

Functional Considerations in Aesthetic Eyelid Surgery

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Background: Aesthetic eyelid surgery involves intricate techniques to improve the appearance of the periorbital region. In the presence of preoperative ptosis, lower lid laxity or malposition, prominent eyes, and xerophthalmia (dry eyes), patients are at an increased risk of developing postoperative complications such as scleral show, ectropion, corneal injury, and persistent ptosis.

Methods: The authors identify patients at increased risk for functional problems after blepharoplasty and describe detailed preoperative evaluation to identify patients who may be at increased risk prior to surgery.

Results: In order to minimize the complications rates associated with blepharoplasty, it is of paramount importance to appreciate and address these functional concerns in the approach to blepharoplasty surgery.

Conclusion: After reading this article, the participant should be able to demonstrate a systematic approach to identify high-risk blepharoplasty patients and manage functional issues in both upper and lower blepharoplasty. (*Plast. Reconstr. Surg.* 134: 1154, 2014.)

The periorbital region is the foundation of an aesthetically youthful appearance, giving blepharoplasty an integral role in facial rejuvenation. A variety of surgical techniques have been described to improve the appearance of the eyelids while attempting to decrease complications.¹⁻⁶ Patients with preoperative upper lid ptosis, lower lid laxity or malposition, prominent eyes, and xerophthalmia (dry eyes) are at an increased risk of developing postoperative complications such as scleral show, ectropion, corneal injury, and persistent ptosis.⁷ The added complexity in the subset of patients with these functional issues necessitates careful assessment and operative planning to mitigate the incidence of poor outcomes. The purpose of this article is to underscore the significance of these functional considerations in blepharoplasty by means of a guided patient interaction.

ANATOMY OF THE EYELIDS

The upper and lower eyelids both consist of an anterior and posterior lamella, separated by the orbital septum.⁸ Skin and the orbicularis oculi muscle, which is subdivided into the pretarsal, preseptal, and orbital components,

constitutes the anterior lamella.⁹ The posterior lamella includes the tarsal plate, which provides the structural integrity of the eyelids, and the conjunctiva¹⁰ (Fig. 1). Having a thickness of 1 mm, the tarsal plate is 25 mm wide, with a height of 10 mm in the upper eyelid and 4 mm in the lower eyelid. Medial and lateral canthal tendons connect the tarsal plates to the bony orbit, creating the tarsoligamentous sling. Posterior reflections of the medial and lateral canthal tendons insert into the posterior lacrimal crest and the Whitnall tubercle, respectively (Fig. 2). The Whitnall tubercle is located 2 mm posterior to the orbital rim, allowing the

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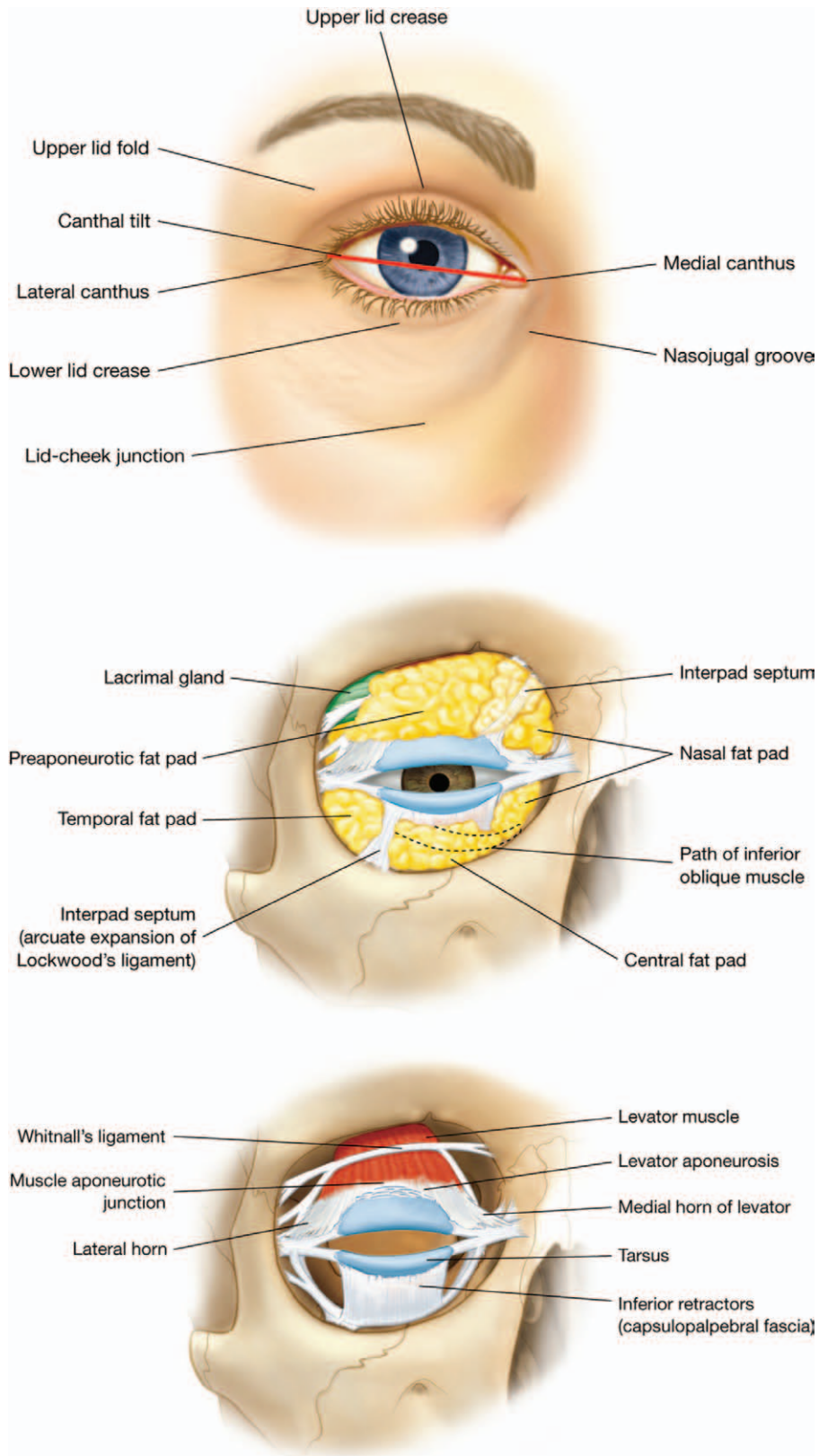


Fig. 1. (Above) Periorbital surface anatomy. (Center) Orbital fat compartments in the upper and lower eyelids. (Below) Posterior lamella and levator palpebrae superioris. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

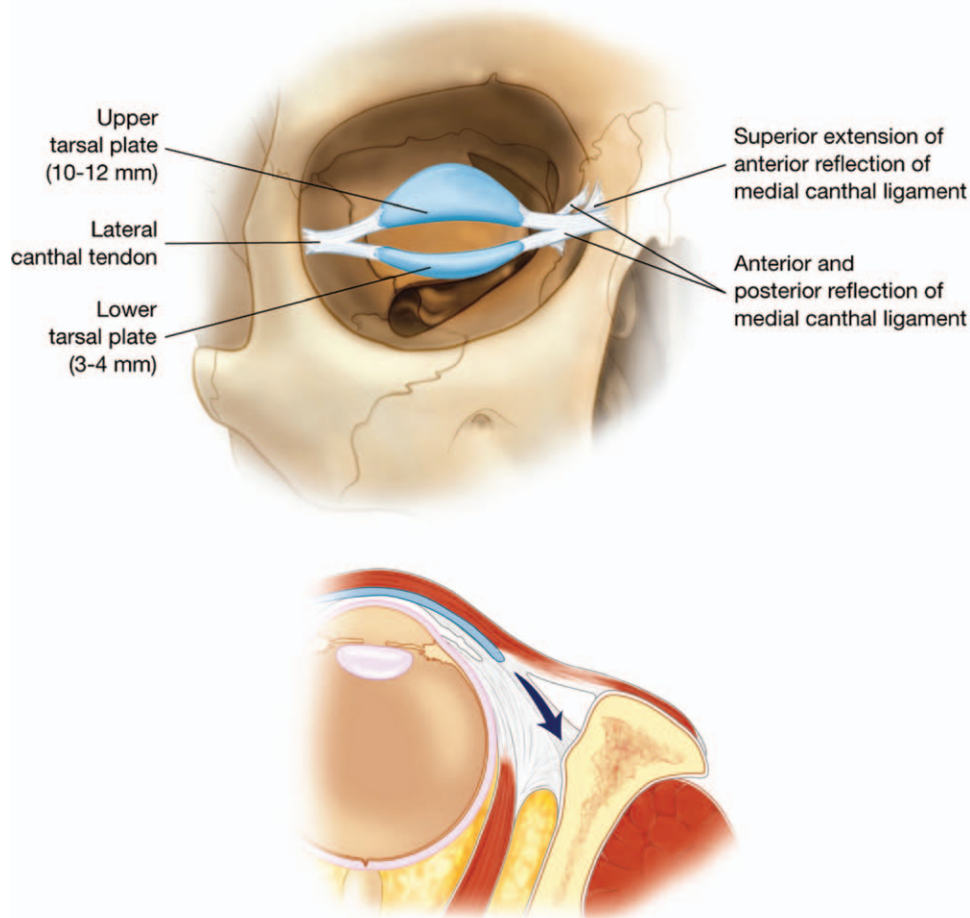


Fig. 2. (Above) The tarsoligamentous sling. (Below) The posterior insertion of the lateral canthal tendon into the Whitnall tubercle. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

eyelid to remain tangent to and follow the curve of the globe through this posteriorly oriented vector.

The upper eyelid consists of two postseptal fat compartments and the preaponeurotic and nasal fat pads, separated by the interpad septum. Immediately deep to the preaponeurotic fat pad is the aponeurosis of the levator palpebrae superioris muscle, which inserts into the anterosuperior aspect of the tarsal plate. Fibers extending into the pretarsal skin create the upper eyelid crease, 8 to 10 mm above the lashes. The sympathetically innervated Müller muscle, which originates from the undersurface of the levator, lies deep to the aponeurosis and is attached to the superior edge of the tarsal plate.¹⁰

The lower eyelid consists of three postseptal fat compartments. Nasal and central fat pads are separated by the inferior oblique muscle, and the central and lateral fat pads are separated by the arcuate expansion of the Lockwood ligament.¹¹ In

the lower lid, the palpebral orbicularis oculi muscle is firmly attached to the underlying maxilla by a ligamentous structure known as the orbital malar ligament, or the orbicularis retaining ligament.^{12,13} This dense attachment results in a depression from the medial canthus to the medial corneoscleral limbus known as the tear trough, or nasojuugal groove.¹⁴ This sulcus continues laterally as the lid-cheek junction, or the palpebromalar groove¹⁵ (Fig. 3).

GOALS OF AESTHETIC EYELID SURGERY

The aesthetic destination varies among patients and should be identified before surgery. Consideration of periorbital form and function, along with anatomy and patient expectation, must be balanced with protecting lid function.

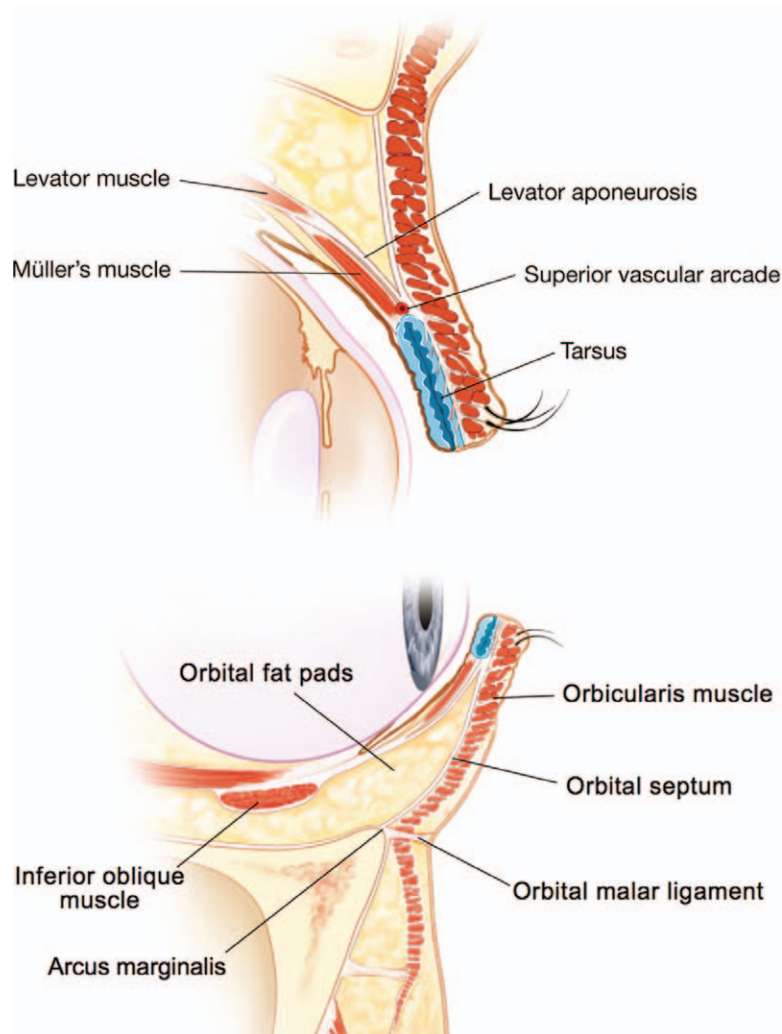


Fig. 3. (Above) Sagittal view of the upper eyelid, depicting the relationship of the levator aponeurosis to the tarsal plate and Müller muscle. (Below) Sagittal view of lower eyelid and orbital malar ligament insertion into the orbicularis and dermis. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

Generally, patients wish to achieve an upper eyelid appearance consistent with that of their youth. This is often accomplished by a crisp supratarsal crease, an arching contour, and an increased eye shadow space.¹⁶ In men, it is imperative to avoid a “feminized” appearance, by maintaining adequate upper lid volume. Conservative skin and fat resection in the upper lid prevents an unnatural, hollowed-out appearance and prevents postoperative lagophthalmos.¹⁶

Lower eyelid rejuvenation is focused on the excision of excess fat, treatment of the tear trough deformity, blending of the lid-cheek junction, and tightening of the skin, while maintaining sharp canthal angles and an almond-shaped eye fissure.⁷

In lower blepharoplasty, prevention of postoperative scleral show and ectropion by addressing lid laxity, malposition, and eye prominence is of paramount importance.

CLINICAL HISTORY

Preoperative patient assessment begins with a thorough medical history, with special attention to risk factors for postoperative complications. Medical history should include documentation of thyroid disease, hypertension, diabetes, bleeding diatheses, glaucoma, and any previous periorbital surgery or trauma. Medications, including aspirin, anticoagulants, nonsteroidal antiinflammatory

drugs, vitamin E, ginkgo, and other herbal medications, should be recorded and held for 2 weeks before surgery.¹⁷

Dry eye syndrome is a constellation of symptoms caused by reduced tear production or increased tear film evaporation, affecting up to 12 percent of men and 17 percent of women in the general population.^{18–20} Often underrecognized, a history suggestive of sicca symptoms must be elucidated and, if present, the decision to proceed with surgery should be made with caution.²⁰ Although transient dry eyes occur in up to 26 percent of postblepharoplasty patients, preoperative symptoms may predispose to long-term morbidity if appropriate measures are not taken.^{19,21} Symptoms typically include foreign body sensation, burning, itching, and ocular discomfort.²² Ability of the patient to tolerate contact lenses often implies adequate tear production. Laser-assisted

in situ keratomileusis increases the risk of developing postoperative dry eyes, caused by the transection of the corneal nerves responsible for reflex tearing during the corneal flap procedure.²³ Blepharoplasty should be delayed by at least 6 months following laser-assisted in situ keratomileusis. Herbal medications including niacin, echinacea, and kava may contribute to dry eyes and should be discontinued preoperatively.²² A history of tobacco use should be elicited, as smoking disrupts the lipid layer of the ocular surface.^{24,25}

In this population, intraoperative avoidance of exposure through the use of corneal protectors and lubrication is prudent. Prevention of lagophthalmos through conservative upper lid excision decreases evaporative losses leading to dry eyes.²⁴ As scleral show and ectropion further contribute to dry eyes, canthal support can be used to control lower lid position, especially in

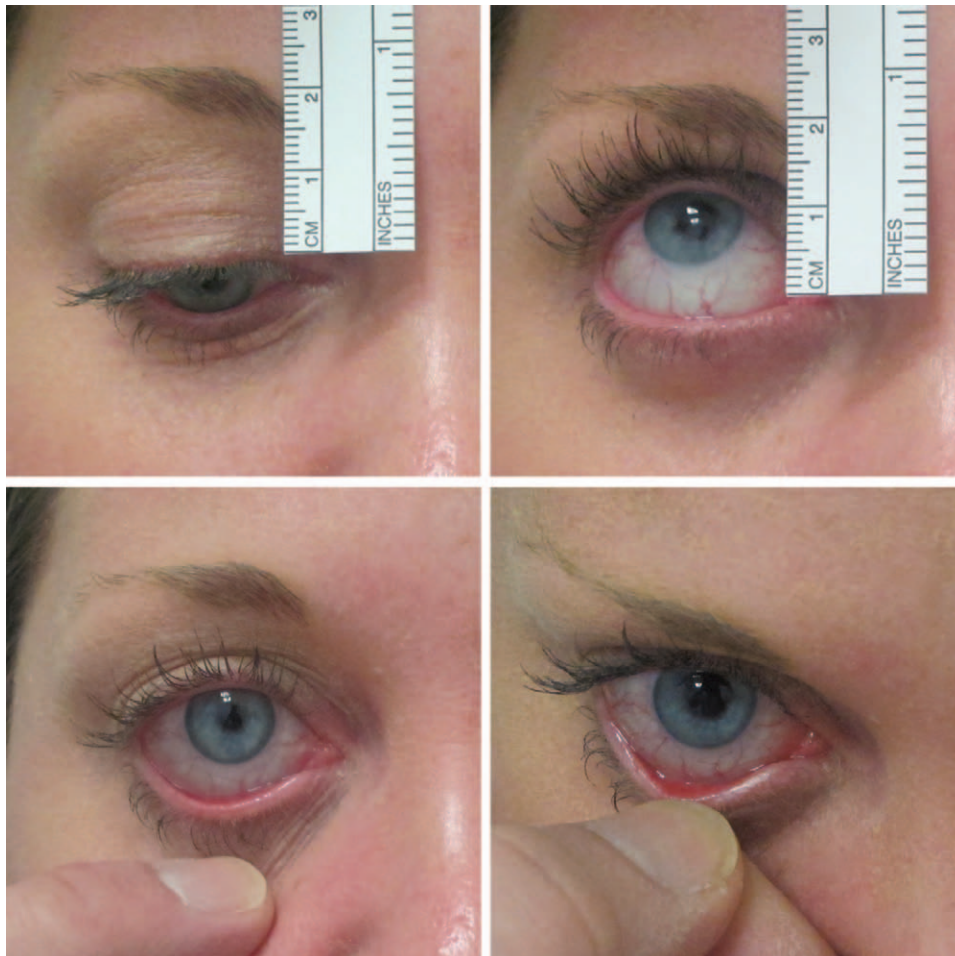


Fig. 4. (Above) Normal levator function from extreme downgaze to extreme upgaze should be greater than 10 mm. (Below) Snap-back test and lid distraction test to assess for tarsoligamentous laxity of the lower lid. Snap-back with any delay indicates laxity with a risk of postoperative lid malposition. Lid distraction greater than 6 mm requires canthoplasty.



Fig. 5. Attenuation of the levator aponeurosis with a high upper lid crease and ptotic lid margin. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

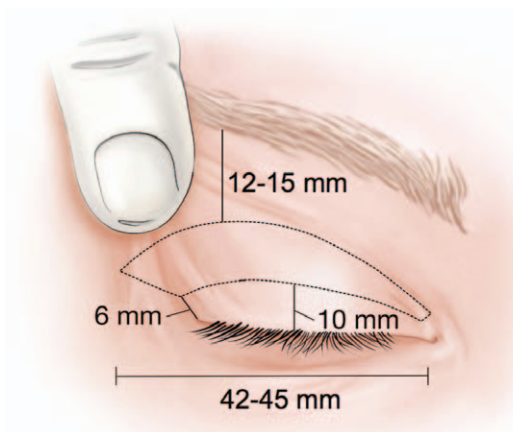


Fig. 6. Upper blepharoplasty markings are performed in the operating room with calipers. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

patients with prominent eyes.²⁶ Lubricating eye drops and ointment protect the cornea postoperatively in patients with dry eyes, and a cyclosporine ophthalmic emulsion (i.e., Restasis; Allergan, Inc., Irvine, Calif.) can be used to stimulate tear production.²⁰

PHYSICAL EXAMINATION

Evaluation should be performed with the patient sitting upright in a relaxed position. Visual acuity, extraocular muscle movements, pupillary

response, and an intact Bell phenomenon should be examined and documented. Dermatochalasis and herniation of upper lid fat should be noted along with presence of lagophthalmos.

Examination for blepharoptosis must be included in the preoperative assessment of every blepharoplasty. The eyebrow should be located at the level of the supraorbital rim in men and up to 1 cm above the rim in women, with the apex of the arch above the lateral limbus.²⁷ Transverse forehead wrinkles may be indicative of compensated lid ptosis, as brow elevation can elevate a ptotic eyelid.⁷ A low-lying lid margin, high upper lid crease, and visibility of the eye through a thinned upper eyelid are signs of acquired involutional ptosis with attenuation of the levator aponeurosis. The degree of ptosis can be measured by the margin-to-reflex distance 1, which is the distance between the upper lid margin and the pupillary light reflex in primary gaze. Normal margin-to-reflex distance 1 values are greater than 2.5 mm; however, the majority of the population will have a margin-to-reflex distance 1 of 4 to 5 mm.²⁸ A phenylephrine test can be used to diagnose bilateral ptosis. After phenylephrine is instilled in the affected eye, the margin-to-reflex distance 1 in the contralateral eye is rechecked. An appreciable decrease in margin-to-reflex distance 1 indicates that bilateral ptosis may be present. Severity of ptosis is based on lid deviation below the normal position and further classified as mild, moderate, or severe (1 to 2 mm, 2 to 3 mm, or >4 mm, respectively). In the presence of blepharoptosis, levator function must be quantified by measuring the amount of lid excursion from extreme downgaze to extreme upgaze with the brow being manually stabilized. Normal levator function yields a value of greater than 10 mm. This is important for determining the appropriate surgical management to correct the deformity.

Lower eyelids should be assessed for fat herniation, malar bags, tear trough deformity, skin pigmentation, and dermatochalasis.²⁹ The position of the lateral canthus should be 2 mm above the medial canthus, denoting a positive canthal tilt. Normally, the lower lid rests 1 mm above the inferior corneoscleral limbus, and scleral show indicates an inferiorly displaced lower lid that predisposes to postoperative ectropion. Further testing of the tarsoligamentous laxity is performed through the snap-back test and lid distraction test. The snap-back test involves asking the patient to remain in primary gaze without blinking while the examiner applies an inferiorly directed force on the lower lid and observes the time required for the lid to return to its native location on release.

Any measurable lag indicates laxity in the lower lid. Lid distraction testing involves applying anterior traction on the lid to measure the amount of displacement from the globe. Distraction of greater than 6 mm indicates significant lid laxity that may require formal lateral canthoplasty to restore the integrity of the lower lid³⁰ (Fig. 4).

A posterior relationship of the anterior cornea to the malar eminence is known as a “positive vector.” Prominent eyes will have a “negative vector” and are at increased risk of developing postoperative complications, including dry eyes, scleral show, and ectropion.³¹ In a study by Hirmand et al., of the 52 percent of patients with prominent eyes, only one-third had a negative vector,²⁶ highlighting the importance of accurately measuring the degree of eye prominence using a Hertel exophthalmometer. The device measures the distance from the anterior cornea to the lateral orbital rim, and is securely placed on the latter, as the examiner aligns the

black lines in the prisms. The scale is read corresponding to the anterior cornea, with values of 15 to 17 mm being within the normal range.³²

The trilamellar precorneal tear film is composed of aqueous, lipid, and mucous layers and provides protection, lubrication, and nourishment of the corneal surface.³³ The Schirmer test offers an objective measure of quantifying tear production in patients who suffer from dry eye syndrome. This simple test uses a tear film filter paper that is placed inside the lateral lower lid margin adjacent to the globe. After 5 minutes, less than 5 mm of wetting of the strip is diagnostic of dry eyes, whereas greater than 10 mm is considered normal.³⁴ To decrease the reflex lacrimation produced by scleral irritation, the cornea is anesthetized with tetracaine. Excess drops should be gently wicked away with gauze before placing a tear film strip. The Schirmer test is easy and practical for all plastic surgeons; however, if a more specific and reliable test is desired, one can measure the tear break-apart time.

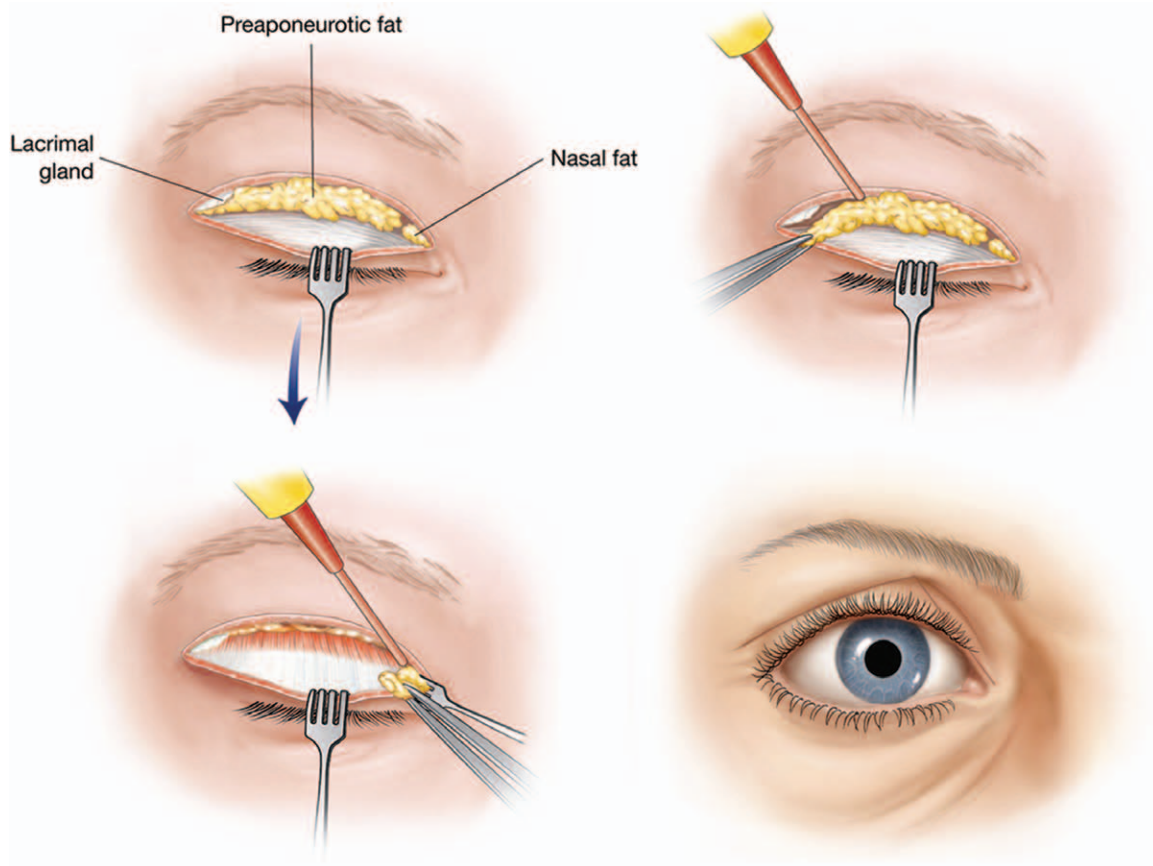


Fig 7. Upper blepharoplasty. (Above, left) Fat compartments after open-sky division of the entire septum. (Above, right) Resection of the preaponeurotic fat pad flush with the superior orbital rim and (below, left) the nasal fat pad that herniates with pressure on the globe. (Below, right) Overresection in the medial third of the lid can result in an A-frame deformity. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

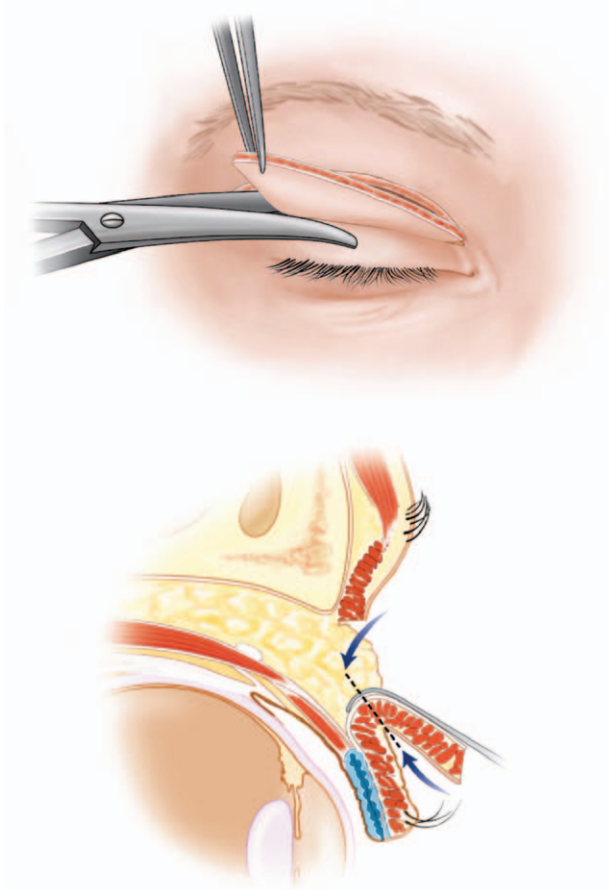


Fig. 8. (Above) Excision of a skin-muscle-septal flap. (Below) Scissors must be angled to bevel cut away from insertion of the levator aponeurosis into the dermis, and to preserve some pretarsal orbicularis. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

UPPER EYELID PTOSIS

Causes of acquired blepharoptosis include traumatic, myogenic, neurogenic, mechanical, and involutional mechanisms. The majority of patients presenting for blepharoplasty have involutional ptosis, characterized by levator aponeurosis attenuation, with downward and lateral shift of the tarsal plate (Fig. 5). Levator function in this group is often excellent. It is important to assess for the presence of unilateral versus asymmetric bilateral ptosis. If the more ptotic eye is corrected in isolation in bilateral ptosis, the contralateral lid will worsen postoperatively, according to Hering's law.^{35,36} These patients should have both lids corrected.

Although many techniques have been devised for ptosis repair, a recent systematic review failed to

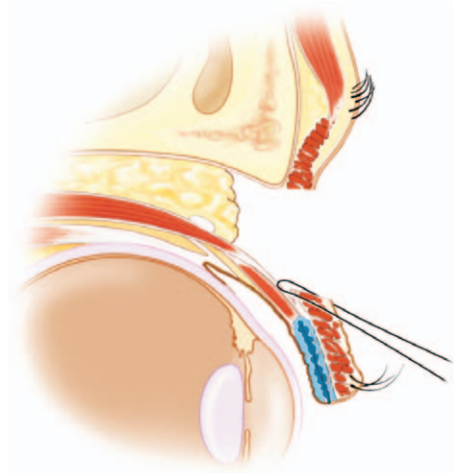


Fig. 9. Supratarsal fixation with 6-0 Vicryl suture from the orbicularis muscle to the levator aponeurosis in the midpupillary line. The surgeon must ensure that there is no conjunctival penetration. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)



Video 1. Supplemental Digital Content 1 demonstrates upper blepharoplasty using an open-sky technique, available in the "Related Videos" section of the full-text article on PRSJournals.com or, for Ovid users, available at <http://links.lww.com/PRS/B145>.

reveal a superior technique in predicting postoperative lid level.^{28,37-41} Levator aponeurosis repair under local anesthesia is commonly performed by plastic surgeons; however, lidocaine can weaken both the levator and the orbicularis (a lid depressor), whereas epinephrine can stimulate the Müller muscle, falsely elevating the lid. We prefer a three-step quantitation technique performed under a general anesthetic without patient cooperation. This technique can easily be used in the setting of upper blepharoplasty and has a revision rate of 2.5 percent.⁴²

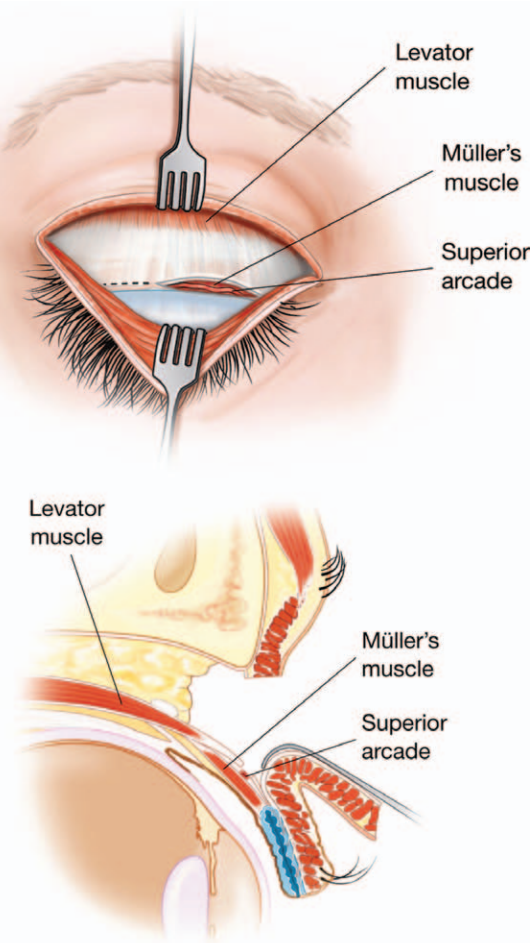


Fig. 10. Ptosis repair. (Above) Levator aponeurosis is carefully elevated off of the Müller muscle with Westcott scissors to the level of the musculoaponeurotic junction. The medial and lateral horns of the levator are kept intact. (Below) Care is taken to avoid injury to the superior vascular arcade. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

UPPER BLEPHAROPLASTY AND PTOSIS: OPERATIVE APPROACH

Preoperatively, with the patient seated in the upright position, a mark is placed at the lateral aspect of the upper lid hooding. This mark serves as the lateral extent of the upper blepharoplasty incision and should be no less than 10 mm above the lower blepharoplasty incision line. It is crucial to remember that the amount of skin left behind is more important than the amount resected.¹⁶ After the patient is prepared and draped, calipers are used to mark the inferior incision line at 8 to 10 mm above the lashes in the midpupillary line, forming the location of the new supratarsal fold.

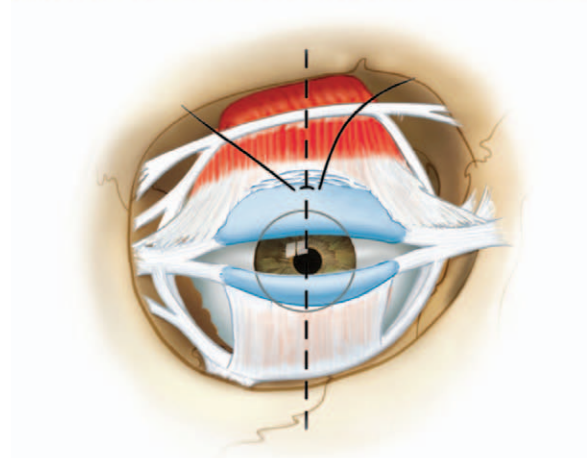
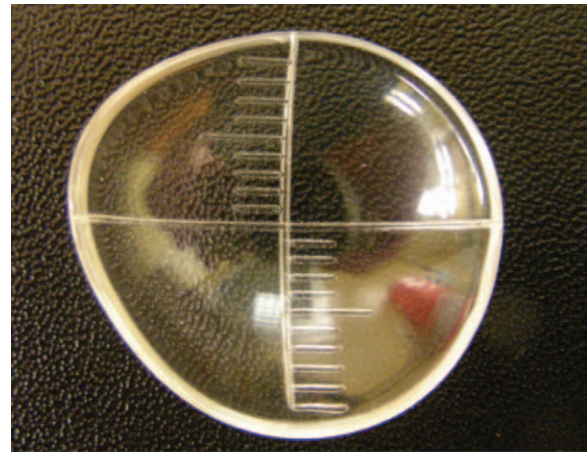


Fig. 11. (Above) Clear corneal protector (Codner, Atlanta, Ga.) allowing visualization of the midpupillary line, with 1-mm vertical graduations to quantify the amount of lid correction. (Below) As the tarsal plate may be displaced laterally, the tarsal levator advancement suture must be placed in line with the pupil regardless of tarsal position. (From McCord CD, Codner MA. *Eye-lid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

The lower incision line is carried medially along a curve to a point just lateral to the punctum and laterally to a point 6 mm above the lateral canthus, which is then connected to the preoperative mark. Next, a point is marked 12 to 15 mm below the brow, in line with the lateral canthus, serving as the highest point of the superior incision line, with the ellipse being completed by free hand. In the presence of brow asymmetry, more skin should be maintained on the side of the higher brow. The total ellipse length should be 42 to 45 mm. No more than 5 mm should be resected in the nasal aspect (Fig. 6).

Before the procedure, 2% lidocaine with epinephrine (1:100,000) is infiltrated. An open-sky

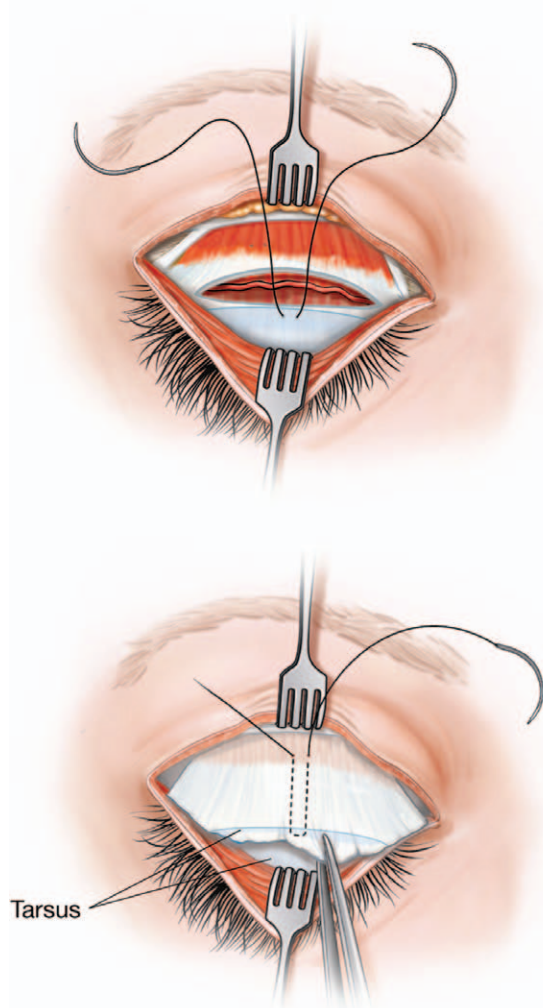


Fig. 12. (Above) Partial-thickness pass with 6-0 silk suture through anterior tarsal plate within 2 to 3 mm of the superior edge. (Below) Both suture ends are passed deep to the levator aponeurosis and are brought out at the musculoaponeurotic junction. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

approach is used to avoid orbicularis bulk leading to postoperative lagophthalmos.⁷ This also provides the access and exposure necessary for the treatment of ptosis. A no. 15 scalpel blade is used to make all skin incisions after a corneal protector is inserted. Colorado needle tip cutting cautery set at 25 is used in the superior incision to cut through the orbicularis oculi to the level of the septum. The entire length of the septum is divided carefully using Westcott scissors, just inferior to the orbital rim, exposing the preaponeurotic fat pad. Gentle inferior traction is applied using a Blair retractor placed in the skin-muscle-septal flap. Forceps (0.5 mm) and



Video 2. Supplemental Digital Content 2 demonstrates ptosis repair using a tarsal levator advancement technique, available in the "Related Videos" section of the full-text article on PRSJournals.com or, for Ovid users, available at <http://links.lww.com/PRS/B146>.

cutting cautery are then used to elevate the fat pad off of the underlying levator aponeurosis in the avascular plane, to the level of the musculoaponeurotic junction. Care should be exercised to avoid inadvertently injuring the levator aponeurosis. The preaponeurotic fat pad is displaced away from the orbit and excised with cautery, flush to the superior orbital rim. Fat excision is very conservative and, in some patients, may not be necessary. Next, two Blair retractors are positioned medially and inferomedially to expose the nasal fat pad, which is identified by applying pressure on the globe. A small incision using the cautery is made to gain access, after which fat is teased out with forceps and amputated (Fig. 7). Overly aggressive fat excision in the medial third can result in an "A-frame" deformity. With straight iris scissors, the skin-muscle-septal flap is divided perpendicular to the skin edge lateral to the lateral canthus. The iris scissors are then beveled 45 degrees toward the lid margin to preserve some pretarsal orbicularis while avoiding injury to the levator insertion into the dermis⁷ (Fig. 8). The lacrimal gland is then assessed for evidence of ptosis in the upper lateral lid. If present, cautery is used to "spot weld" the gland, gently burning the tissues anterior to the gland to achieve retraction. A 6-0 Vicryl suture (Ethicon, Inc., Somerville, N.J.) is then used to place a plication stitch between the lateral horn of the levator and the periosteum of the orbital rim, effectively resuspending the gland. The ptosis procedure below may be performed at this point. Postoperative ptosis is prevented with a single 6-0 Vicryl supratarsal fixation suture between the orbicularis oculi and the levator aponeurosis in the midpupillary line⁴³ (Fig. 9). A Guthrie retractor is placed in the lateral aspect of the incision to

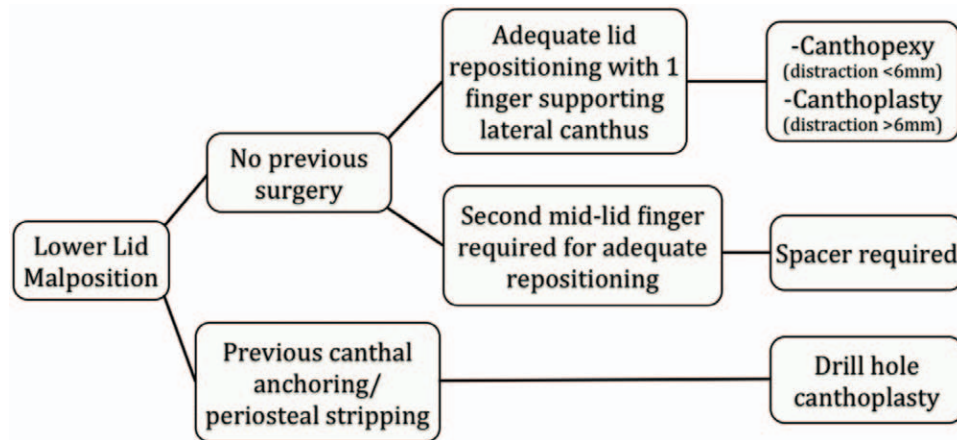


Fig. 13. Algorithm for the management of lower lid malposition.

Table 1. Baseline Demographic and Preoperative Morphologic Characteristics and Type of Lateral Canthal Support Performed

Characteristics	Value
Age, yr	
Mean	52
Range	26–85
Sex	
Male	101/421 (12%)
Female	371/421 (88%)
Scleral show	11%
Tear trough deformity	37%
Canthal tilt	
Positive	53%
Negative	7%
Neutral	40%
Management	
Canthopexy	327/421 (77.7%)
Canthoplasty	94/421 (22.3%)

Table 2. Postoperative Complications

Complications	No. of Patients (%)
Orbital hematoma	2/421 (0.5)
Lower lid malposition	12/421 (3.1)
Ectropion	4/421 (1.0)
Chemosis	51/421 (12.1)

align the lid, and four lateral interrupted 6-0 nylon sutures are placed. The remaining incision line is closed with a running 6-0 nylon stitch including both skin and muscle. (See Video, Supplemental Digital Content 1, which demonstrates upper blepharoplasty using an open-sky technique, available in the “Related Videos” section of the full-text article on PRSJJournal.com or, for Ovid users, available at <http://links.lww.com/PRS/B145>.)

For patients with ptosis, Westcott scissors are used to incise the levator aponeurosis just inside the superior edge of the tarsal plate, protecting

the superior arcade (Fig. 10). The aponeurosis is then elevated off of the underlying Müller muscle to the level of the musculoaponeurotic junction. Injury to the superior vascular arcade and Müller muscle is carefully avoided. A partial-thickness bite of the tarsal plate, within 2 to 3 mm of the superior edge, is taken with a 6-0 double-armed, silk suture. A clear corneal protector (Codner, Atlanta, Ga.) is used to place this stitch in line with the pupil, not the center of the tarsus, which may be displaced laterally⁴⁴ (Fig. 11). Both needles are then passed deep to the aponeurosis and are brought out at the musculoaponeurotic junction (Fig. 12). A surgeon’s knot is tightened until symmetric gapping is present bilaterally between the upper and lower lids to overcorrect the ptosis by 1 mm. Next, suture tension is equalized using the spring-back test. After upper lid closure with downward traction on the lashes, the velocity of reopening on release is observed. Tension is adjusted until the spring-back velocity is symmetric. (See Video, Supplemental Digital Content 2, which demonstrates ptosis repair using a tarsal advancement technique, available in the “Related Videos” section of the full-text article on PRSJJournal.com or, for Ovid users, available at <http://links.lww.com/PRS/B146>.) If either gapping or spring-back are not equivalent bilaterally, greater importance should be given to the gapping, as it is a more objective measure.

LOWER EYELID

A myriad of techniques have been described in lower lid blepharoplasty, including skin pinch,^{5,45} skin-muscle flap,⁶ transconjunctival,^{3,4,9} retaining ligament release,^{2,46} fat transposition,⁴⁷ and skin resurfacing.³ Postoperative lower lid malposition has been reported as high as 30 percent,

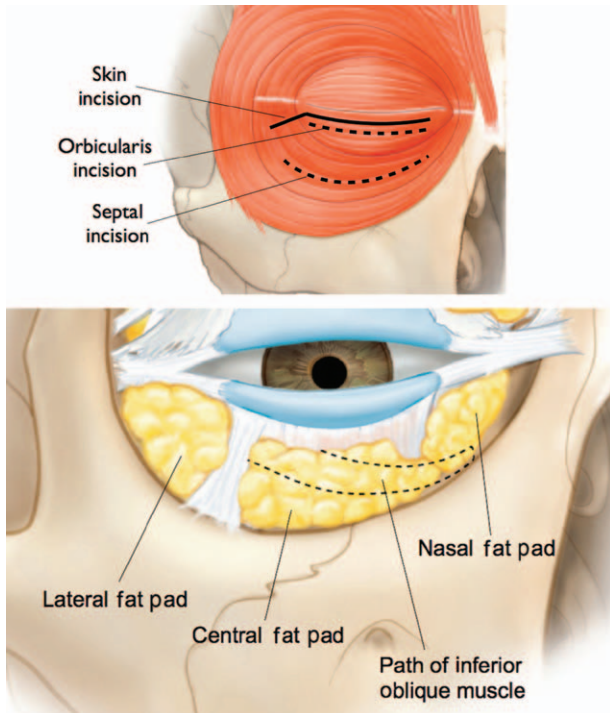


Fig. 14. (Above) Location of skin, muscle, and septal incisions. (Below) Fat compartments of the lower lid to be either excised or repositioned. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

leading to a trend toward routine lateral canthal support.^{1,2,48,49} Patients with lower lid laxity or eye prominence are at an increased risk of dry eyes, scleral show, and ectropion, mandating special attention to the lateral canthus.^{31,50} If only one finger at the lateral canthus is required to adequately

support the lid, canthopexy is used for lid distraction less than 6 mm and canthoplasty is used if distraction is greater than 6 mm.^{1,51} Significant lower lid malposition may necessitate a second finger to reposition the midportion of the lid, indicating the need for a spacer graft to augment canthal support. Drill-hole canthoplasty is planned if periosteal stripping is present from previous surgery (Fig. 13). Prominent eyes require supraplacement of lateral canthal fixation relative to the Whitnall tubercle to reduce the inferior clotheslining effect.^{26,52} For patients with dry eyes, frequent irrigation throughout the operation is advised.

We prefer a transcutaneous lower blepharoplasty with routine canthal support to address periorbital aging while controlling eyelid shape. Our 18-year series of 421 patients demonstrates a low revision rate for lower lid malposition (Tables 1 and 2). Transconjunctival blepharoplasty is used primarily in younger patients who possess excess fat with no skin redundancy, and in darker skin patients when scarring is more of a concern. Lid malposition remains a risk, and canthopexy is performed during the transconjunctival approach.

LOWER BLEPHAROPLASTY: OPERATIVE APPROACH

On marking a prominent crow's foot extending from the lateral canthus, 2% lidocaine with epinephrine is infiltrated throughout the lower eyelid. After a 5-mm incision is made using a no. 15 scalpel blade, needle-tip cutting cautery is used to dissect through the orbicularis to expose the periosteum of the lateral orbital rim. With a Blair retractor applying lateral traction on the

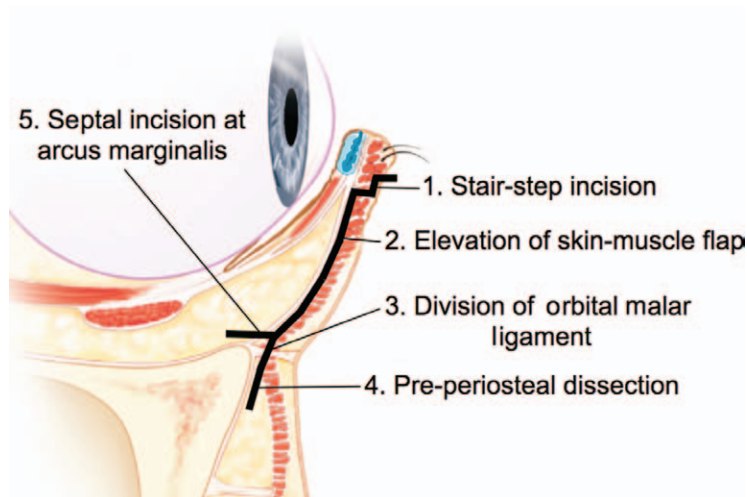


Fig. 15. Diagrammatic representation of dissection sequence for lower blepharoplasty exposure.

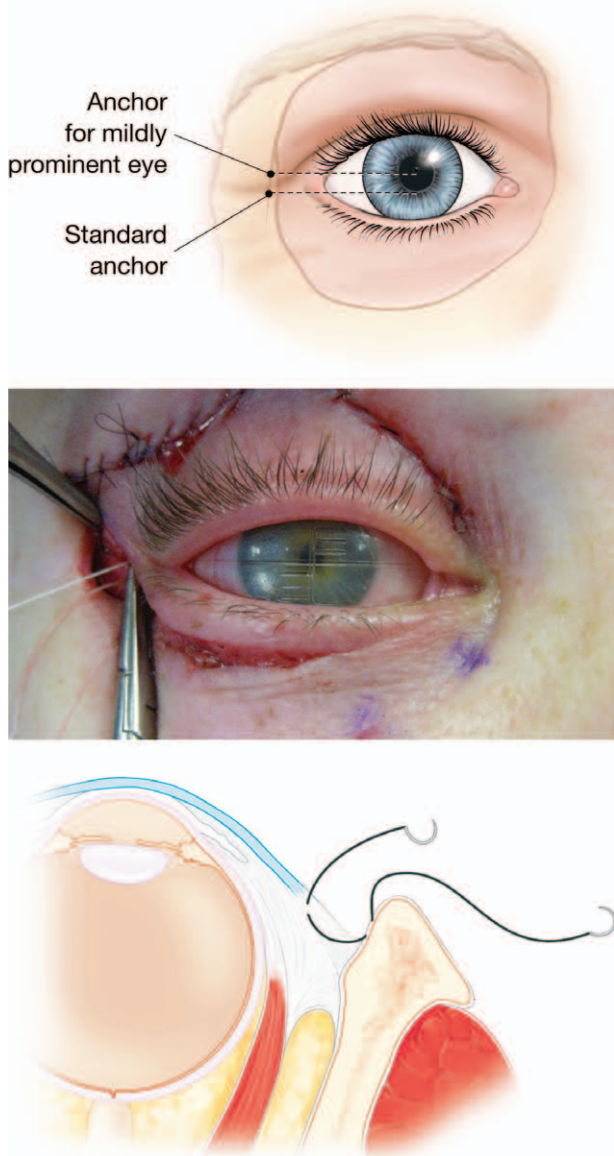


Fig. 16. (Above) Location of canthal anchoring suture placement for standard and prominent eyes. (Center) Clear corneal protector (Codner, Atlanta, Ga.) with horizontal line to direct suture placement in relation to the inferior aspect of the pupil. (Below) Axial view of canthopexy suture posterior to the orbital rim, demonstrating the vector necessary to maintain the lid tangent to the globe. (From McCord CD, Codner MA. *Eyelid & Periorbital Surgery*. St. Louis: Quality Medical; 2008. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc. Copyright 2008.)

lid, straight iris scissors undermine and incise the subciliary skin, remaining lateral to the punctum. A suborbicularis tunnel is developed and the muscle is incised in a stair-step fashion, preserving 5 mm of pretarsal orbicularis (Fig. 14). The skin-muscle flap is elevated off the septum to the level of the infraorbital rim using cutting cautery. The orbital malar ligament is divided at the arcus

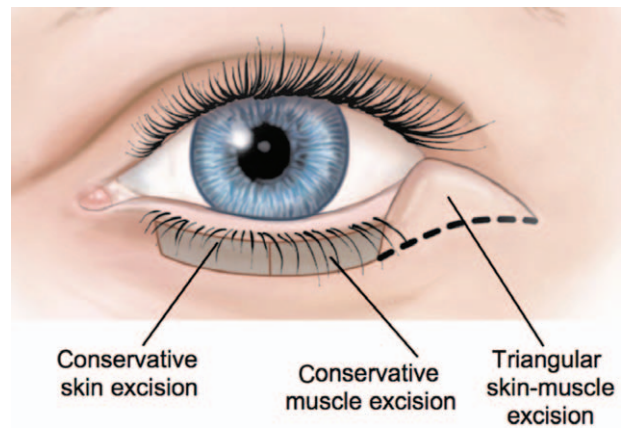


Fig. 17. Triangular excision of composite skin-muscle flap lateral to the canthus.

marginalis along the entire length of the orbital rim. Preperiosteal dissection is continued 10 mm inferiorly and medially to release the tear trough (origin of the orbicularis) if present. Care must be taken to avoid injuring the infraorbital nerve. Next, the septum is divided and partially excised with cautery to expose the three fat pads, which are resected conservatively (Fig. 15). The inferior oblique muscle must be protected to prevent postoperative diplopia. The fat is placed in a moist sponge. The medial and central fat pads can alternatively be caudally transposed into the preperiosteal pocket without the need for suture fixation. Although there are numerous techniques to augment the tear trough,^{3,46,53-56} we prefer the placement of less than 1 cm³ of minced free fat graft from the orbital fat previously excised.¹⁴

At this point, canthopexy is performed for lid distraction of less than 6 mm, and canthoplasty is performed for lid distraction greater than 6 mm. Both ends of a double-armed 4-0 Mersilene suture using a P2 needle (both from Ethicon) are passed through the lateral aspect of the tarsus from medial to lateral, ensuring that the conjunctiva is not violated. The clear corneal protector (Codner, Atlanta, Ga.) has horizontal markings to allow visualization for positioning of the canthopexy at the level of the inferior pupil. In prominent eyes, the canthopexy must be positioned superiorly to avoid clotheslining.²⁶ Both suture ends are passed through the periosteum of the inner lateral orbital wall, from 2 mm deep to the rim, exiting along the rim (Fig. 16). This posterior vector of pull follows the curve of the globe and keeps the lid tangent to the eye. Before securing the knot, ensure that the lower lid can be distracted 1 mm and that superior displacement can cover the pupil. If canthoplasty is required, a canthotomy



Fig. 18. Results following tarsal levator advancement for the correction of bilateral ptosis.

and inferior cantholysis are performed before lid shortening is completed. Suture placement is the same as for canthopexy. With superior traction on the lateral skin-muscle flap, a triangle of tissue is excised in line with the blepharoplasty incision (Fig. 17). A three-point, 4-0 Vicryl stitch is used to resuspend the orbicularis to the lateral orbital rim periosteum at the level of the canthal anchoring.

A conservative strip of redundant skin and orbicularis is excised along the subciliary incision using iris scissors. The lateral incision is reapproximated with interrupted 6-0 plain catgut sutures, and the subciliary incision is closed in a running fashion (Figs. 18 through 20). (See Video, Supplemental Digital Content 3, which demonstrates lower blepharoplasty with lateral canthopexy, available



Fig. 19. (Above) Before and 15 years after lower blepharoplasty and lateral canthopexy with preservation of eye shape and lower lid position. (Below) Before and 9 months after upper and lower blepharoplasty.



Fig. 20. One-year results following upper and lower blepharoplasty. This patient did not undergo face lift or brow lift.



Video 3. Supplemental Digital Content 3 demonstrates lower blepharoplasty with lateral canthopexy, available in the “Related Videos” section of the full-text article on PRSJournals.com or, for Ovid users, available at <http://links.lww.com/PRS/B147>.

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POSTOPERATIVE MANAGEMENT

All patients receive Tobradex (Novartis, Basel, Switzerland) ophthalmic ointment for their incisions, and ice packs are applied for a 24-hour period. Patients are instructed to avoid aspirin and nonsteroidal antiinflammatory drugs for 2 weeks, and are prescribed *Arnica montana* and bromelain to assist with bruising. If chemosis develops postoperatively, ocular decongestants

and steroid eye drops may be used. If symptoms persist, conjunctivotomy and lateral tarsorrhaphy may be necessary.⁵⁷

CONCLUSIONS

Failure to address preoperative functional issues in the setting of aesthetic eyelid surgery predisposes the patient to significant postoperative complications, which can be difficult to remedy. All plastic surgeons must use a system to accurately assess for the presence of blepharoptosis, lid laxity, eye prominence, and dry eyes to achieve optimal functional and cosmetic results. Based on anatomy and pathologic condition, an individualized approach to upper and lower blepharoplasty should be applied to every patient seeking periorbital rejuvenation.

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PATIENT CONSENT

Patients provided written consent for use of their images.

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