

BLEPHAROPLASTY FOR PERIORBITAL REJUVENATION: CURRENT CONCEPTS

¹Dr. Poonam Jain MS, ²Dr. Darab Hormozi MD, FACS

1. Anterior segment, Oculoplasty and Aesthetics, Centre for Sight, New Delhi, India
2. Oculofacial Plastic Surgery, University of Maryland, Baltimore, USA

Abstract: Blepharoplasty is a surgical procedure performed to rejuvenate aging eyelids and periorbital region. The goal is to reverse anatomical changes that occur with aging and to restore the youthful contours in a natural fashion while providing an aesthetically pleasing, lasting result. As the eye is the main focus of attention on a face during communication, cosmetic rejuvenation of the periorbital area has received maximum attention by multiple specialities involved in facial enhancement. The improved understanding of the anatomophysiology of facial aging has led to continuous advancement, a surge in demand and a variety of surgical as well as nonsurgical options for rejuvenation. With an in-depth knowledge and thorough understanding of the anatomy, physiology and function of the eyelids and surrounding structures, the oculoplastic surgeons are expanding their horizons and embracing the rewarding field of facial aesthetics.

Periorbital area is the first area of the face to show signs of aging because of the unique anatomy and functional dynamics of the region¹. According to the American Society of Plastic Surgeons, blepharoplasty is the third most common plastic surgery procedure performed in the United States, with over 216,000 eyelid operations performed in 2013². Although nearly 85 percent of patients undergoing cosmetic eyelid operations are women, it is the third most common aesthetic procedure in men. There are no statistical figures available for India but blepharoplasty procedure has seen a remarkable increase in popularity and frequency in recent years.

The basic cause of aging process is a sum of gravitational descent of tissues, volume loss and deflation along with loss of elasticity and laxity of soft tissues. Lambros³ observed that gravitational soft tissue descent is not a major aging consequence by documenting that the position of moles, wrinkles and other markers on the upper, midface and malar region remain stable in their relative position over time. Later studies concluded that aging is a multifactorial 3-dimensional process and many causative factors have a role to play.

Currently cosmetic blepharoplasty is not just an operation of the eyelids with simple excision of skin and fat, but includes a plethora of procedures to restore youthful contours of the periorbital and midface so that the eyelids naturally blend into the brow and cheek without any demarcation, curves and grooves. This requires technical expertise and a surgeon focussing on aesthetic precision. A thorough understanding of the structural changes that take place with aging and a mastery of the anatomy of the orbit, midface, forehead and brow is critical. This article provides a comprehensive discussion of eyelid surgical rejuvenation tools and techniques currently practised.

Preoperative evaluation of a blepharoplasty patient should include:

Complete medical history including systemic disorders

specially thyroid or bleeding disorders, collagen vascular diseases, prior eyelid or facial surgery and trauma. Hypertension should be well controlled and anticoagulants or platelet inhibiting medications, NSAIDs or supplements should be discontinued before surgery.

A complete ocular examination should be performed to assess visual acuity, extraocular muscle movement and fundus examination and findings should be documented. Schirmer's test and TBUT must be done to rule out dry eye which can get aggravated by blepharoplasty and calls for a more conservative excision of skin and judicious removal of orbicularis muscle. Bell's phenomenon, presence of lagophthalmos and corneal sensations must be assessed to prevent problems like exposure keratitis. Photographs of the patient must be taken to document the preoperative appearance.

UPPER LID BLEPHAROPLASTY

Can be performed for both cosmetic and functional indications.

Functional Indications

- Dermatochalasis that overhangs eyelid margin (pseudoptosis) affecting vision and causing restriction of superior visual field
- Concurrently with ptosis repair (frontalis sling/ LPS advancement)
- To correct associated lash ptosis or entropion,
- Blepharochalasis
- Floppy eyelid syndrome
- Asthenopic symptoms and persistent blepharoconjunctivitis due to excessive redundant skin
- For use of full thickness skin graft elsewhere

PERTINENT ANATOMY AND PHYSIOLOGY OF AGING UPPER EYELID

The upper lid structures going from superficial to deep

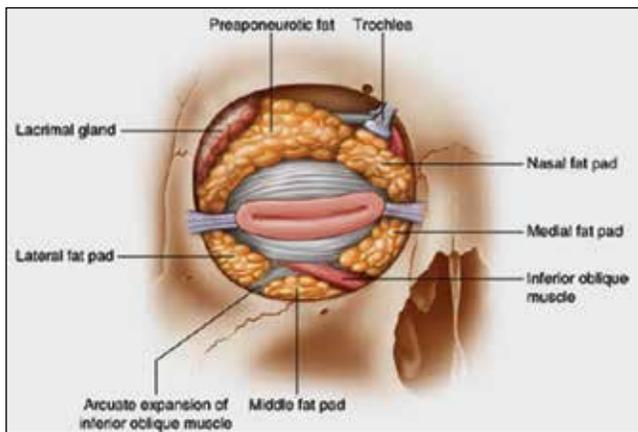


Figure 1: Upper and lower eyelid fat pads. From KS Tan et al.



Figure 3: Prominent nasal fat pad (arrow) is seen. Atrophy of central fat pad with deep superior sulcus and a high lid crease, which is accentuated by ptosis of left upper lid with a compensatory brow elevation. Also, prolapse of all three fat pads is seen in the lower eyelid.

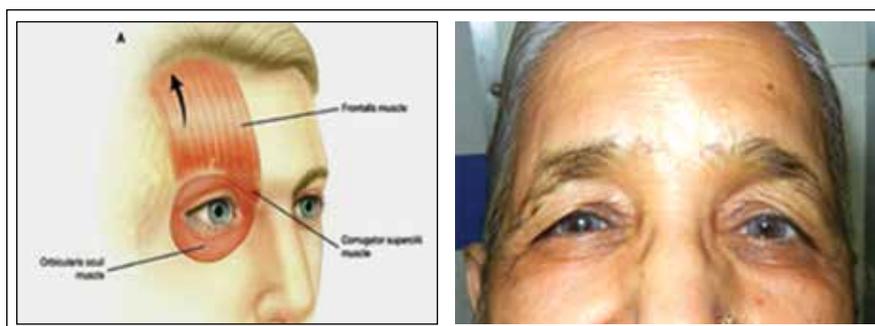


Figure 2: Frontalis muscle is deficient in the lateral part of the brow. In this patient much of lateral hooding of the upper lid is secondary to brow ptosis. Upper lid blepharoplasty alone will worsen the ptotic brow and must be combined with browplasty.

include the skin and orbicularis muscle. The next deeper layer is the orbital septum. Just deep to the orbital septum, in the preaponeurotic plane, are the fat compartments. There are two, the nasal and central fat compartments in the upper lid. The lateral compartment is occupied by the lacrimal gland (Figure 1).

Aging is a dynamic process that involves changes in each layer of the facial tissues. Skin loses elastin and collagen resulting in laxity, redundancy, sagging and wrinkles. Volume loss from adipose and muscle mass atrophy causes further tissue deflation. Brows begin to descend due to relaxation of ligamentous attachments along with resorption and subsequent thinning of the superomedial and inferolateral orbital rim. Since the frontalis muscle, which is the only elevator of the brow, is deficient laterally, lateral brow ptosis is more apparent. (Figure 2). This is aided by atrophy of Retro-orbicularis oculi fat (ROOF) pad. The ROOF pad, also called the brow fat pad, is located deep to the orbital orbicularis oculi and frontalis muscles at the brow overlying the superior orbital rim and is responsible for the youthful

fullness of the brow.

As we age, shift is noted in orbital fat volume. The nasal fat pad increases and becomes more prominent whereas the central preaponeurotic fat pad involutes and retracts. As a result, the superior tarsal sulcus deepens and the lid crease elevates (Figure 3). This fat loss from all compartments accentuates the typical 'skeletonised' hollowed appearance which is the hallmark of aging. Hence the current emphasis on volume augmentation (by use of Fillers/fat injection and conservative fat and muscle excision) as an essential component of rejuvenation.

PREOPERATIVE ASSESSMENT AND PLANNING FOR UPPER LID BLEPHAROPLASTY

The eyebrow and upper eyelid are so intimately intertwined in their function and esthetics that they are considered 2 parts of a continuum and assessed together⁴.

Brow position and symmetry is carefully noted. The brow is manually repositioned at the supraorbital rim in males and slightly above in females

to accurately assess and mark for blepharoplasty. The decision is taken whether a brow lift or browpexy needs to be performed adjunctively. If upper blepharoplasty is performed without correction of a lax or ptotic eyebrow, there are residual upper lid folds and narrowing of brow- lash distance postoperatively, which defeats the aesthetic goal.

Upper lid position and symmetry is assessed while carefully stabilising the brow. Margin-reflex distance (MRD) is measured on each side and compared to rule out presence of eyelid ptosis. Even an unnoticeable, small degree of preexisting ptosis gets unmasked after blepharoplasty because compensatory frontalis activity raises the lid crease height on the affected side leading to asymmetry and compromising the aesthetic result (Figure 4).

A fullness or bulge in the lateral part is due to a prolapsed lacrimal gland which should be repositioned and fixated to the periosteum of the lacrimal gland fossa with sutures.

SURGICAL TECHNIQUE

The first and the most critical step is marking the skin incision. The marking is preferably done with the patient seated upright. If a native eyelid crease is present, it is marked on both the eyes. Crease height is measured on both eyes for symmetry. If the crease is indistinct or needs to be revised, the central height is marked typically at 8-11mm in females and 6-9mm in males. Laterally, beyond the lateral canthus, the mark is tapered superiorly upto the lateral orbital rim to include lateral hooding of skin if present.

Toothless forceps are used to pinch the redundant skin. The inferior tooth of the forceps corresponds to the lid



Figure 4: A mild preexisting ptosis missed at the time of upper blepharoplasty became highlighted postoperatively giving unacceptable result. The patient was happy after Ptosis surgery was performed.



Figure 5: Skin marking for upper blepharoplasty is the most crucial step. The superior and inferior marks should blend into the crease on eyelid opening.



Figure 6: Skin marking for upper blepharoplasty.

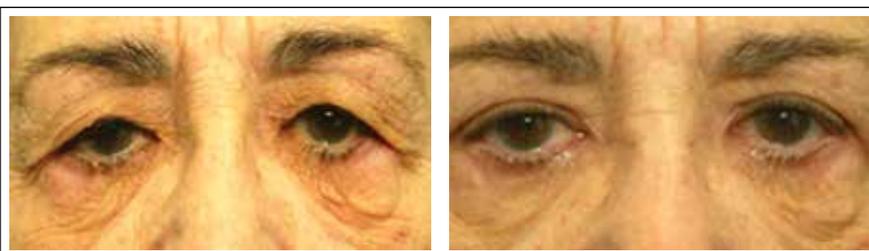


Figure 7: Marked dermatochalasis with lateral hooding of upper eyelid causing pseudoptosis and obstruction of superior visual field. 6 month postoperative result after upper blepharoplasty performed mainly for functional indication.



Figure 8: One month postoperative result in a 40 year old male. Lid crease height was kept low for a better cosmetic result.

crease marking and the upper tooth delineates the maximum extent of skin to be removed. There should be no lifting of lashes while the skin is pinched. The redundant skin is thus marked (Figure 5).

Many shapes and designs of the skin marking have been described in literature. The basic principle is to excise extra skin while carefully leaving at least 20 mm of skin from inferior brow to the lid margin essentially. The curve of the upper mark should follow the contour of the brow remaining equidistant from it (Figure 6).

Second step consists of making skin incision using a surgical blade, RF cautery, electrocautery or Laser. Only skin is excised along the mark leaving orbicularis muscle intact. The benefit of preserving orbicularis is the volumising effect it has, providing a more youthful enhancement to the upper lid besides reducing chances of inducing lagophthalmos. The orbicularis can be selectively trimmed if appears bulky.

As per the plan formulated at the time of assessment, the nasal fat pad is exposed after opening the septum medially. Newer techniques focus on preservation of fat in the eyelid, especially the central fat pad. The nasal fat pad is either modestly excised or redistributed and anchored in the central compartment in cases of hollowing to fill the deep supratarsal hollow.

Meticulous hemostasis is achieved. Excessive and deep cautery should be avoided to prevent injury to the trochlea which is situated between the medial and the central fat pads. The lacrimal gland may be seen prolapsed out of the orbit in the lateral compartment. Care should be taken to avoid mistaking it with fat. The gland should be repositioned in the lacrimal gland fossa by taking a suture bite from the capsule to the periosteum.

Orbicularis muscle closure is performed using vicryl suture followed by skin closure using continuous or interrupted sutures.

Figure 7 and 8 depict postoperative results of functional and cosmetic upper blepharoplasty respectively.

ANATOMY AND AGING OF THE LOWER LID AND MIDFACE

Our understanding of aging has evolved to reflect the concept that the lower eyelid contour does not stop at the inferior orbital rim and is a continuum with the cheek⁵. In youth, the lid-cheek junction is blended together without any

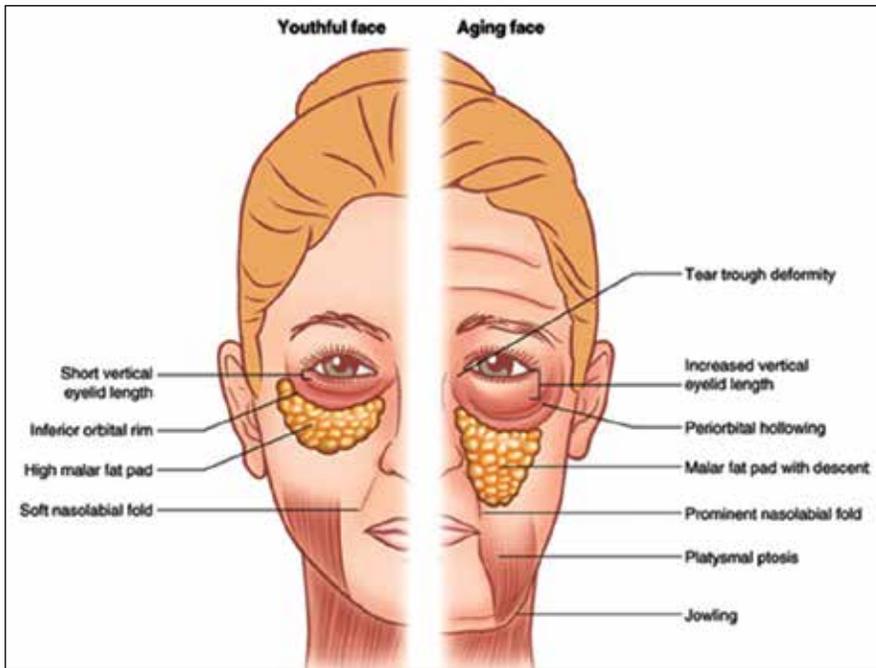


Figure 9: In youth, the malar fat pad overlies the malar eminence. With age, malar fat pad descends, baring the inferior orbital rim. Vertical length of lower lid appears to increase. Ptosis is also evident in the brow and lower face. Wulc. AE et al.

The retaining ligaments of the face are important in understanding the concept of facial aging and rejuvenation. These are strong fibrous attachments that originate from the periosteum and travel perpendicularly through fibrous layers to insert onto the dermis. They anchor and support the skin and superficial musculoaponeurotic system (SMAS) to the underlying bone⁷. There are two important ligaments in the periorbital region that are responsible for the curves and grooves that are so characteristic of aging, the orbicularis retaining ligament and the zygomaticofacial ligaments (Figure 10).

The trademark hollow that appears between the lower lid and upper cheek with age is called the orbitomalar sulcus (Figure 11). This hollow represents the attachment of the orbicularis retaining ligament (ORL) laterally and centrally and the insertion of the orbicularis muscle medially. (The medial third of

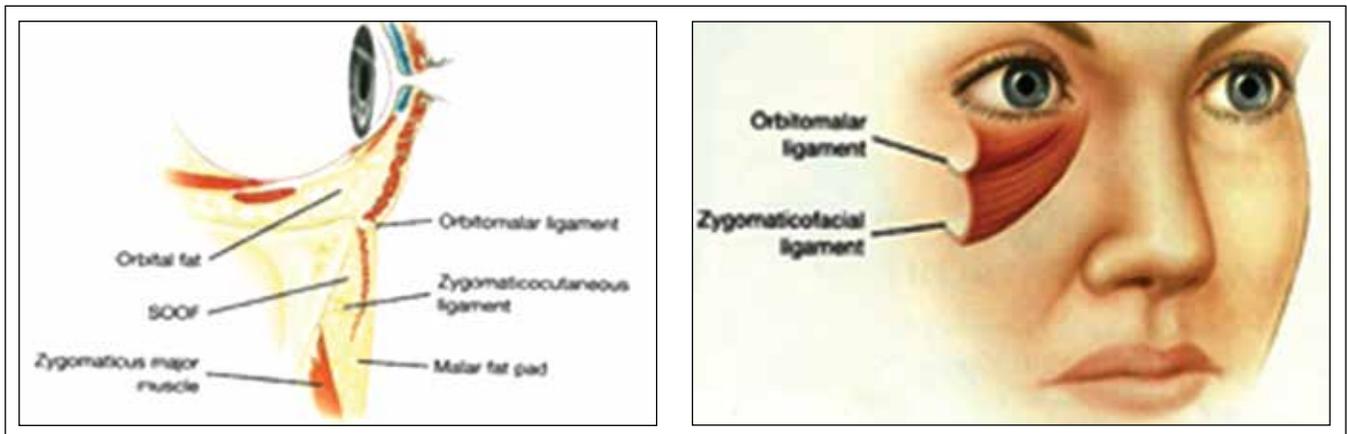


Figure 10: The normal position of the orbital malar and zygomaticofacial ligaments supporting the soft tissue of the midcheek. When lax, they allow the soft tissues to descend, creating a groove where the ligament is attached to the skin and a bulge in the area around it. Codner M. McCord C²¹.



Figure 11: A 40-year-old woman with prominent orbitomalar sulcus (black line), which is a combination of a tear-trough deformity (white arrow) and a prominent lid-cheek junction (black arrow). It represents the attachments of the orbicularis muscle and ORL respectively.

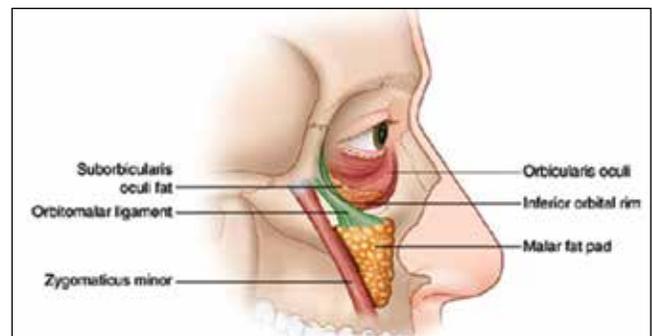


Figure 12: With aging, laxity of the orbitomalar ligament (green) leads to inferior descent of SOOF and skeletonization of inferior orbital rim. KS Tan et al.

demarcation and has a uniform smooth convex contour. As we age, changes that occur combine to create a vertically elongated lower lid, ptotic malar/cheek complex, a lax lower eyelid and protrusion

of orbital fat⁶ (Figure 9). Each of these changes can be attributed to specific changes in the retaining ligaments and soft tissues and need to be understood if we aim to reverse them.

the orbitomalar sulcus is called the Tear Trough). The ORL originates 4-6 mm below the inferior orbital rim, traverses through the Orbicularis Oculi Muscle (OOM) to insert in the dermis at the



Figure 13: This 72-year-old woman is an excellent example of a patient with significant periorbital fat pseudoherniation (above); her lower blepharoplasty involved resection of periorbital fat with excision of redundant skin with midface contouring with SOOF lift. The postoperative photographs (below) demonstrate a smooth lid-cheek junction and no residual bulging of fat in the lower eyelids. Her upper blepharoplasty was combined with internal browpexy.

junction of the lower lid and cheek. As the ligament becomes attenuated and lax with age, tethering of the skin to the zygoma and maxilla just inferior to the orbital rim creates the sulcus which is further accentuated by the orbital fat prolapse above and descent and atrophy of malar fat pad below (Figure 12).

Bone loss in the malar and periorbital region contributes to the overall volume loss⁸. The orbital septum weakens, orbicularis atrophies and the skin becomes lax allowing pseudoherniation of the orbital fat outside the orbital rim. There is also some increase in the actual volume of orbital fat with age⁹ which suggests that in many patients the removal of a judicious amount of lower lid fat is warranted.

APPROACHES TO LOWER LID REJUVENATION

Numerous techniques have been described in literature to perform the procedure with no evidence-based consensus regarding the "ideal" approach to lower lid blepharoplasty^{10,11,12,13}. Each patient has a different presentation with varying amounts of orbital fat prolapse, skin and orbicularis redundancy, lower lid margin and canthal tendon laxity, cheek descent and volume loss, globe prominence, orbitomalar sulcus formation and midface projection or retrusion. Therefore one single procedure

or technique cannot be effective in all the patients. The surgeon should be able to analyse the aging midface and customize the procedure for each patient. This is what makes lower blepharoplasty a challenging procedure to learn.

There are two main approaches to lower lid blepharoplasty.

- Transcutaneous approach
- Transconjunctival approach

The earliest blepharoplasties were performed by the transcutaneous approach using a subciliary incision¹⁴. The pretarsal orbicularis muscle was violated in this approach which compromised tarsal support leading to rounding of lateral canthus and increased lateral scleral show in many cases.

In 1973, Tessier¹⁵ described the transconjunctival incision for removal of fat which has gained wide acceptance in lower lid rejuvenation Loeb^{16,17}.

is credited with introducing the concept of repositioning orbital fat along the medial infraorbital rim to address the tear trough deformity. Since then many authors have described a myriad variations in technique to reposition lower lid fat subperiosteally or supraperiosteally through various approaches and anchoring techniques.

Most favoured current technique of lower blepharoplasty favours a transconjunctival incision with a conservative excision of prolapsed fat in

the lateral and central compartments and conservation with transposition of fat in the medial compartment. Overresection of fat is avoided as it produces a hollowed look which is less youthful and more skeletonized.

Pinch technique is used to excise excess skin via a subciliary incision removing skin only without disturbing the orbicularis oculi muscle.

This is accompanied by a suspension or lifting procedure for contour correction and effacement of the lid-cheek junction often with elevation of the descended or deflated malar fat pad while simultaneously adequately tightening the lower lid.

The most common suspension procedures performed include orbicularis suspension, Sub Orbicularis Oculi Fat (SOOF) lift and subperiosteal or supraperiosteal midface lift (Figure 13).

A detailed description of each of these procedures is beyond the scope of this article.

SURGICAL TECHNIQUE OF TRANSCONJUNCTIVAL BLEPHAROPLASTY

Placement of transconjunctival incision varies in different reports but most prefer it midway between the lower border of tarsus and fornix. Once conjunctiva has been incised, further dissection is carried out through the retractors until fat is seen. The three fat pads are identified and dissected free. A mild pressure applied posteriorly on the globe by the assistant helps in making identification of the fat pads easier.

Care is taken while dissecting medially to avoid injury to the inferior oblique muscle which traverses between the nasal and the central fat pad.

The temporal herniated orbital fat is isolated and the fat that prolapses outside the orbital rim with gentle pressure is clamped with a hemostat, cut and stump cauterised to ensure complete hemostasis.

If fat redraping is to be performed, a preperiosteal dissection is performed along the arcus marginalis to expose the inferior orbital rim. The medial or both medial and central fat pads depending on the case, are dissected free, pedicles created and redraped in the preperiosteal pocket created earlier.

6-0 vicryl suture passed through the centre of the pedicle in a horizontal mattress fashion is then passed horizontally several millimetres below

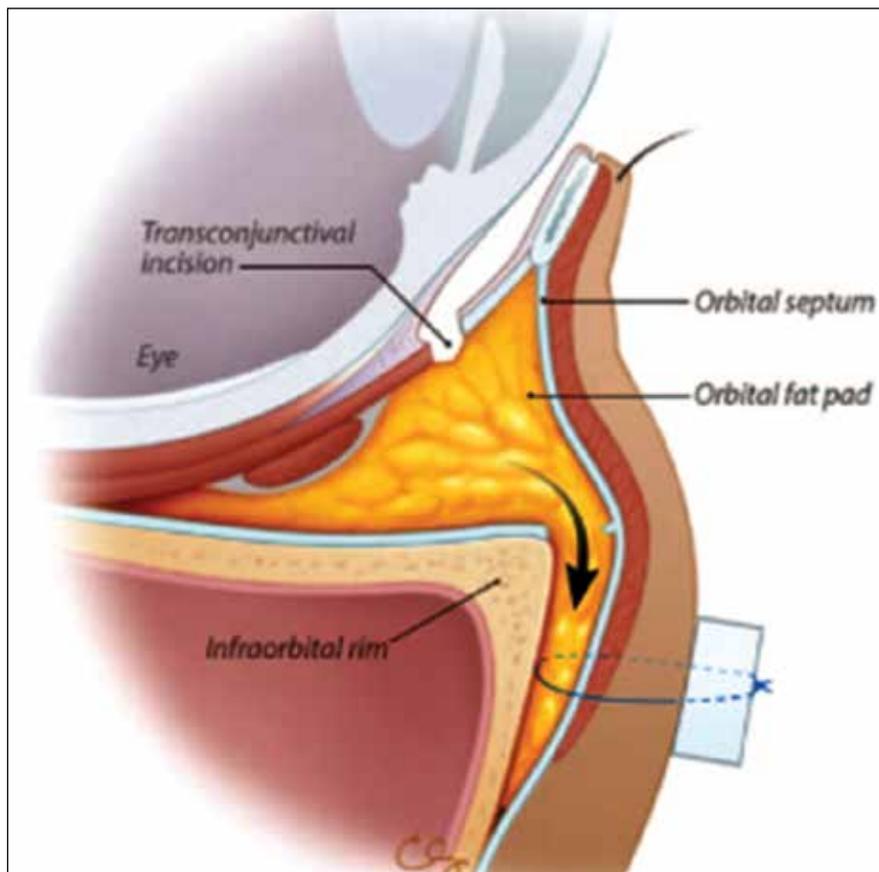


Figure 14: Illustration of the lower lid and periorbital structures. Sagittal view of a subperiosteally repositioned fat pedicle below the infraorbital rim that is secured in place with a percutaneous bolster. From : Zoumalan et al.

the arcus marginalis on the inferior orbital rim. To fill a deep tear trough, the suture passed through the nasal fat pedicle is exteriorized to keep the pedicle in place and tied over a bolster to be removed after a week (Figure 14). Ensure that the orbital septum and inferior oblique are not tethered to the orbital rim.

The suspension procedure is performed as planned.

The lower lid is then reassessed for any laxity which must be corrected by lateral canthopexy or canthoplasty depending on the extent of laxity to prevent eyelid malposition.

Excessive redundant skin is excised by the pinch technique using a subciliary incision elevating a skin only flap. This is done in a conservative and tension free manner to avoid shortening the anterior lamella. The skin excision is greatest at the lateral canthus and gradually tapers as it progresses medially.

POSTOPERATIVE CARE

Patients are instructed to use cool packs to the affected area for the first 24 hours to minimize swelling. Severe pain is unusual following a blepharoplasty, and patients should be evaluated

immediately to rule out retrobulbar hematoma in cases of severe pain and/or vision changes. Head position is usually maintained at or above the heart level to reduce edema. Antibiotic drops with or without a steroid component are used in cases where a conjunctival incision is made in the first week. Aggressive corneal lubrication achieved with eye drops and ointment. Sutures are removed, usually on postoperative days 5 to 7. Most of the swelling usually subsides in 2 weeks after surgery but occasionally may last longer.

COMPLICATIONS

The most dreaded early complication is orbital hemorrhage, which must be identified and treated immediately, as this can result in permanent vision loss and even blindness²². If vision is threatened, immediate treatment should be provided by starting IOP lowering medications and exploration of the wound and/or lateral canthotomy/cantholysis to help reduce orbital pressure.

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

Most of these complications can be avoided with careful preoperative

planning and appropriate surgical technique.

Lid malposition is one of the more feared complications of the lower lid blepharoplasty and frequently requires surgical management.

CONCLUSION

The techniques of blepharoplasty are evolving to reflect the concept that eyelid rejuvenation is not achieved by just excision of redundant skin and excess fat. The goal is greater volume preservation and volume augmentation. Brow restoration and volume enhancement is an integral part of upper lid blepharoplasty. Lower lid blepharoplasty can use a transcutaneous or a transconjunctival approach to address herniated fat pads while blending the lid-cheek junction through release of the orbitomalar ligament and volume augmentation with fat (by repositioning and/or grafting) or injectable fillers. Through an algorithmic approach that meets the needs of each individual patient, the approach to blepharoplasty is customized with consistent and predictable results.

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Correspondence to:
Dr. Poonam Jain
 Senior Consultant,
 Anterior segment, Oculoplasty and Aesthetics
 Centre for Sight, New Delhi, India.

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 011-65705229, +91-9868604336
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