

TITLE: Blepharoplasty

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Introduction

The window to a person's soul is oftentimes said to be the eye. This belief came about due to the multitude of expressions conveyed by the eyes. However, what many people fail to distinguish is the fact that the globe itself is void of expression yet the soft tissues and muscles around the eye are fully animated to display any emotion possible; anger, sadness, worry, joy, etc. As a person ages, these periorbital tissues and muscles undergo a process that renders them less elastic, less robust, and at the mercy of gravitational forces pulling them downward. This may cause a person to appear sad, tired, or mad when in fact they feel completely the opposite. For this reason and many others to include a rejuvenated appearance, blepharoplasty is one of the most commonly performed cosmetic procedures.

The Aging Process

Aging affects the skin and underlying tissues in an intrinsic and extrinsic manner. The naturally occurring effects of time on the skin are referred to as intrinsic, while extrinsic factors are those such as gravity, smoking, and sun exposure that have negative effects on the skin. Extrinsic factors are more controllable as opposed to intrinsic factors. Intrinsic skin changes include the loss of collagen and elastic fibers (elastosis), loss of the dermal-epidermal junction, thinning of the dermis and epidermis, and weakening/thinning of the underlying muscle. These changes along with the extrinsic alterations imposed by the sun (solar keratosis), smoking, and gravity result in rhytids, pigmentary changes and skin irregularities.

On a macroscopic level, aging causes brow ptosis, lateral hooding, crows feet, deep rhytids, skin laxity and loss of elasticity. Due to the fact that the eyes unveil emotion, aging of the upper third of the face is usually of greater impact and more noticeable and aging from the lower face. Likewise, rejuvenation of the upper face will have greater impact than correction of the lower face and neck.

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Eyelid Anatomy

The eyelids function as the protective covering for the globe. The eyelid is divided into an anterior and posterior lamella. The anterior lamella consists of the eyelid skin and the orbicularis oculi muscle. The posterior lamella is composed of the tarsus and the conjunctiva.

The horizontal palpebral fissure is normally 28-30mm and vertically 9-10mm. The intercanthal distance should be 25-30mm or approximately the same distance from medial canthus to lateral canthus of the eye. The upper lid crease is formed by the insertion of the levator aponeurosis and septum into the orbicularis oculi muscle and skin. The upper eyelid crease should be 10-12mm from the lid margin in females and 7-8mm from the lid margin in males. The upper eyelid should rest at a point between the pupil and the superior corneal limbus. The inferior lid should be within 1-2mm of the corneal limbus or abutting the corneal limbus. Important to note, in the Asian eyelid, the fusion of the levator aponeurosis and the septum to the orbicularis oculi and the skin occurs more inferiorly. As a result, the fat can prolapsed anteriorly and obliterate the definition of the upper lid crease and give the eyelid a more full prominent appearance.

Now that a brief overview of the eyelid anatomy has been given, the layers of the eyelid from superficial to deep will now be covered in slightly more detail:

Eyelid skin - This along with the orbicularis oculi form the anterior lamella. The skin of the eyelid is the thinnest in the body and richly vascularized. This allows for rapid healing of incisions during surgery. The skin of the eyelid is innervated by the ophthalmic division of the trigeminal nerve via the lacrimal nerve and the frontal nerve. The frontal nerve branches to form the supratrochlear and supraorbital nerves.

Orbicularis oculi - Subcutaneous muscle that serves a sphincteric function for the eye as well as serves as a pump mechanism for tears to go through the punctum, canaliculi and the lacrimal sac. The orbicularis oculi has 3 parts; all of which contribute to eye closure but they have specific roles. The orbital portion is under voluntary control (i.e. winking). The pretarsal orbicularis is involved in the involuntary blinking action and the preseptal fibers of the orbicularis contribute to both involuntary and voluntary actions of the orbicularis oculi muscle.

Orbital septum - This is a fibrous extension of the orbital periosteum that lies just beneath the orbicularis muscle and forms the anterior border of the orbit confining the orbital fat. The septum also acts as a barrier to the spread of infection and neoplasms. In Caucasian lids, the septum fuses with the levator aponeurosis approximately 3mm above the superior tarsal border. In Asians, this fusion occurs more inferiorly (below the superior tarsal border) which permits orbital fat to reside anterior to the tarsus preventing the attachment of the levator to the skin and expunging the upper eyelid crease. In the lower lid, the septum fuses with the capsulopalpebral fascia (orbital retractor) 5mm below the inferior tarsal border.

Orbital fat pads - These lie just beneath the orbital septum. In the upper lid, there are 2 fat pads: the medial and central fat pads. The medial and central fat pads are separated by the superior oblique muscle. Lateral to the central fat pad is the lacrimal gland which must be avoided during upper eyelid surgery to prevent postoperative xerophthalmia. The lacrimal gland is usually identified by its pink hue rather than the yellow color of fat. The lower lid has 3 fat pads: medial, central and lateral. The medial

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and central are separated by the inferior oblique muscle. It is important to avoid the extraocular muscles when performing upper or lower eyelid surgery to avoid postoperative diplopia.

Upper lid retractors - Located deep to the fat. The levator palpebrae superioris originates at the orbital apex; specifically the lesser wing of the sphenoid. It receives innervations from the oculomotor nerve (cranial nerve III). The levator begins posteriorly as horizontally oriented muscle fibers that extend anteriorly (~36mm) until it reaches Whitnall's ligament. At this point, the orientation of the fibers changes to become vertical and travels another 14-20mm until it reaches the tarsal plate. In addition, it fuses with the septum several millimeters above the tarsal border. As stated earlier, the upper lid crease is formed once the fused septum/levator complex attaches to the skin. Muller's muscle (aka superior tarsal muscle) originates on the posterior surface of the levator just above Whitnall's ligament and travels 10-12mm inferior to insert onto the tarsal plate. Muller's muscle is innervated by sympathetic fibers and is responsible for 2-3mm of upper lid retraction.

Lower lid retractors - Located deep to fat as in the upper lid. The capsulopalpebral fascia originates from the inferior rectus fascia to insert on the inferior border of the tarsal plate. Therefore, this lid retractor does not have independent movement but mimics the movements of the inferior rectus muscle. The inferior tarsus muscle is another lower lid retractor and it originates from the undersurface of the capsulopalpebral fascia and is adherent to the lower lid conjunctiva in addition to the capsulopalpebral fascia. This also has sympathetic innervations.

Tarsus - The tarsal plates can be thought of as the "skeleton of the eyelid". Each plate is roughly 25-30mm horizontally and 10-12 mm (upper lid) or 3-5mm (lower lid) in vertical dimension.

Conjunctiva:- This is the innermost eyelid surface composed of 2 parts: the bulbar conjunctiva and the palpebral conjunctiva. The bulbar portion lines the globe and the palpebral portion lines the eyelid. The two parts meet at the conjunctival fornix at the bases of the eyelids. The conjunctiva is composed of nonkeratinized stratified squamous epithelium with goblet cells that produce a mucinous layer of tear film. There are also numerous glands dispersed throughout the conjunctiva that produce an aqueous form of tear film.

Patient Assessment/Physical Exam: The Office Consultation

In addition to performing a general exam to include a complete head and neck exam, a focused evaluation of the brow and periorbital region should be performed. The following areas should be addressed: 1) the brow position, 2) eyelid shape, 3) lid position, 4) position of the upper lid crease, 5) assessment of the lids for fat herniation, skin excess/laxity, and orbicularis hypertrophy.

1. **Brow position:** It is helpful to consider the upper eyelid and brow as one unit rather than two separate entities. Their positions relative to each other play a crucial role cosmetically.

Female brow: medially, it should be on the orbital rim and just off of the rim centrally. Laterally, it should arch so that the highest point in the arch is located between the lateral limbus and the lateral canthus (~1 cm above the orbital rim)

Male brow: In males, the eyebrow arch is flatter and may be located on orbital rim or slightly below.

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- In both males and females**, attention should be given to any degree of lateral hooding or brow ptosis as this can be addressed simultaneously with a blepharoplasty.
2. **Eyelid shape:** the eyelid should ideally have a positive canthal tilt. This means that the lateral canthus should be 2mm superior to the medial canthus.
 3. **Lid position:** the upper lid should cover 2-3mm of the superior limbus but not encroach on the pupil. The lower lid should rest on the inferior limbus or be 1mm below the inferior limbus. Note the presence of lid ptosis, lagophthalmos, or Bell's phenomenon.
 4. **Upper lid crease:** In females, the upper lid crease should be 9-10mm above the lash line. In males, it should be 8mm above the lash line.
 5. **Assessing skin excess/laxity and lacrimal gland ptosis:** Assessing the skin is important especially in an older individual with thin skin. This patient will require a more conservative resection of fat as well as orbicularis oculi muscle to avoid a "hollowed-out" appearance. In contrast, a younger patient with thicker skin may require relatively more aggressive excision of skin, orbicularis muscle and fat. When assessing the lower eyelid, the snap test is useful to determine skin laxity. To perform this test, the lower eyelid is pulled away from the eye and then quickly released. The lid should audibly and quickly snap back in place. If the lid remains pinched away or fails to return, this may alert the surgeon that a lid shortening/tightening procedure may be necessary.

Preoperative Medical Evaluation/History

Remember that blepharoplasty, like other cosmetic procedures is elective surgery. Preexisting medical conditions must be stable. Fortunately, the use of local anesthetic may circumvent some of these issues. A complete medical history should be obtained in addition to lifestyle history (smoking, alcohol use, drugs, etc). An ophthalmologic history should also be elicited from the patient with emphasis on vision, previous ocular trauma, corrective lenses, glaucoma, excess tearing, dry eye, and Lasik procedure history. A Shirmer's test should be performed if there is any question regarding the presence of dry eye. If a patient has a history of Lasik procedures, no periorbital surgery should be performed for 6 months at the minimum.

Upper lid Surgery

Incision planning-

The upper eyelid is marked with the patient in the upright position. The natural upper lid crease is marked with the marking pen. Both eyelid creases are marked symmetrically so that both upper eyelid creases are 8-12mm above the lid margin. In females, this marking can be carried out beyond the lateral orbital rim at which point the line takes a slightly superior direction. This extension is not advised for male patients. The amount of excess skin present will determine where the superior aspect of the incision will be placed. As a rule of thumb, the superior border of the incision should not be closer than 1cm from the inferior border of the brow hairs. Placing the superior portion of the incision closer than 1 cm to the eyebrow hair will yield a suboptimal cosmetic result. This often occurs when a patient undergoes upper lid blepharoplasty without having the ptotic brow addressed. Web formation can occur if the incision is carried to far medial. Laterally, the incision is placed to help compensate for the degree

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of lateral hooding (i.e. the greater degree of lateral hooding, the more lateral the incision may be carried out to compensate.) Of course, the lateral extent of the incision must be balanced by the appearance of the scar. After the superior and inferior lid crease lines are drawn, they are connected by approximate 30 degree lines medially and laterally to form a gentle arched shape. The reasoning for this is to conserve fat and skin excision which should avoid an over-operated look while still producing rejuvenation that is pleasing cosmetically.

Technique-

First, a protective corneal shield should be placed. Next, 1-2 mL of local anesthesia (1% lidocaine with 1:100,000 epinephrine) is injected into the tissues using a 3cc LuerLock syringe and a 30-gauge needle. It is important to perform these injections carefully as careless injection can lead to damage to eyelid vessels, obscure anatomy and lead to a more ecchymotic postoperative appearance.

An assistant then provides counter traction using a cotton tip applicator medial to the incision. A 15 blade is then used to incise the eyelid skin. A Bishop forceps with blepharoplasty scissors is used to excise skin from the orbicularis oculi muscle which lies directly beneath the skin. The orbicularis muscle is then removed using the same instruments with care not to violate the orbital septum. Once the muscle is removed, the next step is to address the fat pads. The septum is incised over the medial and central fat pads as needed. The medial fat pad has a light yellow/off white, creamy appearance while the central fat pad is dark yellow. Placing gentle pressure on the globe can assist the surgeon with the determination of how much fat to resect as the excess fat will readily come forth in most cases. The herniating fat is then removed using electrocautery and sharp dissection. Care is taken to achieve meticulous hemostasis at this point. Afterwards, the lid sulcus can be deepened using electrocautery if needed to contract the septum. Once hemostasis is ensured, the incision can be closed. There are many methods employed to close the skin but a popular method is the use of 6-0 polypropylene in a running subcuticular fashion with knots tied at the medial and lateral ends and taped to the skin to avoid displacement. This will allow suture removal by cutting the knot on one end and pulling the suture out from the opposite end 5-7 days postoperatively. Once the procedure has been performed bilaterally, a cool compress is placed over the eyes.

Complications-

- -Retroorbital hemorrhage with visual loss
 - -Infection (uncommon due to rich blood supply)
 - -Excess skin removal
 - -lagophthalmos (may be transient or permanent)
 - -ectropion of upper lid
 - -web formation (incision placed too far medial)
- -Blepharoptosis (levator muscle injury)
- -Diplopia (superior or inferior oblique muscle damage)
- -Hollowed out appearance (overaggressive fat removal)
 - -Milia

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Lower Lid Surgery

There are 3 main methods to carry out lower lid blepharoplasty: transcutaneous skin flap technique, transcutaneous skin-muscle flap technique, and the transconjunctival technique.

Transcutaneous skin flap technique-

In this technique, only the skin is addressed. The patient is marked preoperatively in the upright position. Corneal eye shields should be used during lid surgery. After infiltration with local anesthesia, the incision is made 1-2mm below the lash line and may be carried up to 1-1.5cm laterally into a crow's foot rhytid. The dissection is performed carefully between the skin and the orbicularis muscle. Strict attention is paid to hemostasis and preservation of the eyelash follicles. Once the desired amount of skin is undermined, it is then retracted superiorly and conservatively resected. Closure is performed using 6-0 absorbable suture in a running subcuticular fashion.

Transcutaneous skin-muscle flap technique-

This consists of elevating the skin and orbicularis oculi muscle off of the orbital septum. As in the transcutaneous technique, the patient's eyelids are marked in the upright position. The patient is then asked to perform upward gaze and the fat compartments to be addressed are marked. After insertion of corneal eye shields and infiltration with local anesthetic, an incision is made identical to that described above for the transcutaneous technique. At the lateral portion of the incision, the orbicularis fibers are incised and blunt dissection is performed from lateral to medial separating the orbicularis oculi muscle from the orbital septum beneath. Next, a flap is elevated using the blepharoplasty scissors to remove 5-7mm of skin from the pretarsal orbicularis oculi. The orbicularis muscle is then incised with blepharoplasty scissors 5-7mm below the lid margin. The fat compartments are then addressed after blunt dissection has been carried out and the orbital septum exposed. The orbital septum is then incised over the compartments to be addressed and the fat is expelled, cauterized at the base and then excised with scissors. After this has been accomplished, excess subciliary skin is conservatively trimmed. A small 2-3mm strip of orbicularis may need to be removed at the subciliary wound edges to permit apposition of the skin edges. The subciliary incision is then closed with 6-0 absorbable running suture. The lateral extension in the crow's foot rhytid is closed with interrupted 6-0 prolene suture.

Transconjunctival technique-

This procedure is mainly used to address pseudoherniated fat but it cannot address skin excess or orbicularis muscle hypertrophy. However, it does avoid external incisions and avoids the complications of ectropion and scleral show. After injection of local anesthesia and placement of eye shields, a guarded Desmarres retractor is placed inside the lower lid with gentle inferior pressure. The globe is also depressed at the same time to confirm the locations of the infraorbital fat. Monopolar cautery is used to make an incision just below the tarsal plate. The length of the incision will be dictated by how many fat compartments will be addressed. The lower portion of the incision is grasped with Bishop forceps and pulled superiorly to permit the placement of a 5-0 silk traction suture in the midline edge. Using blepharoplasty scissors, dissection is carried out in the submuscular plane. Cotton tip applicators may be used to bluntly dissect with gentle sweeping motions down to the infraorbital rim. This should allow good visualization of the fat compartments and they may then be addressed as needed after the

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septum over the compartments has been incised. The herniating fat is grasped with small forceps and cauterized at the base using bipolar cautery and trimmed using scissors. Afterwards, closure of the transconjunctival incision is not necessary.

Conclusion

Upper and lower eyelid procedures can be very gratifying for both the surgeon and most importantly, the patient. The surgeon can increase his/her chances for success by identifying the expectations of the patient preoperatively to determine if those expectations are achievable. In addition, determining preexisting conditions that may increase the occurrence of postoperative complications is key. Recognition of these facts preoperatively along with meticulous surgical technique intraoperatively, will allow the surgeon to be able to restore the patient's "windows to the soul".

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