showing an oblique view of the medial and central orbital fat pedicles repositioned over the maxilla medial and lateral to the infraorbital nerve. The *dotted white line* demarcates the location of the infraorbital rim hollowing that is seen clinically.

POSTOPERATIVE CARE

Patients are instructed to use ice-water–soaked gauze or cool packs to the affected area for the first 72 hours to minimize swelling. Severe pain is unusual following a blepharoplasty, and patients should be evaluated immediately in the office to rule out retrobulbar hematoma in cases of severe pain and/or vision changes. Head position is usually maintained at or above the heart level to reduce edema. An antibiotic ophthalmic ointment (i.e., erythromycin) is often applied to the upper lids two times per day for the first week. Antibiotic drops with or without a steroid component four times per day for the first week are used in cases where a conjunctival incision is made. Patients are instructed to refrain from any strenuous activity for the first 10 to 14 days. Sutures are removed, usually on postoperative days 5 to 7. Patients are advised that most of the swelling persists for 2 weeks after surgery but that residual swelling, which at times can be asymmetric, may last up to 3 to 6 months.

COMPLICATIONS

Complications associated with blepharoplasty should be well understood by the surgeon. Lelli and Lisman provide a comprehensive review of the complications and categorize them into early, intermediate, and late phases.[70] The most feared early complication is orbital hemorrhage, which must be identified and treated immediately, as this can result in permanent vision loss and even blindness. If vision is threatened, treatment should involve an immediate ophthalmologic consultation and medical and/or surgical treatment. Medical treatment may include intraocular pressure–reducing medications, and surgical treatment may include exploration of the wound and/or lateral canthotomy/cantholysis to help reduce orbital pressure.[71,72] Infections following blepharoplasty, albeit rare, can occur and should be assessed and treated appropriately with antibiotics.[73]

Intermediate- and long-term complications include dry eyes, lower lid malposition,

lagophthalmos, and ptosis. Many of these complications can often be avoided with careful preoperative planning and appropriate surgical technique. Intermediate- and long-term complications can be very difficult to manage, often requiring surgical revision for treatment, and therefore every attempt to avoid such complications with proper planning and execution should be made. Dry eyes should be assessed preoperatively and optimized before the patient undergoes any blepharoplasty procedure. Iatrogenic ptosis should be avoided by taking care to preserve levator attachments to the tarsal plate by avoiding excessively deep dissection directly onto the tarsal plate during an upper lid blepharoplasty. Lagophthalmos often involves overzealous skin excision, particularly when performed in conjunction with a brow lift. Conservative markings and using measurements as a guideline as mentioned above should help avoid such complications. Lid malposition is one of the more feared complications of the lower lid and frequently requires surgical management. On first indication of lid retraction, lid massaging and Carraway exercises should be instituted as soon as possible.[74] Injection of wound modulators such as triamcinolone and/or 5-fluorouracil has been used in attempts to minimize scar formation and retraction. Although they have a long record of safety, efficacy, and mechanistic understanding, the use of such wound modulators is an off-label use, and adequate patient counseling should be performed before their administration.[75–78] If conservative treatments have failed, surgical revision should be considered.

CONCLUSIONS

Recent literature has supported volume preservation with both upper and lower lid blepharoplasty. Such advancements have enabled patients to undergo a procedure that rejuvenates their eyelids and maintains a more natural appearance to the periorbita. Careful preoperative planning should be performed to determine an optimal approach for each patient. The surgeon should be aware of the anatomical changes that occur in the aging eyelid, and the use of premorbid photographs can help clarify such changes and the goal for rejuvenation. An algorithmic approach is useful in determining the appropriate surgical plan. Through careful preoperative evaluation and sound surgical planning, the surgeon can reduce the risks of complications and deliver a consistent and predictable result.

Jason Roostaeian, M.D.
Division of Plastic Surgery
David Geffen School of Medicine
University of California, Los Angeles
200 UCLA Medical Plaza, Suite 465
Los Angeles, Calif. 90095
jasonroostaeian@mednet.ucla.edu

PATIENT CONSENT

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

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