

Lower Eyelid Blepharoplasty

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Abstract

The eyelids and periorbital tissues undergo significant changes with aging and often constitute a major concern for those seeking facial rejuvenation. Over the last decade, there has been a steady increase in the demand for lower eyelid rejuvenation. Many techniques and approaches exist to address these concerns, including both noninvasive (filler, lasers, or chemical resurfacing) and invasive (Blepharoplasty or midface lift) procedures. The danger of side effects when performing lower blepharoplasty has kept many patients and physicians away from the surgery, yet advances in lower eyelid blepharoplasty techniques made this procedure more relevant. The exact surgical approach remains controversial and is largely dependent upon surgeon preference and a patient's cosmetic desire. Here we review the aging changes in the lower lid, indications, preoperative considerations, operative techniques, and complications of lower lid blepharoplasty.

Introduction

The eyelids and periorbital tissues change significantly with aging and often constitute a major concern for the patients. In the past years, there has been an increase in the demand for lower eyelid rejuvenation procedures, that include noninvasive procedures such as laser resurfacing, injectable fillers, or chemical peeling and more invasive procedures like lower eyelid blepharoplasty and midface lift [1]. The complications of lower blepharoplasty have made many patients and physicians hesitant about the surgery in the past, but recent advances in surgical techniques have made this procedure more relevant [2]. In this review, we discuss the aging changes in the lower eyelid, the various surgical techniques of lower eyelid blepharoplasty, their indications and complications.

The Youthful and the Aging Lower Lid-Cheek Complex

Many patients complain of changes in their lower eyelid or midface as part of aging. The youthful lower lid-cheek margin is usually a smooth margin with no demarcation between the lower lids and the cheeks [3]. The lower eyelid's margin normally rests at the inferior corneal limbus and its lowest point is located temporal to the center of the pupil. The crease of the lower lid lies two mm inferior to the lash line medially and 5 mm inferior to it laterally [4]. Anatomically, the lower eyelid is subdivided into three lamellas: an anterior lamella that includes the eyelid skin and orbicularis oculi muscle, a middle lamella (which is the orbital septum), and a posterior lamella composed of the tarsal plate, eyelid retractors, and palpebral conjunctiva. The eyelid retractors (the capsulopalpebral fascia and the inferior tarsal muscle) insert onto the tarsal plate. There are also three postseptal infraorbital fat pads that are an important consideration when performing lower lid blepharoplasty: the medial and central, separated from each other by the inferior oblique muscle and the lateral, separated from the central by the arcuate expansion.

Careful dissection in the area of the infraorbital fat pads should be performed to prevent postoperative strabismus [5].

As people age, several changes to these structures are observed; the orbital septum weakens, orbicularis oculi muscle atrophies, and the laxity of the skin increases [6]. These changes in the supporting ligaments of the eyelid-cheek complex subsequently cause the globe to descend, lead to a midface descend and to pseudo herniation of orbital fat. Fezza, et al. found a linear increase in the lid length (measured from the margin of the eyelid to the inferior orbital rim) in each decade of life from the second to the ninth [7]. The greatest increase was noted in individuals in their forties. Bone loss in the midface is another factor contributing to the volume loss observed with aging [8]. All of these observed changes are the basis for the various surgical approaches that exist to address the aging lower eyelid-cheek complex [8,9].

Indications and Preoperative Evaluation

The most common complaints that bring patients to a blepharoplasty consultation are lower eyelid excessive skin, lower lid laxity, herniated orbital fat, malar mounds/ festoons, nasojugal grooves, or tear trough deformities [10,11]. Patient's eligibility for lower eyelid blepharoplasty may be assessed using an algorithm that combines the amount of orbital fat herniation, the extent of infraorbital rim hollowness, amount of skin excess, total volume loss in the eyelid-cheek area, Fitzpatrick skin types, the vector in the eyelid-cheek complex, and the tone of the lower lid [11]. According to this algorithm, individuals without herniated orbital fat or excess skin would benefit from a more conservative approach using injectable dermal fillers and those with Fitzpatrick skin type III or less would benefit from laser resurfacing or chemical peelings [10]. Alternatively, lower eyelid blepharoplasty surgery can be

combined with these modalities [12]. A careful medical and ocular history and evaluation of the ocular surface are imperative to the success of lower lid blepharoplasty [13-15].

A detailed examination of the periorbital region includes evaluating the eyelid-cheek anatomy, the presence of excess skin, and evaluation of lid laxity with the snap-back and distraction tests, and canthal tendons laxity (as it may suggest the need to perform lateral canthal strengthening procedures). It is essential to document the prolapse of orbital fat (often made more prominent in up and down gaze), presence of tear trough deformity (defined as a concave groove medial to the orbital fat) and/or malar festoons and the presence of a negative orbital vector, which describes the relationship between the orbital rim and lower eyelid.

Operative Technique

There are two main surgical approaches to performing lower eyelid blepharoplasty; the transcutaneous approach and the transconjunctival [16]. With both approaches herniated orbital fat and volume loss in the midface can be addressed. The earliest lower lid blepharoplasties were performed transcutaneously and the transconjunctival approach was mainly reserved for young patients with minimal excess skin and texture changes; however, with recent advances in transconjunctival techniques it has gained large popularity and has become the preferred approach for lower lid blepharoplasty by oculoplastic surgeons. A recent report of the current trends in lower blepharoplasty among oculoplastic surgeons in the US found that the factors affecting the approach used the surgeon's preference and the need for skin resection [17]. Surgeons report using different approaches for lower eyelid blepharoplasty: transconjunctival (96%), transcutaneous (82%), and both transconjunctival and transcutaneous (51%). Most concerns with the transcutaneous approach are the skin incision, which entails a scar or may lead to scleral show. In a study comparing the rate of permanent scleral show between the two approaches, the transconjunctival approach was associated with 3% rate of scleral show compared to 28% in the transcutaneous [18].

Transcutaneous Approach

The transcutaneous lower lid blepharoplasty can be performed using either the skin flap method or the skin-muscle flap method. The first involves the removal of excess skin without orbicularis, while in the latter the orbicularis muscle is also removed.

The skin flap method is performed using a subciliary incision. The skin is then separated from the orbicularis and dissected to the level of the orbital rim [19]. The subciliary skin incision was originally made 2 mm inferior to the lash line, to limit the visibility of a scar. Recently, McCollough, et al. introduced a technique involving an incision 4 mm inferior to the lash line, usually at the superior horizontal rhytid of the eyelid, to protect the integrity of the lower tarsus [20,21].

The skin muscle flap procedure is often reserved for younger patients with skin excess and orbicularis oculi hypertrophy. The dissection is carried in-between the orbicularis muscle and the orbital septum. The excess pretarsal/preseptal orbicularis are cut and the periorbital fat is accessed via small incisions in the orbital septum [22,23].

Careful attention to the zygomatic nerve and its branches should be paid, as cutting them may lead to orbicularis muscle hypotony and subsequently lower eyelid malposition. Figure 1 is an example of a

simultaneous midface lift combined with lower eyelid blepharoplasty performed via the transcutaneous approach (Figure 1). It is important that skin incision will be performed conservatively, not to create tension that will contract the anterior lamella and may result in ectropion of the lower lid.

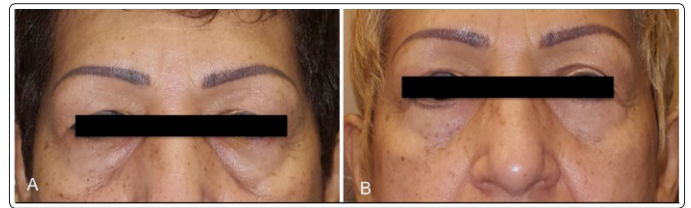


Figure 1: A- status pre op and B- post bilateral transcutaneous lower (using skin and muscle flap) and upper eyelid blepharoplasty combined with a midface support stitch from SOOF to inferior orbital rim

Transconjunctival Approach

The transconjunctival approach, as its name applies, allows the surgeon to access the orbital fat pads of the lower lid while avoiding the visible external scar. It is the preferred approach in patients with herniated infraorbital fat and minimal excess skin [24]. An incision in the lower conjunctiva below the tarsus is made, but the exact incision placement depends whether the surgeon is using the preseptal or the postseptal approaches [25,26]. In the first, the incision is made 4 mm inferior to the tarsus, and the surgical plane is anterior to the septum. Massry, et al. introduced the postseptal approach, where the incision is made 6 to 7.5 mm inferior to the tarsus, allowing the surgeon to enter posterior to the septum and not to disrupt the integrity of the septum [27]. Closure of the incision is surgeon dependent and does not affect complication rates [28]. Figure 2 is an example of a patient pre and post transconjunctival lower lid blepharoplasty.

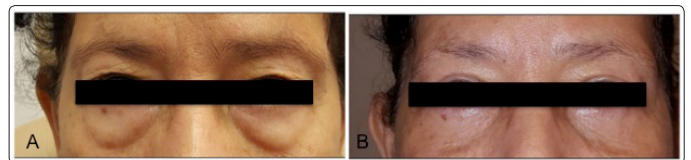


Figure 2: A- status pre op and B- post bilateral trans conjunctival lower and upper eyelid blepharoplasty

Orbital Fat Manipulation

Once orbital fat has been accessed it can be excised, repositioned, or augmented with autologous fat transplant, dermal allograft or synthetic filler [29]. In their review, Kossler, et al. found that 99% of oculoplastic surgeons in the US excise orbital fat during lower blepharoplasty surgery and 80% use fat repositioning techniques [17]. Fat excision should be performed cautiously to prevent creating periorbital hollowness (medially defined as the tear trough deformity) and displacement of the globe, as the periorbital fat pads are important for the vertical position of the globe. Pack, et al. showed that removing as little as 0.5mL of fat may cause 1 mm inferior and 2 mm posterior displacement of the globe [24]. Fat excision is thus usually reserved for younger patients with prominent infraorbital fat and no degenerative changes in the face [30]. Fat repositioning should be considered in older patients with volume loss in the midface the fat could be repositioned to either the supra-or subperiosteal planes [31-33].

When the subperiosteal plane is used, an incision is made below the inferior orbital rim through the arcus marginalis. The periosteum is raised over the superior part of the maxilla, preserving the infraorbital neurovascular bundle and the dissection continues 15 mm below the rim to create a pocket for the transposition of fat. In periosteal psupralane, the plane of dissection is through the sub orbicularis oculi fat nasal to the infraorbital neurovascular bundle. When Comparing outcome for patients who had transconjunctival lower eyelid blepharoplasty and fat was transposed to either planes, Massry, et al. found that patient satisfaction was similar, yet there was more bruising, swelling and contour abnormalities when fat was transposed to the supraperiosteal plane [33]. With both techniques, the medial and lateral fat pads are secured either transcutaneously or within the wound.

Orbicularis Tightening

Lid laxity is often simultaneously addressed during lower lid blepharoplasty procedures with orbicularis and horizontal lid tightening. Orbicularis suspension involves tightening the preseptal orbicularis muscle to either the periosteum of the orbital rim or to the superior limb of the lateral canthal tendon). It may be combined with either fat excision to treat lateral convexity or with skin incision to treat dermatochalasis. In cases of minimal lateral canthus laxity (1-2mm) -Lateral canthus suture canthopexy is often used to elevate the lateral canthus. For moderate (3-6 mm) laxity, lateral retinacular canthopexy may be more suitable, and in cases of severe laxity (> 6 mm) one may consider doing canthoplasty with cantholysis or the lateral tarsal strip procedure [34,35].

Complications

Complications of a lower lid blepharoplasty can range from cosmetic deformity to permanent vision loss and may result from removal of excess tissue, unfamiliar anatomy or a surgical error. Lelli and Lisman categorized these complications based on the timing of their appearance to early, intermediate and late [36]. Early complications (within one week after the surgery) of lower lid blepharoplasty include abrasion to the cornea, infections and retrobulbar hemorrhage. Using corneal shields during surgery may prevent abrasions. Antibiotics (topical and if necessary systemic) are the mainstay of treatment for Infections. Retrobulbar hemorrhage is a rare, vision-threatening emergency that requires immediate identification of the source of bleeding and a possible intra-operative canthotomy and cantholysis.

Intermediate complications (occurring in 1-6 weeks postoperative time frame) include various eyelid malposition, strabismus, corneal exposure mainly as a consequence of eyelid malpositions, and epiphora. The most common eyelid malpositions encountered posts operatively are retraction of the lower lid, lagophthalmos, and ectropion. Retraction and ectropion of the lower lid are a result of damage to either the anterior or the septum (middle lamella). Ectropion may be prevented with intraoperative lateral canthopexy. Treatment of lower lid retraction may be either conservative or surgical [37-39]. Conservative treatment includes lid massage or Carraway exercises, and sometimes the off label injection of triamcinolone or 5-fluorouracil into the wound [10,37,38]. These injections are believed to be associated with less scarring and shortening of the vertical lid [10,39]. If surgical revision is indicated, anterior lamellar deformities (using full-thickness skin graft) and middle lamella (hard-palate spacer graft or a cellular dermal allograft) should be addressed [37].

Lagophthalmos and exposure keratopathy may result from damage to the anterior lamella or the zygomatic nerve. Treatments involve aggressive lubrication and rarely, lateral canthal repositioning. Strabismus most commonly results from inferior oblique muscle damage and is usually managed conservatively. Late complications (>6 weeks post operatively) include eyelid contour and height changes discussed earlier, hypertrophic scar (most commonly seen in the transcutaneous approach and minimized by meticulous skin incision), and skin pigmentation.

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