CHAPTER 22

Blepharoplasty

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The demand for blepharoplasty (cosmetic eyelid surgery) continues to rise annually in the United States; according to the American Society of Plastic Surgery, 206,509 blepharoplasties were performed in 2014.[1] The frequency of this procedure has predictably coincided with an increased number of early and late complications. Complications are inevitable, but surgeons must be able to recognize postoperative complications and guide appropriate management. Most important, complications can be significantly minimized with a detailed understanding of the surgical anatomy, focused history and physical examination, patient education and informed consent, and a refined surgical approach. This chapter discusses the spectrum of complications seen with blepharoplasty, preventive solutions, and treatment options.[2–4]

Anatomy

Skin

The skin of the eyelid is the thinnest in the body and has minimal subcutaneous fat. As patients age, the periorbital skin has decreased type I collagen synthesis and increased dermal collagenase activity. With time, these metabolic shifts lead to thinning, folding, and wrinkling of the eyelid skin.[2–10]

Orbicularis Oculi

The orbicularis oculi is the sphincter of the eyelid. This muscle is adherent to the overlying skin and comprises three parts: orbital, palpebral, and lacrimal. The outer, orbital portion attaches medially to the medial canthal tendon, the nasal part of the frontal bone, and along the inferomedial orbital margin. Laterally, the orbital portion continues around the orbit and attaches to the lateral canthus. The palpebral portion of the orbicularis oculi, the middle segment, has pretarsal and preseptal segments. Medially, the preseptal segment of the palpebral portion of the orbicularis oculi has the anterior head, which becomes the anterior crus of the medial canthal tendon and inserts into the frontal process of the maxilla, and the posterior head, which inserts into the posterior lacrimal crest (Horner's muscle). Laterally, the preseptal fibers of the palpebral portion of the orbicularis oculi coalesce with the lateral palpebral ligament to form the lateral palpebral raphe. The small, inner portion of orbicularis oculi, the lacrimal segment, interdigitates with the medial palpebral ligament. This portion of the orbicularis oculi arises from the orbital surface of the lacrimal bone, passes behind the lacrimal sac, and divides into two slips, upper and lower, which are inserted into the superior and inferior tarsi, medial to the puncta lacrimalia.[2–10]

The three segments of the orbicularis oculi have distinct functions. The orbital portion of the orbicularis oculi tightly closes the eye. Contraction of the pretarsal and preseptal portions of the palpebral orbicularis oculi primarily closes the eyelid. The lacrimal portion transposes the lacrimal canals medially to receive tears and compresses the lacrimal sac.[2–10]

The orbicularis oculi is anchored by well-defined ligamentous attachments. Medially, the orbicularis oculi attaches directly to the inferior orbital rim. Laterally, the orbital retaining ligament bridges the fascia of the orbicularis oculi to the periosteum of the orbital rim. At the lateral canthus, the orbital retaining ligament merges with the lateral orbital thickening, a triangular condensation of the superficial and deep orbicularis oculi that extends across the frontal process of the zygoma onto the deep temporalis fascia. Release of the orbital retaining ligament and lateral orbital thickening allows untethered redraping of the eyelid.[2–10]

With age, the orbicularis oculi muscles relax, and the ligamentous attachments attenuate. This transformation

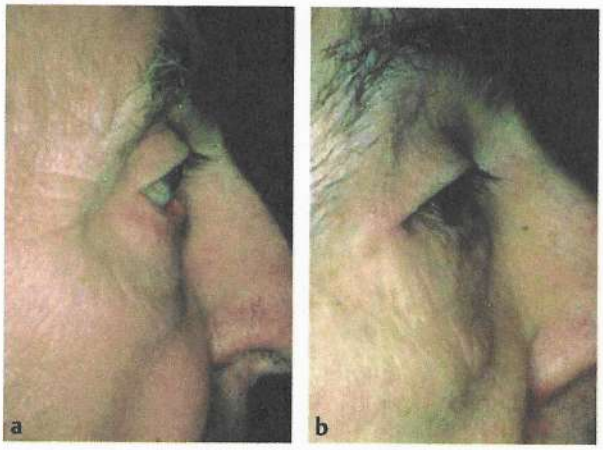

Fig. 22.1 (a) This patient had ectropion and lower lid retraction with malar ptosis after a lower lid blepharoplasty by a referring plastic surgeon. **(b)** Correction of the ectropion and lower lid contraction with a tarsal strip canthoplasty. This patient elected not to correct the malar ptosis.

results in progressive eyelid ptosis. Malar ptosis compounds this eyelid ptosis, forming a malar crescent or festoon over the malar eminence with an aged appearance. In addition, the pigment of the orbicularis oculi becomes more apparent over the thinning skin.[2–10]

Fig. 22.1a demonstrates a patient with ectropion and lower lid retraction with malar ptosis after a lower lid blepharoplasty by a referring plastic surgeon. **Fig. 22.1b** demonstrates the correction of the ectropion and lower lid contraction with a tarsal strip canthoplasty that I (H.M.S.) performed. Of note, the patient elected not to correct the malar ptosis.

Tarsal Plates

The tarsal plates, composed of dense fibrous tissue, are located directly above the lid margins and contribute to the integrity and support of each eyelid. Each tarsus measures approximately 29 mm long and 1 mm thick. The semilunar, superior tarsus measures 10 mm centrally and narrows medially and laterally. Conversely, the rectangular, inferior tarsus measures 3.5 to 5 mm centrally. The medial and lateral ends of the tarsi are attached to the orbital rims by the medial and lateral palpebral ligaments. Each tarsus contains approximately 25 sebaceous meibomian glands, which secrete meibum, an oily substance that prevents evaporation of tear film.[2–10]

Septum

The orbital septum has dense fibroelastic tissue and forms the anterior boundary of the orbital contents. On the upper eyelid, the orbital septum inserts 10 to 15 mm above the superior tarsal border and joins the levator aponeurosis. On the lower eyelid, the orbital septum joins the capsulopalpebral fascia 5 mm below the tarsal border. In addition, inferiorly, the orbital septum fixates to the rim of the orbital periosteum and forms the arcus marginalis.[2–10]

Postseptal (Intraorbital) Fat

The upper eyelid has two distinct intraorbital fat compartments, medial and central, divided by the superior oblique. The medial fat pad is lighter and firmer than the central fat pad. In addition, the medial fat pad encompasses the infratrochlear nerve and the terminal branch of the ophthalmic artery. Of note, the lacrimal gland occupies the lateral compartment.[2–10]

The lower eyelid has three distinct fat compartments: the medial, central, and lateral fat pads. The inferior oblique separates the medial and central fat pads. The central and lateral fat pads are separated by the arcuate expansion, a fascial band extending from the capsulopalpebral fascia to the inferolateral orbital rim.[2–10]

Of note, the interconnecting septae of the intraorbital fat link the extraconal (outside the muscle cone) and intraconal (within the muscle cone) spaces. Therefore traction on fat just posterior to the orbital septum can produce forces in any of these spaces and accounts for the small but definitive risk of orbital hemorrhage and even blindness when addressing anterior orbital fat in surgical procedures.[2–10]

Preseptal (Extraorbital) Fat

The preseptal, or extraorbital, fat represents retro-orbicularis oculi fat and may accumulate outside the orbital rim on the inferior lateral brow and upper malar areas.[2–10]

Upper Eyelid Retractors

The levator palpebrae muscle is the upper eyelid retractor and originates from the lesser wing of the sphenoid, extending anteriorly along the superior orbit. The levator condenses approximately 14 to 20 mm above the superior border of the tarsus into Whitnall's ligament. Anterior to Whitnall's ligament, the levator forms a bilamellar aponeurosis that joins with the septum to insert into the tarsus. A lateral horn divides the lacrimal gland into the palpebral and orbital lobes and contributes to the lateral retinaculum. A medial horn inserts into the lacrimal crest. The posterior lamella of the levator aponeurosis contains Mueller's muscle.[2–10]

Lower Eyelid Retractors

The capsulopalpebral fascia forms the lower eyelid retractors. This fibroelastic tissue originates from the inferior oblique muscle, fuses into Lockwood's ligament, and inserts approximately 5 mm below the inferior tarsus.[2–10]

Lateral Canthus

The lateral canthus partitions into an anterior and posterior leaflet. The anterior leaflet inserts onto the orbital rim periosteum, and the posterior leaflet inserts onto the lateral orbital tubercle (Whitnall's), approximately 3 mm behind the orbital rim. The lateral canthus lies approximately 6 mm below the lacrimal gland fossa and is the culmination of the lateral canthal retinaculum, which consists of the following:

- Lateral horn of the levator palpebrae superioris
- Preseptal and pretarsal orbicularis oculi
- Lockwood's ligament
- Check ligament of the lateral rectus muscle

Of note, all key elements of the lateral retinaculum need to be addressed before mobilizing the lateral canthus for any repositioning or tightening procedures. The most anatomically ideal and aesthetically pleasing position of the lateral canthal tendon is 10 to 15 degrees above the medial canthal tendon.[2–10]

Fig. 22.2a demonstrates a patient with lateral canthal effacement and displacement after three blepharoplasties by a referring plastic surgeon. In addition, this patient has levator dehiscence and ptosis of the upper lid and ectropion of the lower lid. **Fig. 22.2b** demonstrates the correction of the lateral canthus, lid ptosis, and ectropion with levator advancement and a canthoplasty that I (H.M.S.) performed.

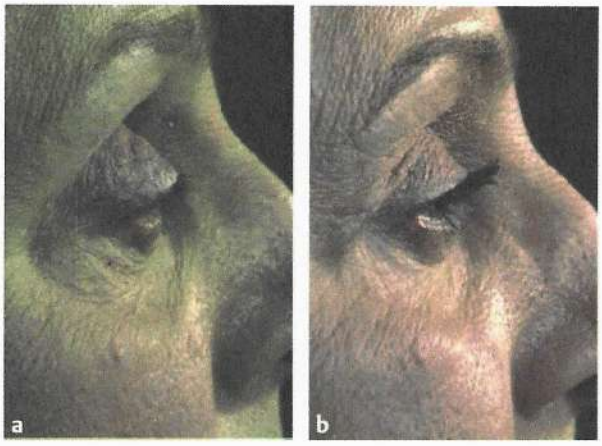

Fig. 22.2 (a) This patient had lateral canthal effacement and displacement after three blepharoplasties by a referring plastic surgeon. In addition, he had levator dehiscence and ptosis of the upper lid and ectropion of the lower lid. **(b)** After correction of the lateral canthus, lid ptosis, and ectropion with levator advancement and a canthoplasty.

Medial Canthus

The medial canthal tendon inserts into the bony orbit with three leaflets: anterior and posterior horizontal leaflets and a vertical leaflet. The medial canthal tendon is the culmination of the medial canthal retinaculum, the confluence of the deep head of the pretarsal orbicularis, the orbital septum, the medial end of Lockwood's ligament, the medial horn of the levator aponeurosis, the check ligaments of the medial rectus muscle, and Whitnall's ligament. Of note, the upper, lower, and common lacrimal canaliculi are closely approximated to the medial canthal retinaculum, and care should be taken to preserve their integrity when altering its position[2–10] (**Fig. 22.3**).

Avoiding Unfavorable Results and Complications in Blepharoplasty

Summary Box

Unfavorable Results and Complications Associated with Blepharoplasty

- Visual loss secondary to hemorrhage
- Perforation of the globe during anesthesia
- Damage to the extraocular muscle
- Damage to the cornea
- Wound dehiscence
- Lower eyelid malposition
- Upper eyelid malposition (ptosis)
- Loss of lashes
- Dryness
- Infection
- Incisional scarring
- Excessive upper lid fat resection
- Inappropriate lower lid fat resection

Patient Evaluation

A detailed history and physical examination may not only differentiate an ideal surgical approach but also elucidate the patient's desires. The preoperative consultation should dismantle any preconceived notions of blepharoplasty and educate the patient on the appropriate surgical steps based on the patient's aesthetic aspirations, clinical history,

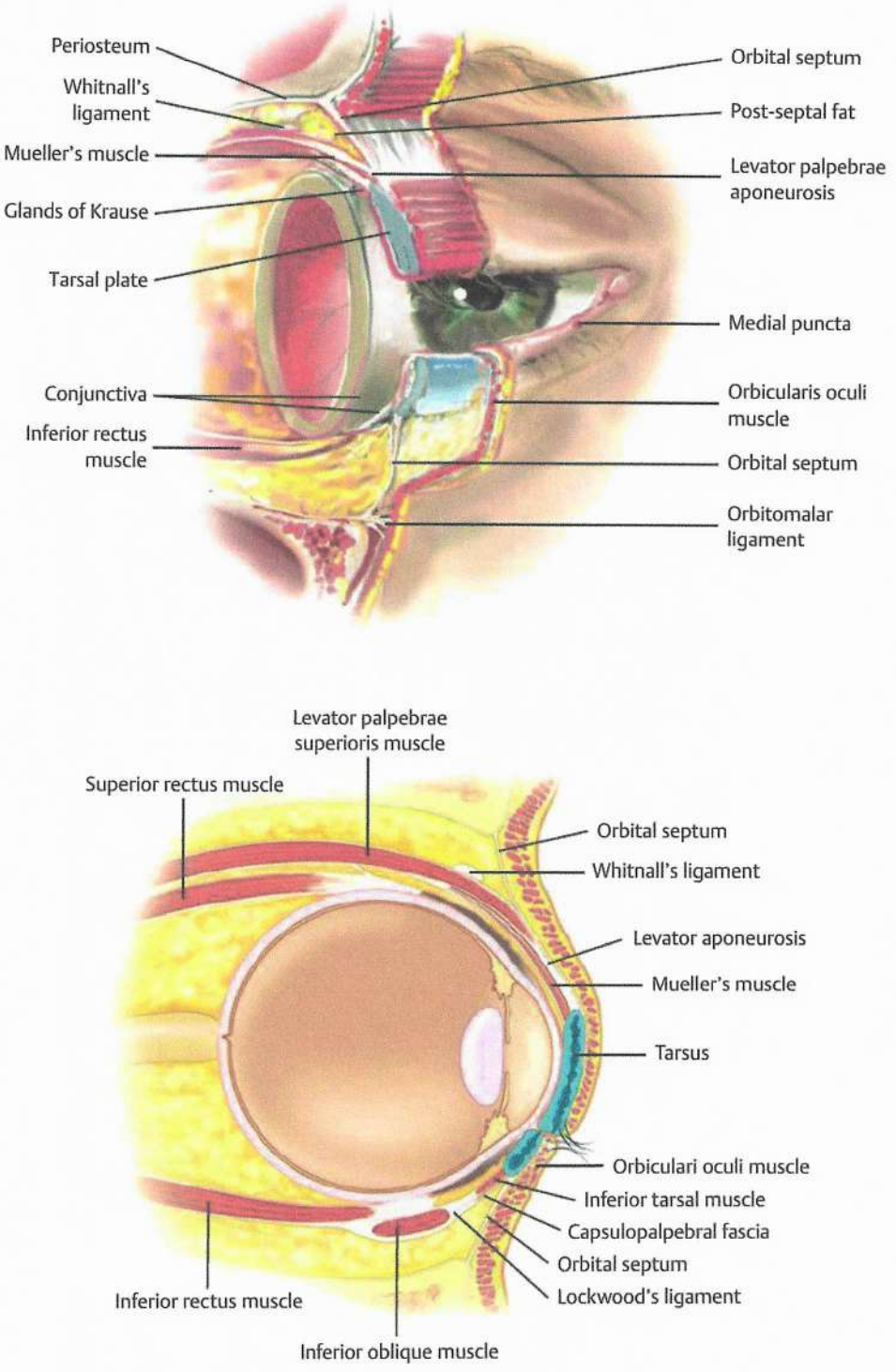

Fig. 22.3 (**a**) An oblique cross-section of the right orbit and adnexa. (**b**) A lateral cross-section of the right orbit and adnexa. Note the relationship of the levator, the superior rectus, the inferior oblique, and rectus muscles. Also, note the preaponeurotic fat pad superiorly and the postseptal fat pad (precapsulopalpebral) inferiorly.

and eyelid morphology. Together, the surgeon and patient should develop a mutual understanding that the surgical approach will be selected based on not only patient preference but also the tissue characteristics. The patient must understand the limitations of his or her eyelid topography. The surgeon and patient can review patient images and physical attributes to determine the ideal clinical course. This educational approach and informed consent has proven to enhance patient satisfaction and overall aesthetic outcomes.[2–4,11–15]

Medical History

Before the physical examination, the surgeon should take a detailed history. The consultation should include a general medical history and a detailed ocular history, including a description of dry eyes or ophthalmic lubricants, corrective lenses, thyroid disease, previous refractive surgery, recurrent acute or chronic blepharitis, and any other ocular or periocular conditions. A detailed history may suggest various procedures for the patient. For example, a patient with a history of dry eyes and corrective lenses will certainly demand greater tear production and tolerate less evaporative loss than a patient without those underlying issues. Alternatively, chronic blepharitis or recurrent herpes zoster may be exacerbated by eyelid surgery, and prophylactic antibiotic or antiviral therapy may be warranted before surgical intervention. The most important aspect of obtaining a good history is to tailor the surgical procedure to the individual patient; this approach will minimize risks and maximize the cosmetic and therapeutic aspects of any procedure.[2–4,11–15]

The aesthetic desires of the patient must be discussed and determined; I (H.M.S.) prefer having the patient describe his or her complaints while looking in a mirror. In addition, reviewing static and dynamic eyelid and facial photographs from multiple views may identify abnormalities, delineate patient wishes, and enhance the consultation.[2–4,11–15]

Physical Examination

A detailed physical examination is essential to determining the ideal surgical approach. The initial examination should note any gross anatomic abnormalities and normal structures; in addition, the proper anatomic position and relationship of the upper and lower lids should be identified. The upper lid should divide the width of the iris in half. The lower lid should lie above or abut the corneoscleral junction; the upper and lower lids should have a smooth sweeping arch or contour. The highest point or maximal arch of the upper lid should lie at the most medial aspect of the pupillary aperture. Inflammatory changes and crusting along the eyelid margins or within the eyelashes indicate blepharitis. A clear glistening corneal surface, sclera, and conjunctiva without injection indicate adequate coverage,

Fig. 22.4 (a) This patient had upper eyelid ptosis after four blepharoplasties by a referring plastic surgeon. **(b)** After correction of the lid ptosis with levator advancement and a canthoplasty.

lid excursion, and appropriate wetting of the ocular surface. Eyelid folds should be symmetrical; the fold height varies according to the patient's sex and race. The patient's superior sulcus should be examined, including the level of concavity or convexity and its relationship to eyelid movement.[2–4,11–15] **Fig. 22.4a** demonstrates a patient with upper eyelid ptosis after four blepharoplasties by a referring plastic surgeon. **Fig. 22.4b** demonstrates the correction of the lid ptosis with levator advancement and a canthoplasty that I (H.M.S.) performed.

Eyelid margin abnormalities (ectropion or entropion) and whether they change with the blinking cycle should be determined. For example, patients with involutional entropion will usually present with lax lower eyelids, scleral show, and sometimes a tendency toward ectropion until they are asked to close their eye forcibly. Almost immediately, the lower eyelid of these patients will briskly roll inward against the globe with forced blinking.[2–4,11–15] **Fig. 22.5a** demonstrates a patient with chemosis, scleral show, and lid retraction after a blepharoplasty by a referring plastic surgeon. **Fig. 22.5b** demonstrates the correction with a canthoplasty and a palatal graft that I (H.M.S.) performed.

Furthermore, baseline visual acuity should be documented with a Snellen chart; the right and left eye should be assessed with and without corrective lenses. Commonly, patients complain about visual acuity changes postoperatively; as such, a baseline should be documented presurgically. Of note, astigmatism in a selective meridian can be alleviated or induced by surgery, and an ophthalmologist referral may be warranted before surgical intervention.[2–4,11–15]

Next, extraocular motion and pupillary function should be assessed, with asymmetries being most notable. Normal facial animation and a pupillary light and accommodation response should identify appropriate innervation.[2–4,11–15]

Fig. 22.5 (a) This patient had chemosis, scleral show, and lid retraction after a blepharoplasty by a referring plastic surgeon. **(b)** After correction with a canthoplasty and a palatal graft.

Fig. 22.6 (a) This patient had chemosis, scleral show, and lid retraction after a blepharoplasty by a referring plastic surgeon. **(b)** After correction with a canthoplasty and a palatal graft.

Subsequently, tonicity of the lower eyelid should be measured. The lower eyelid is gently pulled down and distracted away from the globe and then allowed to retract back into its regular anatomic position. Delays or asymmetries in the rate or position of the lower lid snap-back should be recorded. A youthful and intact lower eyelid should position itself against the globe and revert to an appropriate height within 1 second of distraction. I (H.M.S) grade snap-back as weak, moderate, or brisk; anything but a brisk snap-back requires increased intrinsic support or minimized extrinsic distraction forces.[2–4,11–15]

In addition, the periorbital anatomy should be evaluated, specifically the presence or absence of zygomatic or malar support. Patients whose malar eminence lies posterior to their cornea have poor lower lid support and are prone to malposition. In patients with lower eyelid malposition (scleral show), the surgeon should digitally elevate the lower eyelid and tighten while concomitantly visualizing the tension created on the suborbital soft tissues. This manual suspension may guide appropriate surgical intervention. In addition, the surgeon should try to assess which lamella (anterior, middle, posterior) is deficient. This differentiation will assist in planning complementary procedures to the canthopexy such as cheek or midface suspension, interposition grafts, skin grafts, or external flaps.[2–4,11–15] **Fig. 22.6a** demonstrates a patient with chemosis, scleral show, and lid retraction after a blepharoplasty by a referring plastic surgeon. **Fig. 22.6b** demonstrates the correction with a canthoplasty and a palatal graft that I (H.M.S.) performed.

All patients should be assessed for baseline tear production with Schirmer's test using topical anesthesia and precut standardized No. 41 filter paper strips. This assessment should take place in a dark room to prevent the effect of ambient light on tear production. Patients can be subdivided into three categories: low tear producers (0–9 mm), moderate tear producers (10–20 mm), or high tear producers (21–30 mm). Of note, very high tear producers may have obstruction of the nasolacrimal system and may present with a spectrum of complaints including epiphora, recurrent medial canthal swelling, and/or mucopurulent discharge.[2–4,11–15]

In addition to tear production and tear quality, the ability of tears to withstand evaporation or breakup should be assessed; a simple test can be performed that measures film breakup time. Fluorescein is introduced onto a topically anesthetized eye, and after the patient blinks to disperse the agent, the eyelids are then held apart and the uniform tear film is visualized over the corneal surface through a cobalt blue filter. The period between holding the patient's eyes open and deterioration of the tear layer (tear film breakup) should be longer than 20 seconds. Of note, because of the multifactorial etiology of tear quality, this test may have low yield.[2–4,11–15]

After a detailed history and physical examination, the surgeon should identify the problem and tailor the surgical procedure according to the specific patient's findings. There are almost no contraindications to surgery in the periocular region but rather definitive historical and physical signs that dictate the ideal surgical approach for an individual patient.[2–4,11–15]

Fig. 22.7 outlines key components of the preoperative physical examination before an upper and lower eyelid blepharoplasty.[3,16]

Upper Lid Blepharoplasty

The morphology of the upper eyelid can be differentiated into four different categories:

1. Occidental
2. Deep set
3. Baggy
4. Asian

The normal youthful *Occidental* upper eyelid has levator extensions inserting into the skin surface to define a lid fold that averages 6 to 8 mm above the lid margin. The orbital septum coalesces with the levator aponeurosis, creating

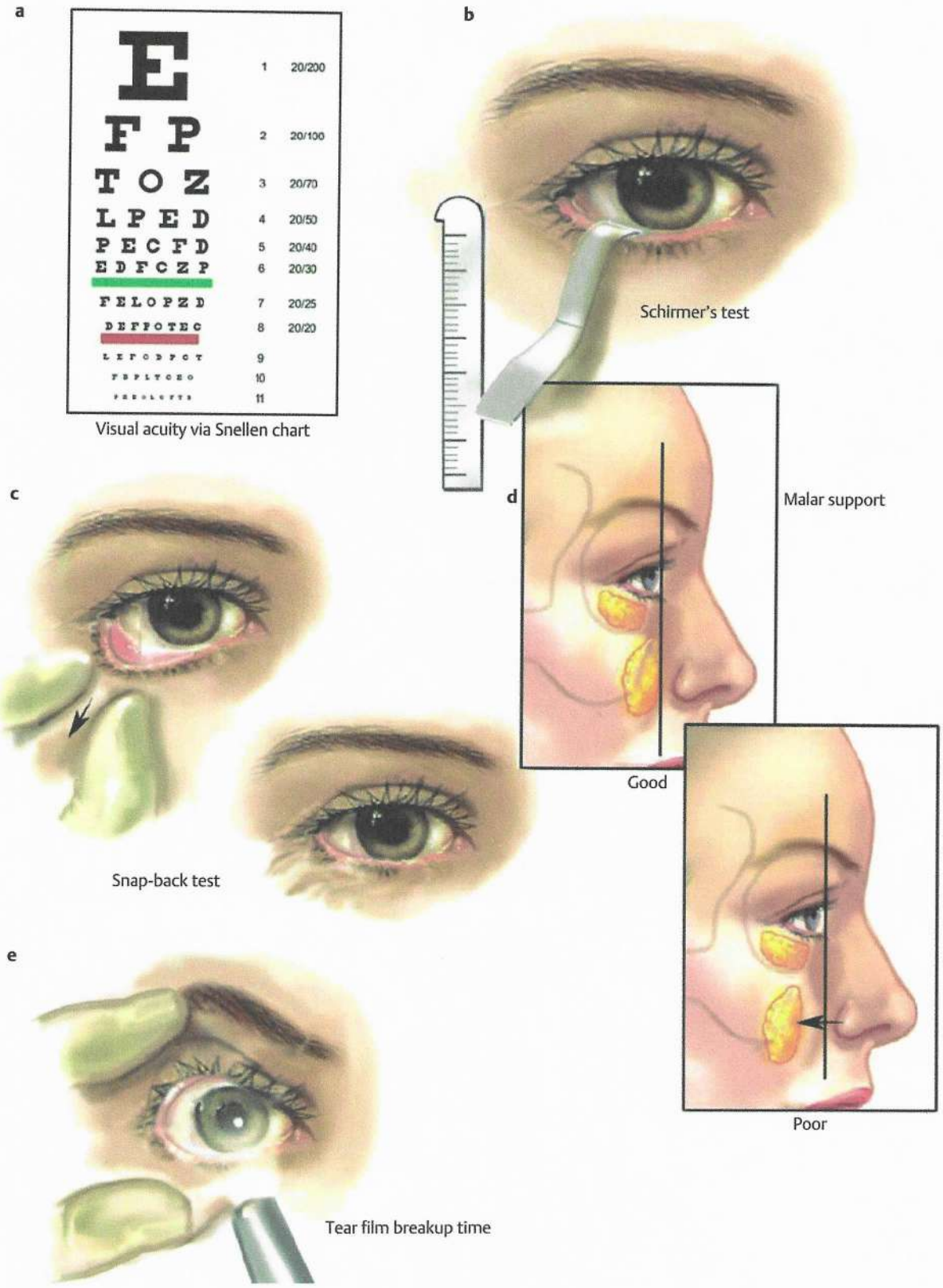

Fig. 22.7 Key components of the preoperative examination for an upper and lower lid blepharoplasty. **(a)** A basic Snellen chart should be used before surgery with all patients undergoing eyelid procedures to document their baseline visual acuity. **(b)** Schirmer's test strips measure baseline tear production. **(c)** A lower lid snap-back test. **(d)** The relationship of the anterior globe vector to the midfacial skeletal support in a youthful face and malar support. **(e)** A Bell's reflex test with a normal result. (**a** From Codner MA, McCord, CD Jr. Eyelid and Periorbital Surgery. 2nd ed. New York: Thieme Medical; 2016.)

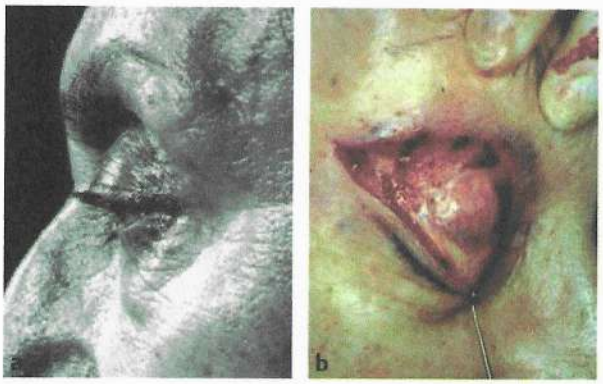

Fig. 22.8 (a) This patient had levator dehiscence and overresection of fat after a blepharoplasty by a referring plastic surgeon. **(b)** The levator dehiscence of the same patient.

Fig. 22.9 A herniated lacrimal gland after an upper lid blepharoplasty by a referring plastic surgeon.

the fat-containing aponeurotic space. The position of the levator-skin linkage and the anterior-posterior relationship of the preaponeurotic fat determine the lid fold height and degree of sulcus concavity or convexity. In the *deep-set* eyelid or in the case of levator dehiscence from the tarsal plate, the upper lid crease is displaced superiorly, measuring 8 to 13 mm from the lid margin. The orbital septum and preaponeurotic fat linked to the levator are displaced superiorly and posteriorly. These anatomic changes create a lid crease; a deep superior sulcus; and, in the case of levator dehiscence, eyelid ptosis.[2–4,17–23] **Fig. 22.8a** demonstrates a patient with levator dehiscence and overresection of fat after a blepharoplasty by a referring plastic surgeon. **Fig. 22.8b** identifies the levator dehiscence intraoperatively.

In the *aging or baggy* eyelid, the septum becomes attenuated and stretches. The preaponeurotic fat attachments loosen, and this attenuation allows orbital fat to prolapse forward and slide over the levator into an anterior and inferior position. The net result is an inferior displacement of the levator skin attachments and a low and anterior position of the preaponeurotic fat pad. Clinically, this transposition results in a low lid crease that is only a few millimeters from the lid margin and may not be visible because of the overhanging lid. The youthful *Asian* eyelid anatomically resembles the baggy or senescent upper lid with a low levator skin zone of adhesion and an inferiorly, anteriorly located preaponeurotic fat. The characteristic, but variable, low eyelid crease and convex upper eyelid sulcus are classic.[2–4,17–23]

The four anatomic variations in the upper eyelid displayed by different ethnic groups and the changes associated with senescence within each group allow for a convergence of anatomy. Many of these ethnic differences are erased by aging or attenuation of structures, allowing for a unified lid concept. Before an upper lid blepharoplasty, the upper eyelid topography should be categorized with a tailored approach to treat the pathology.[2–4,17–23]

In planning and executing the upper lid blepharoplasty, the surgeon must first determine the endogenous lid crease or the height at which to create a new lid crease (if different from the existing crease). Of note, a new lid crease would require supratarsal fixation. The level of the lid crease serves as the lower limb of the blepharoplasty incision and the height of supratarsal fixation, if indicated. The width or extent of skin excision is determined by pinching the lid skin between forceps and using slight lash line eversion as the end point. This superior mark will determine the location for the superior limb of the skin incision.[2–4,17–23]

Concurrently, the extent of lateral eyebrow ptosis and the amount of lateral upper eyelid hooding should be determined. The degree of lateral hooding will dictate the lateral extent of the incision. In general, incisions that extend beyond the orbital rim are not well tolerated. The upper and lower limbs typically have unequal lengths to eliminate dog-ears and must be exaggerated as when widening the lateral skin excision. Sometimes, a balance must be made between the extent of lateral hooding and maintaining the incision lines within the confines of the orbital rim. Of note, if the lateral extent of the incision becomes excessive, then a lateral brow suspension should be entertained. In addition, an enlarged or herniated lacrimal gland can also produce fullness of the lateral portion of the upper eyelid. The lacrimal gland can be resuspended or plicated; excision of the gland is discouraged because of the risk of dry eye syndrome.[2–4,17–23] **Fig. 22.9** demonstrates a herniated lacrimal gland after an upper lid blepharoplasty by a referring plastic surgeon.

In practice, the upper lid blepharoplasty can be efficiently performed using a few technical manipulations consistent with the anatomy. Digital traction and light pressure by the surgeon or assistant allow smooth, quick incisions. Slightly more pressure must be exerted on the scalpel laterally as the skin thickens. The skin may be elevated with the orbicularis muscle with a needle-tipped, insulated cautery; resection can be optimized by transposing the myocutaneous flap superonasally while providing digital traction laterally. The orbital septum may be stabbed or widely incised,

exposing the preaponeurotic space. The underlying levator aponeurosis is protected by opening the septum as cephalad as possible, because the levator and septum diverge as one moves superiorly.[2–4,17–23]

Fat will prolapse spontaneously or with light digital pressure. The medial fat is whiter and lies medial to the superior oblique muscle. The central or preaponeurotic fat is darker and less fibrous. Care should be taken not to overly resect fat when using digital pressure techniques. Excessive traction and manipulation of fat could cause a deep orbital hemorrhage and should therefore be avoided. Closure may then be performed; I (H.M.S.) prefer 6–0 nylon interrupted sutures laterally and 5–0 nylon intracuticular sutures medially.[2–4,17–23]

Once the upper lid skin is incised or excised, the levator may be modified (shortened or lengthened) by various interventions, including plicating the levator muscle alone, removing a strip and apposing the cut ends, or plicating and removing the excess levator above the suture line.[2–4,17–23] **Fig. 22.10** demonstrates intraoperative levator advancement sutures. The skin edges may also be incorporated in these modifications to accentuate or move the lid crease (supratarsal fixation). These changes may be performed alone or in combination and may be used freely with the standard upper lid blepharoplasty.

Fig. 22.11 outlines the planning and execution of an upper eyelid blepharoplasty.[3]

Fig. 22.10 Intraoperative levator advancement sutures, performed with local anesthesia. Of note, the patient had a previous blepharoplasty with untreated ptosis by a referring plastic surgeon.

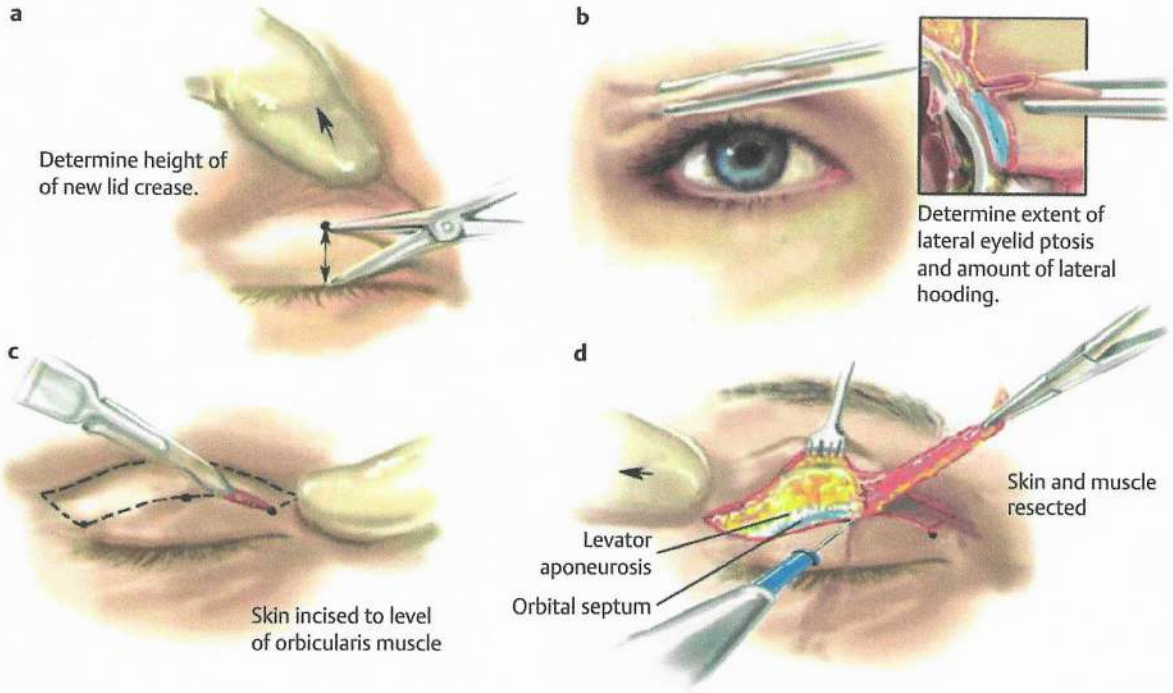

Fig. 22.11 Key steps in planning and executing an upper lid blepharoplasty. **(a)** Determination of the endogenous lid crease or height at which to create a new lid crease (if different from the existing crease). The latter would require supratarsal fixation. **(b)** Determination of the extent of lateral eyebrow ptosis and, hence, the amount of lateral upper eyelid hooding. The degree of hooding will dictate the point of the lateral extension needed to treat the hooding. **(c)** Digital traction and light pressure by the surgeon or assistant allow smooth, quick skin incisions. Slightly more pressure must be exerted on the scalpel laterally as the skin thickens around and lateral to the orbital rim. **(d)** The skin may be elevated with the orbicularis muscle in one maneuver using an instrument on the skin muscle section to be resected and pulling this superonasally while providing digital traction. A needle-tipped insulated cautery is most advantageous, especially in avoiding any delaying hemostasis problems. The orbital septum is then widely opened, exposing the preaponeurotic space.

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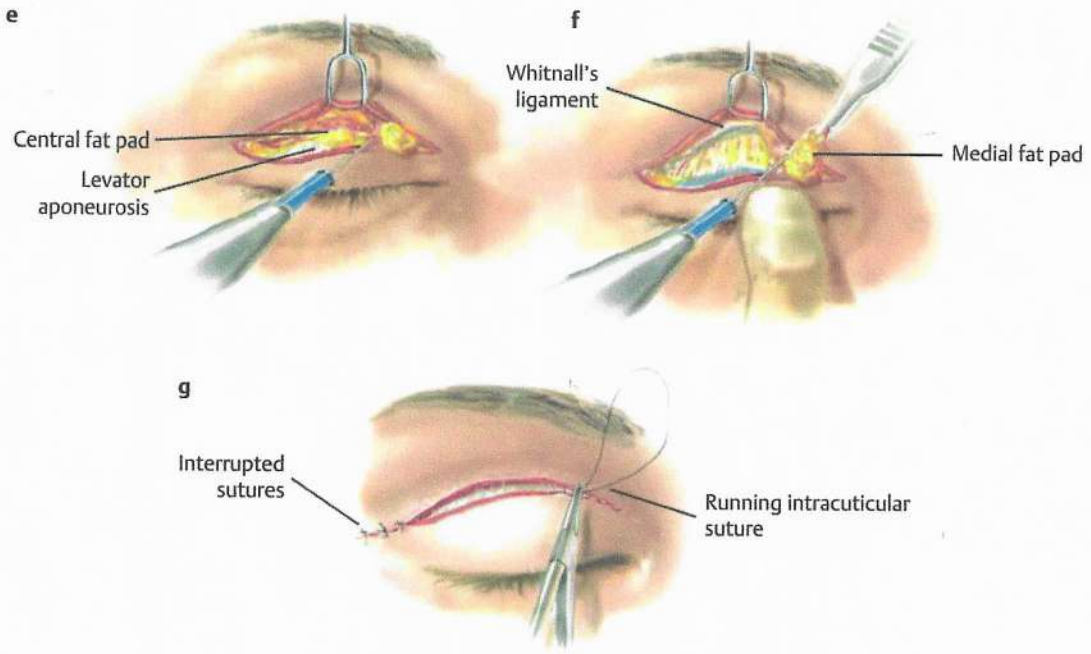

Fig. 22.11, *cont'd* (e) The underlying levator aponeurosis is protected by opening the septum as cephalad as possible, because the levator and septum diverge as one moves superiorly. **(f)** The medial fat pad may require some digital pressure to expose and grasp; however, care should be taken not to overly resect fat when using digital pressure techniques. Excessive traction and manipulation of fat could cause a deep orbital hemorrhage and should be avoided. **(g)** Closure may then be performed, preferably with 6–0 nylon interrupted sutures laterally and 5–0 nylon intracuticular sutures medially.

Lower Lid Blepharoplasty

The lower lid blepharoplasty can successfully address redundant skin and muscle, laxity of the septum, excess fat, lower lid malposition, and prominence of the nasojugal groove. The operative approach is multifactorial and should be guided by the preoperative history and physical examination, the cosmetic goals of the patient, and the preferred surgical approach of the surgeon. Lower lid deformities can be addressed by either a transcutaneous or transconjunctival approach. Both interventions can treat lower lid pathology, but certain techniques may be favored based on the patient presentation or surgical preference. As with the upper lid, the successful completion of the lower lid blepharoplasty requires a few technical pearls that will simplify and speed its execution.[2–4,24–37]

Transcutaneous Lower Lid Blepharoplasty

For a transcutaneous lower lid blepharoplasty, the primary incision should be in a desired fold or potential fold lateral to the lateral canthus (**Video 22.1**). This incision should be limited but provide access for small curved scissors. The scissors should be passed through the incision into the suborbicularis preseptal space. This plane is then developed from lateral to medial while gently pushing and spreading the scissors. Once the plane is developed, the myocutaneous flap can be mobilized with ease. The scissors are withdrawn, and only one limb of the scissors is inserted into the preseptal suborbicularis plane, with the other over the skin surface. The scissors may be beveled toward the eyeball (less skin, more muscle). Using the scissors, the second incision is completed lateral to medial ending just lateral to the lower lid punctum. Inferior digital traction and superior traction with a small hook may stabilize this incision. Using an insulated Desmarres retractor, the flap should be mobilized to the orbital rim without violating the septum.[2–4,24–37]

The septum may then be opened widely or with stab incisions. In either case, the inferior oblique muscle should be visualized and protected before resection or repositioning fat. The muscle is most anterior medially, adjacent to the medial fat pad. Overresection of fat, especially in the lateral compartment, can lead to unacceptable cosmetic results. Orbital fat may be repositioned and/or resected depending on the needs of the patient. Skin resection should be conservative with lateral and cephalic vectors; resection should transpose the most tension under the canthus and the least tension in the mid-lower lid. If the patient is awake, he or she can look up and open the mouth to add conservation to the skin excision step. Before closure, resection of a few millimeters of orbicularis muscle at the superior aspect of the flap may diminish the annoying blepharoplasty bulge or roll. Instead of discarding the muscle, the orbicularis flap may be used as a sling, fixed to the lateral canthus, to reinforce the repair. Closure is completed after hemostasis is controlled. Typically, the I (H.M.S.) prefer 6–0 silk medially and interrupted nylon laterally.[2–4,24–37]

Fig. 22.12 outlines the planning and execution of a lower eyelid transcutaneous blepharoplasty.[3]

Transconjunctival Blepharoplasty

The ideal candidate for transconjunctival blepharoplasty is a younger patient without midface ptosis. The orbital septum is convex, but there is not sufficient skin redundancy to require skin redraping. Small skin changes may be treated with a skin trim or laser.[2–4,24–37]

The transconjunctival approach to the retroseptal space may be preseptal or retroseptal; the most controlled and anatomically consistent approach is the preseptal route. The retroseptal route simply entails incising the conjunctiva and cutting through the lower lid retractors into the postseptal space. Conversely, the preseptal route requires entry into the postorbicularis preseptal space above the fusion of the lower lid retractors and the orbital septum. This approach will allow direct visualization of the septum; each fat pad can be addressed separately in a controlled fashion.[2–4,24–37]

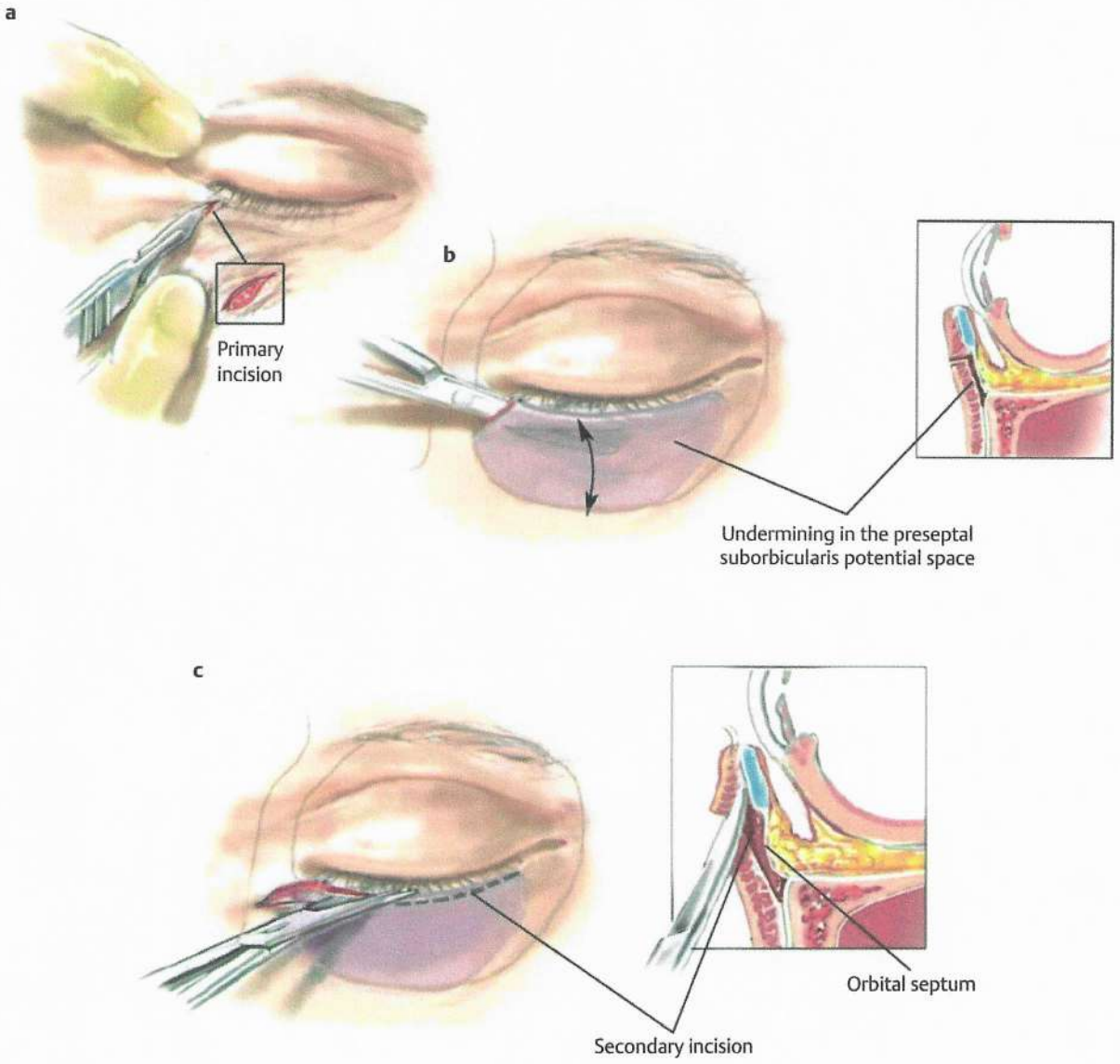

Fig. 22.12 Key steps in planning and executing the lower lid blepharoplasty. **(a)** The primary incision should be in a desired fold or potential fold at and lateral to the lateral canthus. The incision should be limited but be able to admit a small curved scissors. The scissors should be passed through the incision into the suborbicularis preseptal space. **(b)** This plane is developed from lateral to medial while gently pushing and spreading the scissors. Once this plane is developed, the myocutaneous flap can be mobilized with ease. The scissors are withdrawn and only one limb is inserted into the preseptal postorbicularis plane, with the other over the skin surface. The scissors may be beveled toward the eyeball (less skin, more muscle). **(c)** The second incision is completed lateral to medial with the assistance of inferior digital traction, ending just lateral to the lower punctum. The flap should be mobilized to the orbital rim without violating the septum. This is best achieved with a combination of digital cheek traction inferiorly and instrument elevation of the myocutaneous flap.

Continued

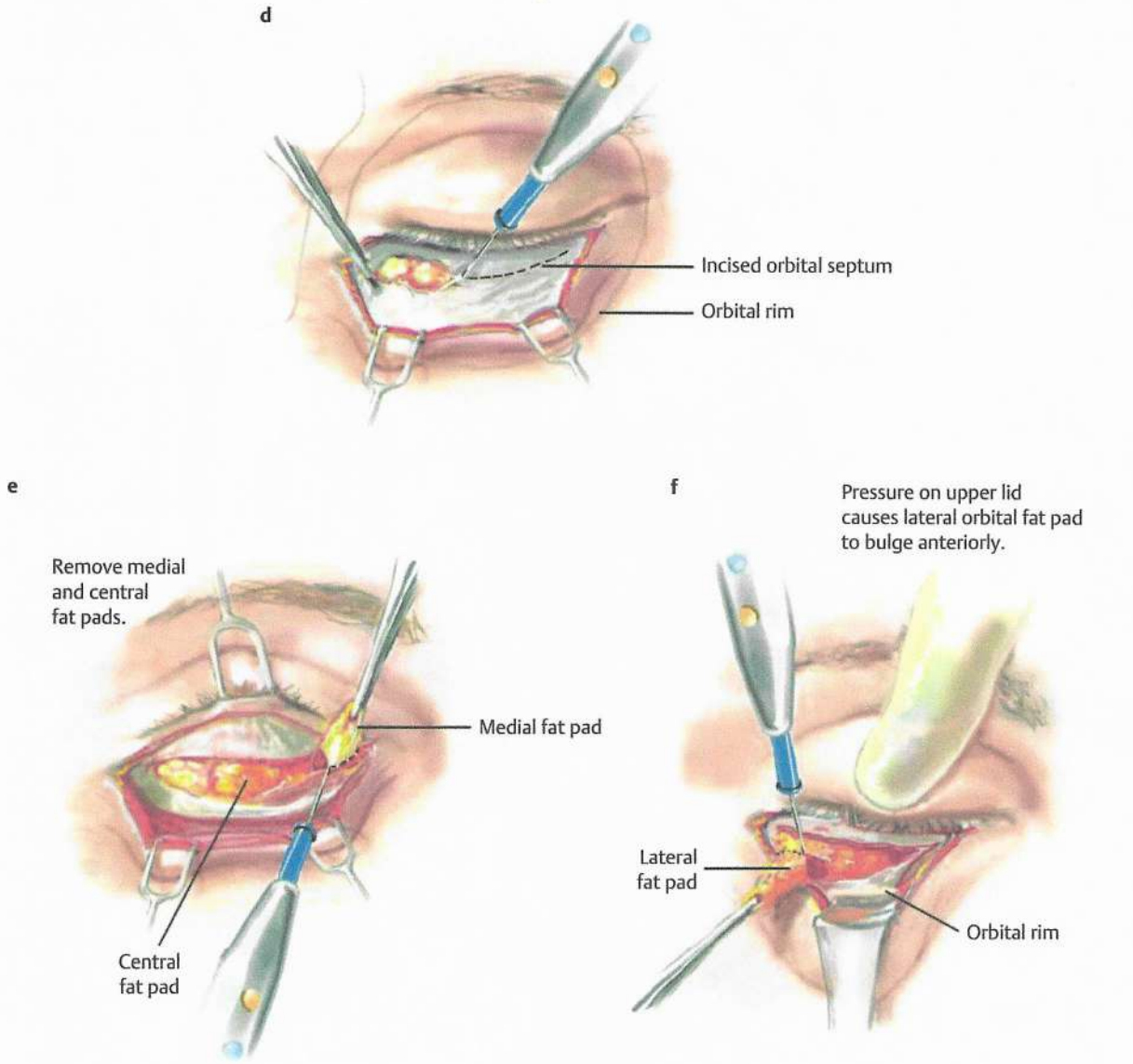

Fig. 22.12, *cont'd* (d) The septum may then be opened either widely or with stab incisions. **(e)** In either case the inferior oblique muscle should be visualized and protected. The oblique muscle should be identified before resection or repositioning fat. The muscle is most anterior medially adjacent to the medial fat pad, and this is the best place to identify it using an instrument to spread or probe while concomitantly applying light digital pressure. **(f)** Overresection of fat, especially the lateral compartment, can lead to unacceptable cosmetic results. Skin resection should be conservative and invoke lateral and cephalic vectors.

Continued

A few simple surgical pearls may streamline the transconjunctival preseptal lower lid blepharoplasty procedure. A protective lens should always be used. A conjunctival stay suture can be placed deep in the fornix and the lid margin to apply traction superiorly. This maneuver causes the inferior edge of the tarsal plate to rise to the surgeon. The conjunctiva and lower lid retractors are incised just below the tarsal plate entering the postorbicularis preseptal space. A plane can then be developed to the orbital rim with the assistance of the traction suture and a nonconductive instrument (Desmarres rectractor). The orbital septum may then be widely incised or punctured; the inferior oblique muscle must be identified and preserved. The fat pads may be addressed individually; resection, repositioning, and/or conservation are all viable options depending on the preoperative examination. I (H.M.S.) prefer a supraperiosteal tunnel with a temporary transcutaneous stay suture to maintain the proper location when repositioning fat. A single absorbable conjunctival suture may

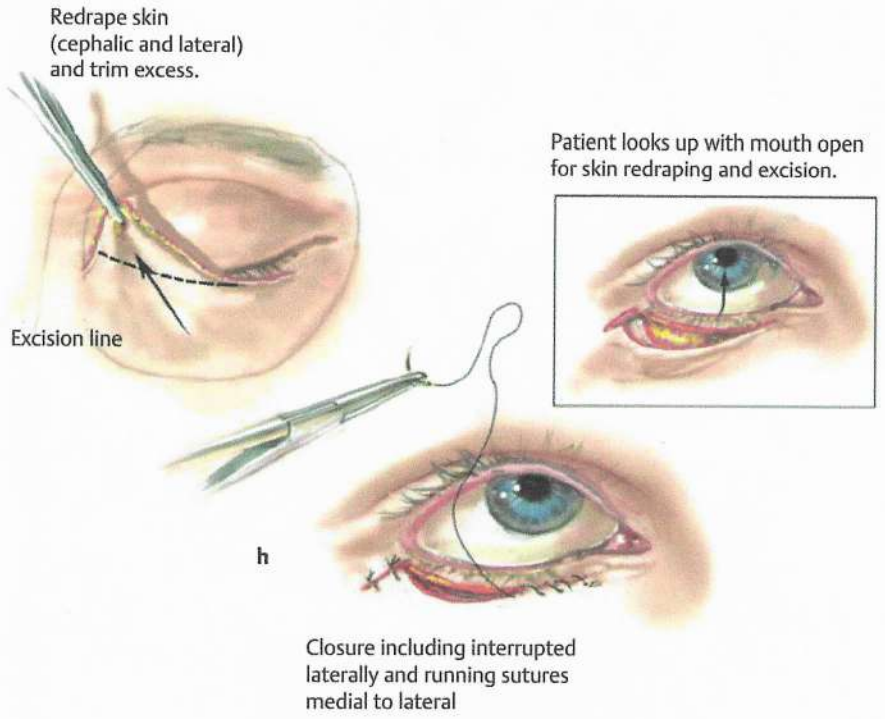

Fig. 22.12, *cont'd* (g) This will render the most tension under the canthus and the least distraction force in the mid-lower lid. The patient should look up and open the mouth to add conservation to the skin excision step (*inset*). Before closure, a few millimeters of orbicularis muscle can be resected at the superior aspect of the flap. This does not affect function and prevents the annoying postblepharoplasty bulge or roll. **(h)** Closure is completed after hemostasis is attained. Running 6–0 silk medially and interrupted nylon laterally is preferable.

be useful, when closing, to avoid Tenon inclusion cysts; this suture should be placed laterally to prevent postoperative complaints of corneal irritation.[2–4,24–37]

Managing Complications in Blepharoplasty

Visual Loss Secondary to Hemorrhage

Retrobulbar hemorrhage is one of the most commonly feared complications of blepharoplasty, and the overall incidence has been reported to be 1 in 25,000 cases. Bleeding in the orbital bed, either during the procedure or several days after the procedure, can create a hematoma that can compress the neurovascular structures, leading to ischemia of the retina, central artery, and/or optic nerve. Bleeding may be secondary to inadequate hemostasis, disruption of deep orbital vessels from traction of superficial fat pads, or direct trauma to the vasculature during local anesthetic injections. In addition, patient comorbidities (including hypertension and coagulopathies) and/or medication (such as aspirin and vitamin E) may contribute to bleeding risks.[2–4,38–52]

Signs of retrobulbar hemorrhage should be instantly identified and addressed to prevent permanent visual compromise. Symptoms may include sudden pupillary changes, proptosis, visual loss, and/or loss of ocular motility. Vision should be checked immediately after surgery and before discharge. Patients should not only be able to visualize light but also be able to discern gross objects; patients should be instructed to contact the surgeon immediately if severe pain or visual loss develops postoperatively.[2–4,38–52]

If retrobulbar hemorrhage is suspected during or after the procedure, the surgeon, and preferably an ophthalmologist, should evaluate the globe (including intraocular pressure) and the optic nerve for ischemia; all surgeons should be familiar with basic techniques for assessing the globe, including Schiotz tonometry, and a stepwise approach to decompress the globe and alleviate symptoms. Mild hemorrhage can be controlled by head elevation and close observation. For more severe hemorrhage, lysis of one or both crura of the lateral canthal ligament allows the globe to move forward and protects the eye from ischemic and/or decompressive damage. In addition, the intraocular pressure can be reduced by topical medications (timolol 0.5%, dorzolamide 2%, or brimonidine) or systemic administration of hyperosmolar agents (mannitol) and corticosteroids. Finally, in cases of severe hematoma uncontrolled by the previously described measures, the surgeon should explore the retroorbital space to control the hemorrhage. Finally, paracentesis

of the anterior chamber is very effective in decreasing intraocular pressure, but this approach should be reserved for the ophthalmologist or more experienced surgeons.[2–4,38–52]

Perforation of the Globe

Perforation of the globe is a rare but potentially devastating surgical complication. To avoid this injury, the globe should be protected with a corneal shield before surgical intervention and local anesthesia injection; in addition, any needle should always be directed away from the globe. If a globe perforation occurs, ophthalmic consultation should be obtained immediately, and the procedure should be interrupted. Signs and symptoms include sudden change in vision or of the position or symmetry of the pupil.[2–4,38–52]

Damage to the Extraocular Muscles

Extraocular muscles may also be damaged during blepharoplasties, resulting in temporary or permanent strabismus. Damage may occur from anesthetic injections or direct trauma during surgical dissection. The inferior oblique muscle is at highest risk during a lower lid blepharoplasty, because this muscle is the only extraocular muscle that originates anteriorly in the orbit. This pink-purple structure is located between the medial and central fat pads.[2–4,38–52]

A superior oblique palsy, although at a lower incidence, has also been reported from damage to this muscle during an upper lid blepharoplasty. This injury can be avoided with careful nasal dissection, limited cautery in the trochlear region, and proper identification of the superior medial palpebral artery below the medial fat pad.[2–4,38–52]

Damage to the Cornea

One of the most common complications during a blepharoplasty is trauma to the corneal epithelium. Although most injuries heal spontaneously within 24 hours or less, damage to the corneal epithelium may cause significant discomfort and potentiate a source of infection. This injury may occur during surgical dissection but also may be secondary to the traumatic insertion and removal of protective corneal shields. To prevent this complication, surgeons should not only have controlled, purposeful movements of the instruments but also irrigate the corneal lenses with balanced saline and fill them with lubricants before placement. In addition, at the conclusion of the procedure after the shields have been removed, both eyes should be irrigated with balanced saline to remove any foreign bodies, and ophthalmic ointment should be applied. If an abrasion occurs, antibiotic ophthalmic ointment can be prescribed, and the patient should be observed frequently until healing occurs. Topical ophthalmic anesthetic solutions must be avoided; even though they may alleviate pain, these solutions can significantly delay healing and put the patient at risk for a neurotrophic corneal ulcer.[2–4,38–52]

Wound Dehiscence

Wound dehiscence may occur immediately after surgery or days to weeks postoperatively. This complication may be directly related to inadequate closure or disruption of sutures but also may be secondary to underlying pressure on the incision, (i.e., a hematoma). Hematomas either occur from poor hemostasis or rebound bleeding after the adrenaline effects have subsided. In general, minimal bleeding from the surgical incision can be observed carefully in the recovery room, and the patient should be counseled about normal sequelae. Occasionally, however, if more brisk bleeding develops, the surgical site should be explored in the operating room. Of note, fat excision may be associated with "flash" hemorrhage from traction of vessels deep in the orbit. In some instances, the sutures can be loosened from the incision to release fluid and avoid pressurizing the orbit until hemostasis is obtained.[2–4,38–52]

Lower Eyelid Malposition

Final positioning of the lower eyelid directly correlates to an adequate understanding of the lower lid anatomy, the pathology of the aging eyelid, and the aesthetic goals of the patient. Externally, the lower lid should abut the globe in its entire length. In addition, an imaginary line drawn from the medial canthal angle to the lateral canthal angle should arc 10 to 15 degrees from the horizontal, positioning the lateral canthus above the medial canthus. Furthermore, the sclera should not be visible on primary gaze (i.e., inferior scleral show), the lashes should not be in contact with the cornea (entropion), nor should the eyelid margin be rotated (ectropion) so that the palpebral conjunctiva is exposed.[2–4,38–52]

Overresection of skin or aggressive dissection and fat removal during a blepharoplasty can lead to entropion or ectropion. This presentation may be caused by the lack of external skin, disinsertion of the lower lid retractors, or cicatricial scarring.[2–4,38–52]

Many patients with dermatochalasis (excess skin) also have variable degrees of eyelid laxity, which must be addressed during the surgical intervention (e.g., canthal tightening, lateral canthal strip, etc.). Lower lid malposition often becomes more apparent after a blepharoplasty if this laxity is not corrected. The surgeon must carefully examine the relative position of the eyelid margin and tarsal consistency before surgery (i.e., snap-back test, eyelid distraction test, etc.).[2–4,38–52]

Conjunctival chemosis (swelling) may be secondary to significant tightening of the lower eyelid with resultant edema or may occur when repositioning severely and chronically malpositioned eyelids. Malposition may increase conjunctival exposure and subsequent desiccation, which leads to edema and further exposure; conjunctiva, like any mucous membrane, requires moisture, and desiccation is not well tolerated. Proper wetting with topical drops and

Fig. 22.13 (a) This patient had chemosis, scleral show, and lid retraction after a blepharoplasty by a referring plastic surgeon. **(b)** After correction with a canthoplasty and conjunctival resection.

Fig. 22.14 (a) This patient had upper lid retraction after a blepharoplasty by a referring plastic surgeon. **(b)** After correction with a deep temporal fascia spacer graft.

Fig. 22.15 This patient had two failed ptosis operations by a referring plastic surgeon with compensatory brow elevation on the left.

ointments is usually helpful in preventing or alleviating this cycle, but a temporary lateral tarsorrhaphy may be a faster solution in the more severe cases.[2–4,38–52]

Fig. 22.13a demonstrates a patient with chemosis, scleral show, and lid retraction after a blepharoplasty by a referring plastic surgeon. **Fig. 22.13b** demonstrates the correction with a canthoplasty and conjunctival resection that I (H.M.S.) performed.

Upper Eyelid Malposition

Upper eyelid malpositions tend to be less common than lower eyelid malpositions. Most upper eyelid malpositions are secondary to excessive skin excision or damage to the levator complex.[2–4,38–52] **Fig. 22.14a** demonstrates a patient with upper lid retraction after a blepharoplasty by a referring plastic surgeon. **Fig. 22.14b** demonstrates the correction with a deep temporal fascia spacer graft that I (H.M.S.) performed.

A detailed preoperative examination, including assessment of eyelid closure, should minimize the incidence of postoperative malposition. Any inability to close the eye (lagophthalmos) must be carefully noted, because lagophthalmos will likely worsen postoperatively. In addition, when deciding the amount of skin to remove, care must be taken not to confuse excessive upper eyelid skin with brow ptosis (especially in men).[2–4,38–52] **Fig. 22.15** demonstrates a patient with two failed ptosis operations by a referring plastic surgeon, with compensatory brow elevation on the left brow. To determine the amount of skin to be resected, the brow is placed in the desired anatomic position and smooth forceps can mark the skin to be removed so that the lashes are only slightly everted. Inadequate preoperative assessment of eyelid movement and anatomy may result in postoperative lagophthalmos and decompensation.[2–4,38–52]

Ptosis

Ptosis, drooping of the upper eyelid, is a rare complication after blepharoplasty. This malposition may result from direct damage to the levator aponeurosis during surgical dissection or secondary to a traction injury. In addition, surgeons may fail to identify ptosis preoperatively, specifically in those patients with significant dermatochalasis; this inadequate preoperative assessment may compound unwanted postoperative outcomes.[2–4,38–52]

Most important, for any malposition, surgeons should attempt conservative measures before intervening too quickly. The patient and/or the surgeon may feel compelled to correct the problem; however, many of the issues from eyelid malpositions spontaneously disappear or improve significantly over time, and often the surgical approach to

Fig. 22.16 (a) This patient had upper lid ptosis after a levator procedure by a referring plastic surgeon. In addition, the patient had a persistent low incision line of the left upper lid. **(b)** After ptosis correction and supratarsal fixation.

correct the problem is inadequate, excessive, or not appropriate in addressing the long-term issues (**Fig. 22.16**).[2–4,38–52]

Loss of Lashes

Loss of eyelashes occurs more commonly after a combined blepharoplasty and ptosis repair than after a blepharoplasty alone. During a ptosis repair, excessive dissection near the tarsus (2–3 mm from the lid margin in the upper lid) can lead to damage of the hair follicle, with subsequent atrophy and loss of lashes. As such, this area should be avoided during blepharoplasty.[2–4,38–52]

Dryness

Postoperative dry eyes are most commonly seen in patients with preoperative tear insufficiency. In addition, a blepharoplasty may result in decompensation in these predisposed patients because surgical steps may widen the palpebral fissure and subsequently increase exposure to the environment. Also, dryness may be the sequela of cicatricial healing in the skin and/or conjunctiva. Finally, the lacrimal gland itself may be damaged during upper lid blepharoplasty, where the gland can mistakenly be excised as upper lid fat. To avoid this complication, lateral dissection near the lacrimal gland should be limited. Usually, the lacrimal gland and the upper eyelid fat have a noticeable color difference; lacrimal gland tissue is whiter and partitioned, and eyelid fat has a pearly, smooth, yellowish appearance.[2–4,38–52]

Often, dryness can be treated with artificial tears and lubricants. However, if symptoms persist, an ophthalmologist should evaluate the consistency and production of corneal tear film. Possible treatment options include temporary or permanent punctal plugs in addition to aggressive, topical wetting agents.[2–4,38–52]

Infection

Infection after blepharoplasty is extremely rare because of the extensive vascularity of the eyelids. Nevertheless, once the orbital septum has been violated, pathogens can easily gain access to the deep orbital structures (orbital cellulitis). A common source of infection may be an obstructed nasolacrimal outflow system in which bacteria can multiply and reflux toward the conjunctiva. Signs of orbital cellulitis include pain, redness, decreased vision, restricted ocular motility, and proptosis. Systemic antibiotics are indicated if an infection is suspected, and close management with appropriate specialists is encouraged. Proper assessment of the nasolacrimal apparatus before surgery may prevent this potentially devastating complication.[2–4,38–52]

Incisional Scarring

Incisional scarring requiring surgical intervention rarely occurs after a blepharoplasty; generally this sequela can be managed with conservative measures—massage and intralesional and/or topical corticosteroids. Early scar revision should be avoided until the scar matures. In cases in which the scar may be secondary to tension, scar revision will rarely improve the final scar, and in many instances may worsen the result.[2–4,38–52]

Excessive Upper Lid Fat Resection

Overzealous fat resection of the upper eyelids should be avoided whenever possible. Many older patients, in addition to excess upper eyelid skin, present with considerable atrophy of the orbit fat and laxity of the periocular aponeurotic system. Rather than excess orbital fat, these patients have attenuation of tissues. Removal of excess fat from the upper lid—especially in the midportion—may result in the accentuated superior orbital rim and a hollowed appearance. Of note, the nasal fat pad is more forgiving, and overresection of this fat pad rarely results in any significant abnormality. If the surgeon identifies excess upper eyelid fat, he or she should sculpt the fat and reposition the tissues to optimize the upper lid contour. Fat, superficial fascia, and thin dermal grafts may all serve as potential late fillers for hollowed orbits.[2–4,38–52]

Inappropriate Lower Lid Fat Resection

As in the upper eyelids, excessive fat resection from the lower lids can result in a cosmetically displeasing deformity. This complication can be prevented if the relationship between the globe and the orbitomaxillary junction (tear trough) is carefully assessed preoperatively. Excessive fat removal from the lower lids must be avoided, and when possible, the removed fat must be repositioned to soften the orbital rim.[2–4,38–52] **Fig. 22.17a** demonstrates a patient

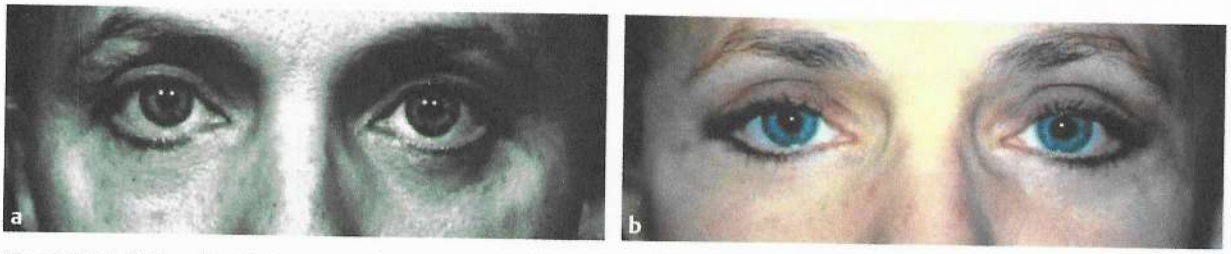

Fig. 22.17 (a) This patient had excessive fat resection after a four-lid blepharoplasty by a referring plastic surgeon. **(b)** After correction with a canthoplasty and midface suspension.

with excessive fat resection after a four-lid blepharoplasty by a referring plastic surgeon. **Fig. 22.17b** demonstrates the correction with a canthoplasty and midface suspension that I (H.M.S.) performed.

Underresection of fat may also create superficial asymmetry and a globular appearance of the lower skin. This complication can be minimized intraoperatively by periodically palpating and reexamining the superficial contour of the lower lid after the removal of fat from each compartment. Should an uneven appearance persist beyond the 3-month postoperative period, further repositioning and/or fillers may be warranted to establish appropriate lower lid contour.[2–4,38–52]

Conclusion

Blepharoplasty is a seemingly straightforward procedure; however, even the most experienced and skilled surgeon may be faced with complications. Many of the complications are avoidable through comprehensive preoperative evaluation, adequate preoperative patient education, thorough knowledge of eyelid anatomy, and meticulous surgical technique. Despite all efforts, every surgeon will eventually encounter postoperative complications and must be prepared to handle them, or they risk causing serious functional or cosmetic morbidity to the patient.

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