

Lower eyelid blepharoplasty: An overview

Kasturi Bhattacharjee, Sripurna Ghosh¹, Shoaib Ugradar², Ariel M Azhdam³

Of the two common techniques of lower blepharoplasty, the transconjunctival approach is limited to young patients with prominent herniation of lower fat pad without skin excess and the transcutaneous approach to patients requiring skin excision. However, the current trends not only highlight the traditional sculpting of the three orbital fat pads in lower lid blepharoplasty but also additional relocation of the intraorbital fats for correcting the inferior orbital hollowing. The purpose of this review is to analyze the published literature on common types, techniques, indications, and outcomes of the multiple surgical variants of lower lid blepharoplasty often aimed at treating the redundant skin, steatoblepharon, tear trough deformity, lid laxity, and dermatochalasis, thereby to correct the negative vector and inferior orbital hollowing along with effacement of the lid cheek junction. An extensive survey of peer-reviewed literature published in English in electronic databases, as well as bibliographies from cited articles, was conducted. Databases such as MEDLINE PubMed, the Cochrane Library, and Embase were scanned using relevant medical subject heading (MeSH) terms. Clinical studies with a minimum of five study cases were included. Level III evidence, case reports, letters, editorials, and case series with fewer than five eyes were excluded. This article provides a concise overview of available literature and as such no meta-analysis was done due to the narrowed scope of the involved studies and the variety in surgical approaches and techniques of lower lid blepharoplasty.

Key words: Augmentation blepharoplasty, lateral canthopexy, lower eyelid blepharoplasty, orbital fat transposition

Changes in the eyelids and periorbital region have a significant impact on the signs of aging and often account for major concern for those seeking facial rejuvenation. An aging eyelid manifests various changes that include laxity of skin, orbital septum (OS), canthal tendons, and the orbicularis muscles. Prolapse of the orbital fat, development of malar festoons, crow's feet like radiations, and periocular wrinkles are associated with changes.^[1] Over the decade the demand for restoration and rejuvenation of lower eyelids, either by noninvasive procedures such as laser resurfacing, dermal fillers, and chemical peeling or by more invasive procedures like lower eyelid blepharoplasty and midface lift has escalated many folds.^[2]

Lower eyelid blepharoplasty has been customary for addressing the undesirable progression of the aging lower eyelids. This is a time-tested technique that achieves satisfactory cosmetic results and positive changes in the restoration of the aging periorbital tissues concerning the brow and the cheek for a youthful facial look.

Department of Ophthalmic Plastic and Reconstructive Surgery and Oculofacial Aesthetics, Sri Sankaradeva Nethralaya, Guwahati, ¹Medical Officer, N.R.S Medical College, Kolkata, Former Fellow, Department of Ophthalmic Plastic and Reconstructive Surgery, Sri Sankaradeva Nethralaya, Guwahati, Assam, ²Faculty, UCLA, Stein Eye Institute, Division of Orbital and Ophthalmic Plastic Surgery, ³Research Associate, Jules Stein Eye Institute, UCLA, Los Angeles, California, USA

Correspondence to: Dr. Kasturi Bhattacharjee, Director and Senior Consultant, Department of Ophthalmic Plastic and Reconstructive Surgery and Oculofacial Aesthetics, Sri Sankaradeva Nethralaya, 96 Basistha Road, Guwahati, Assam, India. E-mail: kasturi@bhattacharjee44@hotmail.com

Received: 17-Dec-2019
Accepted: 14-May-2020

Revision: 06-Feb-2020
Published: 23-Sep-2020

Access this article online

Website:
www.ijo.in

DOI:
10.4103/ijo.IJO_2265_19

Quick Response Code:



Currently, lower eyelid blepharoplasty is performed either by the transcutaneous approach or by the transconjunctival approach. Of the two surgical approaches, the transconjunctival approach is being preferred over the transcutaneous approach as it is a simpler and faster surgical technique with possibly less postoperative scarring and ectropion, though the transconjunctival approach is not a substitute for the transcutaneous approach. While fat and skin excision are still carried out with current lower lid blepharoplasty, present trends follow a tissue-preserving philosophy that may include orbital and sub orbicularis oculi fat (SOOF) relocation and fat transposition to restore apparent volume loss associated with facial aging.

Eyelid surgery dates back to 2000 years ago when it was first described by Susruta in the Susruta-tantra, but it was Bourget who first described the separate compartments in the eyelids and the transconjunctival approach of lower lid surgery for excision of lower lid fat.^[3,4]

In the 1970s, Furnas identified the redundancy orbicularis oculi muscle as a contributor to the aging of the lower lid and focused upon resection of excess sagging tissues to restore a more youthful look.^[5]

Traditional fat excision procedures are now known to cause enhancement of a tear trough deformity resulting in a hollowed

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

Cite this article as: Bhattacharjee K, Ghosh S, Ugradar S, Azhdam AM. Lower eyelid blepharoplasty: An overview. Indian J Ophthalmol 2020;68:2075-83.

look and sometimes in lid retraction.^[6] Moreover, it can cause a relative depression near the medial orbit and in the area of the septal confluence of the lower eyelid midface junction. Loeb stressed that preservation and transposition of fat rather than its resection was effective for a smooth esthetic transition between the lower eyelid and cheek.^[7] Hamra further advocated modifying Loeb's technique to use vascularized fat pedicles to fill the tear trough.^[8] More recently, a combined surgical procedure using a transconjunctival approach for orbital fat access along with a minimal skin excision has been in vogue.

During lower eyelid blepharoplasty, prolapsed fat pads can be mobilized to areas of depression. Harvesting of fat or dermis fat grafts from other body sites may provide a further option^[9,10] Micro-fat grafting is a great alternative for augmentation in patients with post-blepharoplasty hollowing, especially after classical fat sculpting techniques, often referred to as "augmentation blepharoplasty."^[11]

Aspiration and reinjection liposculpture of autogenous fat through small incisions have been reported to provide excellent results.^[12] The recent use of autologous fat injection or hyaluronic acid dermal fillers to replace periorbital volume has provided yet another option for cases that are not amenable to traditional blepharoplasty due to soft tissue atrophy.^[13] Lateral canthopexy and canthoplasty have now become an integral part of lower lid blepharoplasty to prevent lower lid malposition.^[14]

In this review, we discuss the anatomical considerations, indications, trends, and surgical techniques along with the complications of lower eyelid blepharoplasty.

Description of Evidence

A comprehensive search of manuscripts and e-data based literature in English-language journals was conducted in PubMed and the Cochrane Library. Keywords in the search were by relevant medical subject heading (MeSH) terms of the lower eyelid, lower blepharoplasty, lateral canthopexy, and augmentation blepharoplasty. The search generated 202 articles whose abstracts were reviewed by the authors [Fig. 1]. Of these, 154 addressed to lower lid blepharoplasty. Level III evidence, letters, editorials, case reports, reviews, histopathology reports, and laboratory studies were excluded from these abstracts, and finally 58 full-text articles were reviewed for relevance. Around 40 of the 58 articles, conformed to the inclusion criteria as per the study design and the number of eyes reported in the study. The remaining papers were related to lower lid anatomy in general while the rest highlighted the various approaches to lower lid surgeries. The largest portion of the studies involved analyses of eyelid changes with aging.

Anatomical Considerations

The surgical anatomy of the lower eyelid requires precise knowledge of the internal structures to prevent iatrogenic complications. From a surgical point of view in lower lid blepharoplasty, the main risk points are handling the OS, inferior oblique muscle, and the lower lid retractors or the capsulopalpebral fascia (CPF).^[15] Special attention should be given while handling the tissues in the critical zone. The "critical zone" first described by Hwang *et al.* is of surgical importance to avoid postoperative paralysis of the pre-tarsal or pre-septal orbital orbicularis muscle (OOM), which may

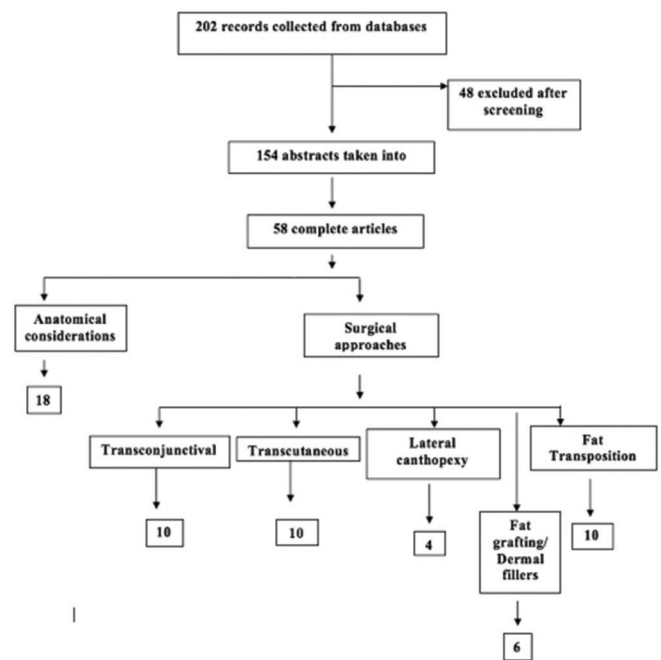


Figure 1: A flowchart of the articles reviewed and analyzed

result in iatrogenic ectropion or weakness of the lower eyelid following transcutaneous lower lid blepharoplasty.^[16] This area contains the terminal twigs of the zygomatic branches of the facial nerve that supply the pretarsal and pre-septal OOMs at a right angle.^[17] This critical zone is described as a circle with a 0.5 cm radius, with its center located 2.5 cm inferolateral 30° from the lateral canthus [Fig. 2].

Normally the lower eyelid's margin rests at the inferior corneal limbus with its lowest point located temporal to the mid pupillary line.^[18] 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 OS), and a posterior lamella (composed of the tarsal plate, eyelid retractors, and palpebral conjunctiva).^[18]

The OS is a thin fibrous structure that forms a diaphragm between the contents of the orbit and the superficial face and inserts onto the inferior margin of the lower tarsus. The lower eyelid retractor or the CPF also inserts on the inferior border of the inferior tarsus. In Asian lids, this insertion line often lies higher and may have an overriding of the pre-septal orbicularis oculi over the pretarsal orbicularis appearing as an epicanthus.^[19] Few authors reported that the CPF merged with the OS beneath the lower border of the tarsal plate.^[20,21] Others contended there is no clear blending of the CPF and the OS.^[22]

Laterally, the orbital retaining ligament forms the indirect attachment between the orbicularis muscle and the bone. The ligament extends from the orbital rim to the undersurface of the orbicularis. The expanded lateral end of the orbital retaining ligament blends with the lateral orbital thickening.^[23] This ligamentous expansion has been variously identified as the orbitomalar ligament by Kikkawa *et al.*^[24] and as the malar septum by Pessa *et al.*^[25]

Attachment of the skin to the bone results in localized hollowing in those regions. In the periorbital region,

three hollows may be outlined: the orbital rim hollow, the zygomatic hollow, and the septal confluence hollow. Goldberg *et al.* reported that the identification of these hollows helps in the prototype framework amenable to dermal fillers for rejuvenation.^[26] The term nasojugal fold was first introduced by Duke-Elder and Wybar in 1961.^[27] Loeb further characterized the “nasojugal groove” for anatomical landmarks.^[28] The term “tear trough deformity” was conceived by Flowers. He postulated that volume loss, the descent of aging tissues, and poor development of the infraorbital malar complex resulted in the tear trough deformity formation.^[29]

Previous studies have reported a mean age range of 38–51 years for the appearance of the tear trough deformity in Caucasians.^[30] Shome *et al.* reported that amongst Indian the mean age of occurrence of tear trough was 40–60 years, with initial signs appearing as early as 35–40 years.^[31]

There are three retro septal fat pads associated with the lower eyelid contour and are an important consideration in a lower blepharoplasty.^[18] The inferior oblique lies between the medial and central fat pads and is prone to iatrogenic trauma during surgical dissection of the neighboring fat pads.^[32] The central and lateral fat pads are separated by the arcuate expansion, which is a fascial expansion from the CPF to the inferolateral orbital rim. About 2 mm outside the orbital rim, the recess of Eisner is created by the insertion of the inferolateral part of OS, which allows the spillover of the lateral fat pad on the orbital rim.

Codner described that Clifford’s ligament, which is an arcuate expansion of Lockwood’s ligament, inserts into the inferolateral orbital rim. This ligamentous expansion fuses with the septum between the central and lateral fat compartments of the lower eyelid, and it should be preserved during lower lid dissection to maintain lateral support.^[33] Dutton observed that the arcuate expansion serves to check the inferior rectus and inferior oblique muscles while also serving as a protective mechanism to prevent excessive backward displacement of Lockwood’s ligament.^[34]

Contemporary esthetic trends in lower eyelid blepharoplasty focus on reducing “eye-bag” prominence, thereby effacing the lower lid-cheek junction and recreating a smooth transition of lower lid cheek interface. This prolapse or herniation of the orbital fat in the lower eyelids also known as steatoblepharon often gives the appearance of “bags under the eyes.”

Steatoblepharon may be graded as follows.^[35]

S = -1: Very prominent fat pads

S = 0: Mildly noticeable fat pads

S = +1: Absence of all three fat pads

S = +2: Hollowing of periorbital fat

Indications and Preoperative Evaluation

The common indications of lower lid blepharoplasty include rhytidosis and lower eyelid dermatochalasis, relative steatoblepharon, pronounced nasojugal groove, infraorbital/malar deflation, malar mounds or festoons, and lower eyelid asymmetry. Most of these are associated with a double convex deformity of the lower eyelid (the superior convexity is caused by prolapsed orbital fat, the concavity caused by the hollowed inferior orbital rim, and the lower convexity is due to the malar

mound) and is characterized by the prominence of the lower orbital rim, lengthening of the lower eyelid surface area, and bowing or herniation of orbital fat pads.

It is prudent to use an algorithm based on the amount of skin excess, amount of orbital fat herniation, the hollowness of infraorbital rim, laxity of lateral canthus, tone of the lower lid, and the vector in the lid-cheek complex to assess patient’s eligibility for the type and technique of lower blepharoplasty.^[36,37] Accordingly, young patients with minimal excess skin and texture changes with intraorbital fat herniation would benefit from a transconjunctival approach and transcutaneous approach is preferred for excess skin.

A detailed preoperative evaluation should be carried out before planning for blepharoplasty procedures. This includes a thorough medical history and ophthalmic history including any surgical interventions. Physical examination should specifically account for the lower eyelid position, periorcular skin, prolapse of orbital fat (often made more prominent in up gaze), presence of tear trough deformity, inferior scleral show, dry eye examination, horizontal lid laxity, canthal tendon laxity, cheek projection, malar festoons, and negative vector calculation, which describes the relationship between the orbital rim and lower eyelid.^[36]

Photographic documentation of preoperative and postoperative conditions after proper written informed consent is advisable.

Operative Techniques of Blepharoplasty

The two main surgical approaches for lower eyelid blepharoplasty are the transcutaneous and the transconjunctival approach. Previously, the main approach for lower eyelid blepharoplasty was transcutaneous except for in young patients where scarless surgery and absence of skin redundancy were the indications for the transconjunctival approach.^[36,37] However, a US-based study that identifies the factors affecting preferences regarding surgical approaches amongst oculoplastic surgeons has shown a preferential shift to transconjunctival approaches of lower eyelid blepharoplasty.^[38]

Though both approaches address the herniated orbital fat and volume loss in the midface, the removal of all the three prolapsed orbital fat produces a hollow appearance of the lower eyelid [Fig. 3]. Preservation of the orbital fat with its relocation and repositioning is more favorable as it creates a gradual transition to the malar eminence, resulting in a smooth contour of the upper face.^[37,39] [Fig. 4]. A combination of these approaches along with strengthening procedures for the atrophied septum or septorrhaphy and tightening of the orbicularis muscle, lateral canthal tendon, and skin yields favorable outcomes.^[40,41]

Scars leading to inferior scleral show is the most common deterrent factor for surgeons to avoid the transcutaneous approach. A comparative study of the two approaches by Appling *et al.* has shown that the transconjunctival approach was associated with a 3% rate of the scleral show while the rate hiked to 28% in the transcutaneous.^[42]

The lower eyelid blepharoplasty surgery can be performed under either local or general anesthesia depending upon the patient and/or surgeon’s preference, need for adjuvant operations, and surgical planning.

Transconjunctival lower lid blepharoplasty [Fig. 5a-i]

About 1% lidocaine containing 1:100,000 epinephrine is infiltrated into the inferior fornix and eyelid skin with an additional supplement of local anesthesia of approximately 0.2 mL is injected in all the three fat pads. A pre-septal or retro-septal incision about 4–6 mm inferior to the tarsus is given through the conjunctiva [Fig. 5c]. Radiofrequency monopolar cautery gives better hemostasis than by the sharp dissection with scissors. Gentle pressure on the eyeball prolapses the medial, central, and lateral compartments of the fat pads. Fat is “teased out” and conservative fat dissection is done using radiofrequency monopolar or bipolar cautery [Fig. 5d]. The inferior oblique muscle lying between the medial and central fat pockets is identified and preserved by careful dissection [Fig. 5e]. The endpoint for fat excision is reached when gentle pressure on the globe flushes the anterior orbital rim with the anterior aspect of the orbital fat. Once the orbital fat has been accessed it can either be excised or repositioned. In the study by Kossler *et al.* amongst the oculoplastic surgeons of the USA, 99% excise some amount of the orbital fats during lower lid blepharoplasty, whereas 80% prefer fat repositioning.^[38]

The medial, central, and lateral fat pads are fashioned into three fat pedicles which are repositioned or relocated beyond the infraorbital rim into the SOOF area. Further release of the orbicularis-malar ligament is done to allow for transposition of the prolapsed fat underneath the orbicularis muscle beyond the infraorbital rim with the help of temporary exteriorized sutures [Fig. 5f-i]. The fat can be repositioned either in the subperiosteal or supra-periosteal plane. The lower orbital rim anatomy is masked in this technique, thus yielding a more smooth and revitalized contour of the midface.^[43]

When the fat pedicles are transposed along the subperiosteal plane, an incision is made through the arcus marginalis below the inferior orbital rim. The periosteum is lifted from the underlying inferior orbital bone and dissection is carried inferiorly for approximately 15 mm to fashion a pocket for fat transposition. Care should be taken not to damage the infraorbital neurovascular bundle. In suprapariosteal fat transposition, the plane of dissection is along the sub orbicularis plane. Though fat transposition by either subperiosteal or supra periosteal plane gives similar outcome, however, Massry *et al.* found that there was more bruising, swelling, and contour abnormalities when fat was transposed to the suprapariosteal plane.^[44]

The conjunctival incision is not sutured but the inferior and superior edges of the conjunctival epithelium are juxtaposed to avoid overlapping. However, few surgeons prefer to suture the conjunctival incision. The incision usually heals within a week to give the desired outcome.

Transcutaneous lower lid blepharoplasty [Fig. 6a-e]

Transcutaneous lower eyelid blepharoplasty with fat excision is an age-old technique of rectifying the unpleasant effects of senescence on the eye. It is a safe and effective method to contour the lower eyelid. Skin markings are preferably done in a sitting posture before injection of local anesthetic solution. The “skin pinch” technique is effective for determining the skin laxity when fat prolapse is not the issue.^[41] A subciliary incision with the skin elevated off the orbicularis is the ideal approach. The amount of skin pinch between forceps is a measure of

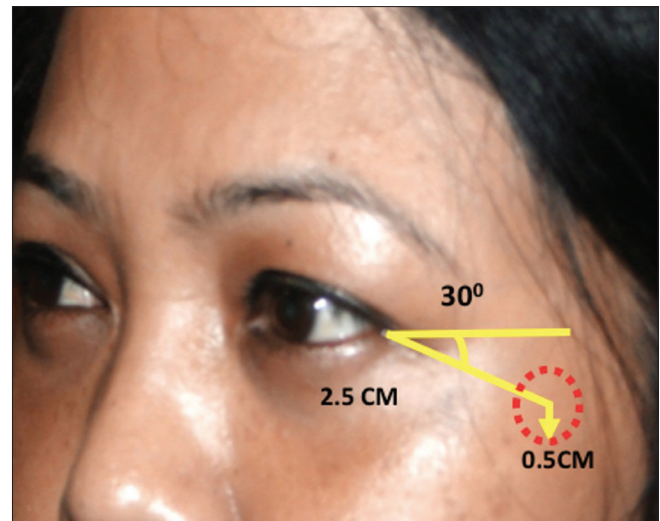


Figure 2: The critical zone highlighted as a circle with a 0.5 cm radius, and its center located 2.5 cm inferolateral, 30° from the lateral canthus

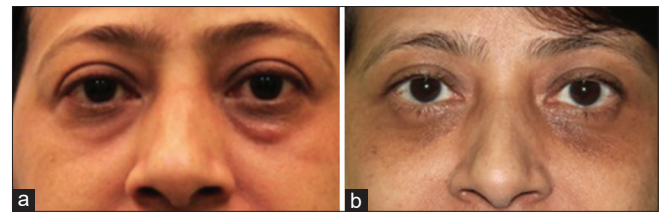


Figure 3: Preoperative (a) and postoperative (b) photographic comparisons following lower lid blepharoplasty with excision of all the three fat pads. Note the prominence of the tear trough and increased pigmentation seen in (b)

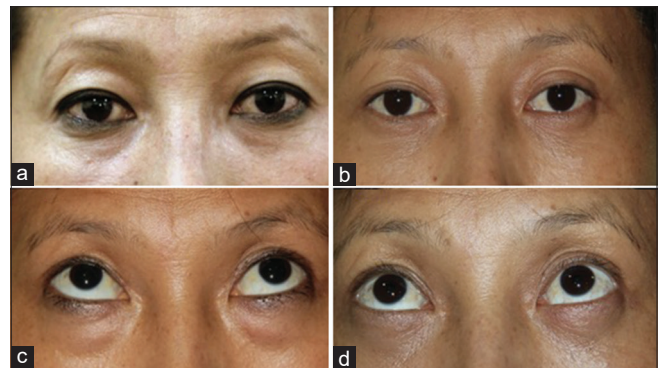


Figure 4: Preoperative (a and c) and postoperative (b and d) photographic comparisons in primary and up gaze following lower lid blepharoplasty with pre-periosteal fat relocation

the resection. Conservative excision of the redundant skin is carried out, preserving underlying orbicularis. Following the skin incision, the OS is identified and an incision is made to expose the three orbital fat pads. The fat pads are accessed and either resected or fashioned into three fat pedicles before transferring to the SOOF region, following the release of the orbicularis-malar ligament.^[45,46] The advantage of the transcutaneous approach is that it can be combined with a midface lift and lateral canthopexy or canthoplasty depending on the severity of canthal laxity [Fig. 7]. Lateral canthal suture canthopexy is preferred

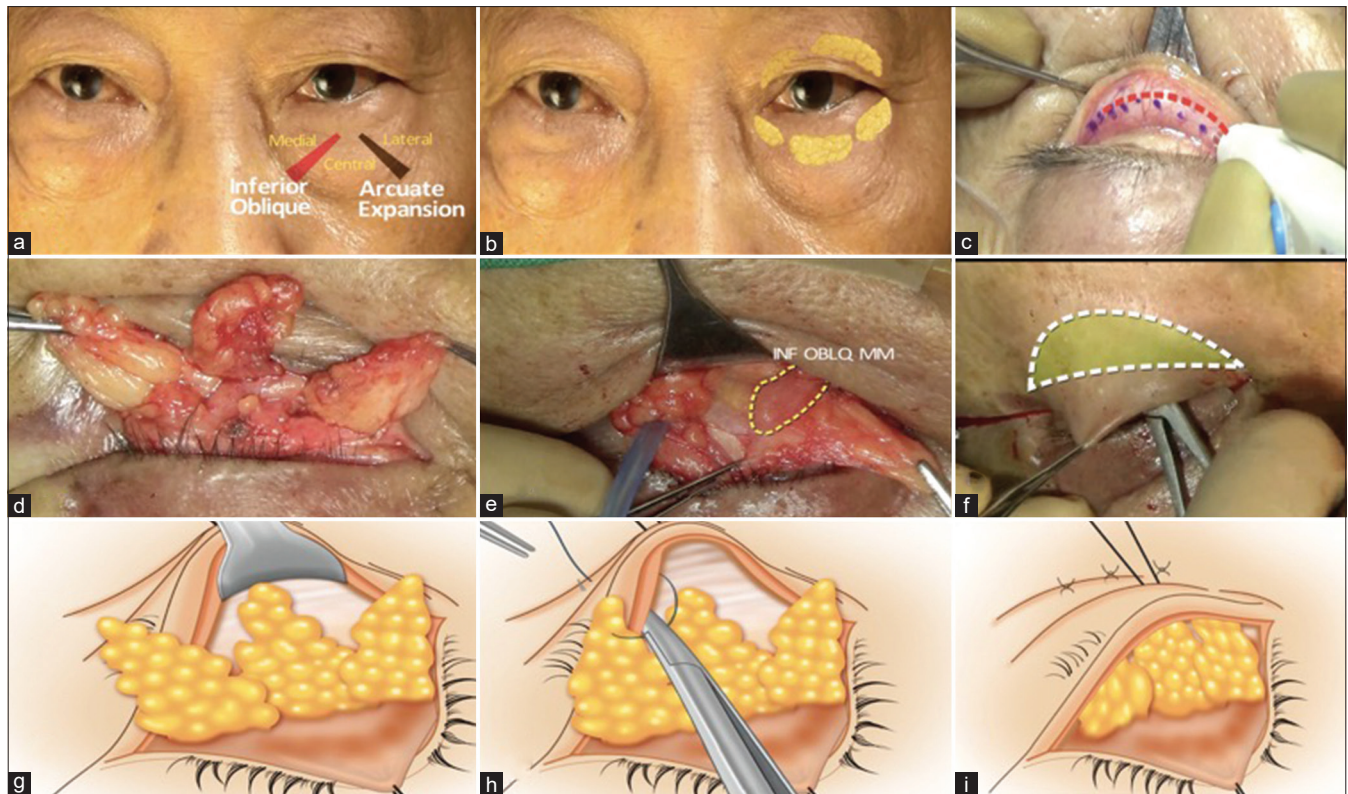


Figure 5: (Transconjunctival lower lid blepharoplasty): (a) Three lower lid fat (LLF) pads with inferior oblique muscle (IOM) between medial and central fat and arcuate ligaments between central and lateral fat. (b) Periorbital fat pads. (c) Transconjunctival incision 8 mm from lid margin (d) 3 LLF pedicles (e) Position of the IOM between the medial and central fat pads (f) The orbitomalar ligament and its release (g) Schematic representation of the LLF pedicles (h) Schematic representation of redraping of LLF pedicles (i) Schematic representation of redraped LLF tied over bolsters

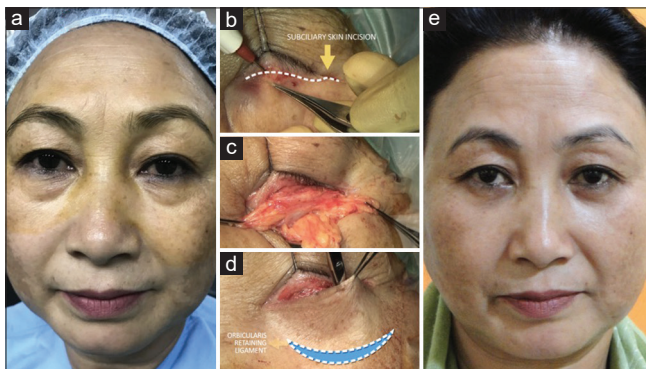


Figure 6: (Transcutaneous lower lid blepharoplasty): (a) Preoperative photograph (b) Sub-ciliary incision (c) Exposure of three fat pedicles. (d) Release of the orbicularis retaining ligament (e) Postoperative photograph

in case of minimal lateral canthus laxity of 1–2 mm and lateral reticular canthopexy is more suitable for moderate canthal laxity of 3–6 mm. However, canthoplasty with cantholysis or the lateral tarsal strip procedure is advocated for severe laxity (>6 mm).^[47,48]

Performing a transconjunctival technique could avoid two major theoretic problems, the potential for vertical lid shortening and the tendency for recurrent lid bulging.^[39] Mandelson postulated that addressing three major aspects such as lower lid fat prolapse, optimum fat excision, and

canthopexy for lid laxity, is the ideal approach for lower lid blepharoplasty.^[39]

A less conservative “skin-muscle flap” method through a subciliary incision can also be done, thereafter undermining the skin and orbicularis. The pretarsal orbicularis fibers are left untouched while the skin and pre-septal orbicularis are raised as one flap. Dissection up to the orbital rim along the OS is carried out. Periorbital fat is maneuvered after incising the septum. Excess skin is excised; however, damage to the orbicularis causing its denervation may lead to lower lid laxity. Though originally the excess pretarsal orbicularis muscle was excised, nowadays trimming of the redundant pre-septal orbicularis muscle is preferred by many surgeons.^[44]

The amount of fat excised from both the lids must be compared and may be measured to ensure uniform excision. The skin is closed with monofilament 6 ‘O’/7 ‘O’ nylon or polypropylene sutures with minimum excision of skin if required.

Another modification of lower lid blepharoplasty in patients with hypoplastic malar regions combines standard canthopexy and cheek-lift for the midface, along with double breasting of the orbital fat and SOOF pad and lifting of the lower orbital margin. In this technique, the post septal fat is teased to form a uniform sheet and redraping done over the hypoplastic malar region up to the SOOF, creating a smooth lid-cheek transition. This apron of fat is secured to the periosteum as well as the SOOF thereby redraping the SOOF over the fat apron and creating a double-breasted SOOF lift

while augmenting the cheek volume. This modified lower lid blepharoplasty is a safe and effective option in patients with flat malar prominences.^[46]

In a recent modification, downward rotation of the CPF, OS, and orbital fat complex through a subciliary incision to camouflage the tear trough deformity showed excellent results.^[49] In this technique, after meticulous dissection and creation of a flap of the CPF, septum, and fat complex, the flap was extended up to 5–6 mm below the arcus marginalis after the release of tissue tension, and the fan-shaped vascularized flap was apposed to the supra-periosteal tissues using interrupted absorbable sutures.

A web-based survey amongst the members of the American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS) to assess the preferential surgical patterns and shift in management protocols has been a useful tool for an overall assessment of one's management procedures and to rectify the loopholes. Web-based multiple-choice questionnaires were sent which included both functional and cosmetic blepharoplasties. Nearly 96% reported using the transconjunctival approach, 82% transcutaneous approach, and 51% both the approaches. Of those performing the transconjunctival approach, 74% used electrocautery for

incision, 21% used scissors, and 5% scalpel. About 80% of respondents performed fat repositioning, of which 70% preferred to reposition the fat in the supraperiosteal plane versus 30% in the subperiosteal plane. Canthal suspension often accompanied the lower lid blepharoplasty either by open canthoplasty (71%), closed canthal suspension (no canthotomy- 51%), or by canthopexy (43%).^[38]

Complications

The most alarming complication following lower lid blepharoplasty is postoperative retro-orbital hemorrhage. This is a rare but potentially sight-threatening complication and requires immediate attention. Meticulous cautery of the bleeds during fat excision and its manipulation is of paramount importance. Besides, edema and hemorrhage of the orbicularis muscle in the transcutaneous approach, can affect visual acuity. Rancati *et al.* have demonstrated that complications like the scleral show, lagophthalmos, insufficient skin removal, lower eyelid cicatrization, retraction, skin scar, and ectropion occurs following the transcutaneous approach and could be avoided with the transconjunctival approach.^[50]

The other frequently encountered complications in both the transconjunctival and transcutaneous approaches of lower

Table 1: The approaches of lower lid blepharoplasty and the complications.

Author	No. of cases	Approaches	Complications	Preferred Technique of lower blepharoplasty
Huang, 2019 ^[49]	86	Tc	Lower lid retraction (5.8%) Reoperation for skin ptosis (2.3%) Reoperation for pretarsal roll asymmetry (1.16%) Sensory abnormalities (3.4%).	Tc with the downward rotation of the Capsulopalpebral Fascia, Orbital Septum, and Orbital Fat Complex
Khan, 2017 ^[46]	33	Tc	Hypertrophic scar (3.03%), stitch sinus (3.03%), chemosis (3.03%),	Tc
Rancati, 2015 ^[50]	177	Tc- 58% Tconj- 42%	Tconj: Insufficient lipectomy (2.7%), Tconj: Bleeding (1%) Tconj: Corneal ulcer (1%) Tc: Infections (2%) Tc: Scleral show (2%) Tc: Insufficient skin resection (1%) Tc: Bleeding (1%) Tc: Corneal Ulcer (1%)	Tconj, as a lower rate of complications, was observed by the trans-conjunctival approach, with greater patient satisfaction
Hidalgo, 2011 ^[6]	248	Tc Tconj	Lower lid malpositioning (1.2%), Revisions (2.4%)	Integrated approach (Tconj to resect and transpose fat combined with Tc for a skin flap technique to excise excess skin.
Guo, 2010 ^[51]	2400	Tc- skin flap Tc-skin-muscle flap Tconj-Hamra's procedure	Ectropion (0.5%) Hollow eyes (0.6%) Dry eyes (0.5%) Retraction (5.4%)	Tconj for primary eye bags Tc for excess skin and muscle Tconj- Hamra's technique in the weakness of supporting structures with prominent tear trough
Garcia, 2006 ^[52]	50	Tc	Results based on the Garcia- McCollough Scale for Lower Eyelid Appearance. Lower lid contour deformity (3.9-4.26) /malposition (4.03-4.23), visible scars (4.43-4.64)	Tc
Muhlbauer, 2000 ^[40]	60	Tc	Recurrence, Widening of palpebral aperture (6.66%)	Tc
Baker, 1999 ^[36]	16	Tc Tconj	Hollowing in fat excision (12.5%)	Tconj with fat preservation

Tc- Transcutaneous, Tconj- Transconjunctival

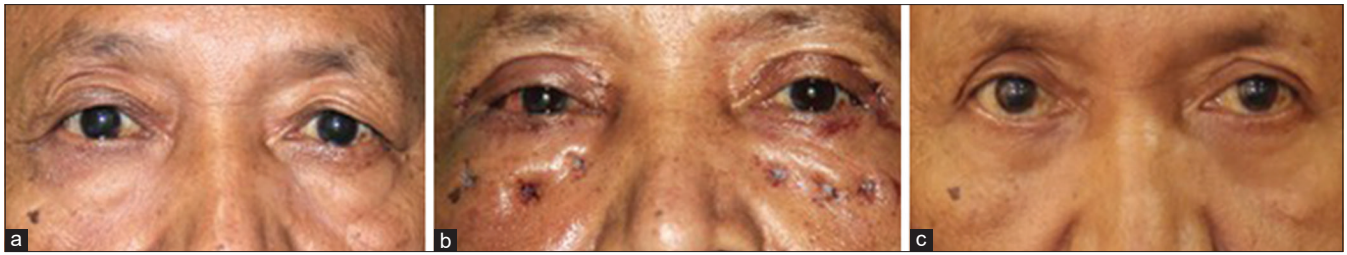


Figure 7: (a) Preoperative photograph (b) Lower lid blepharoplasty showing the three bolsters of suprapariosteal fat relocation down to the SOOF along with midface lift and lateral canthopexy (7 days postoperative). (c) Postoperative photograph (6 months postoperative)

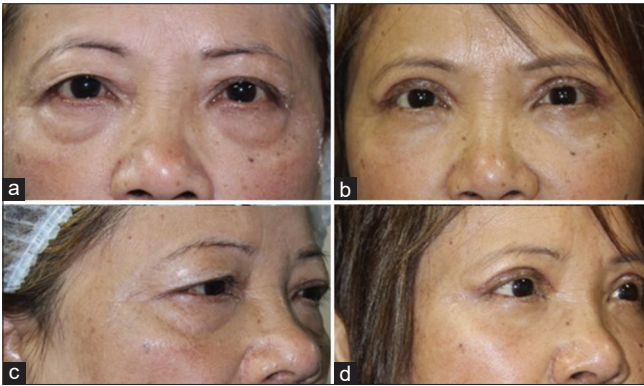


Figure 8: (a and c) Preoperative photograph frontal and right oblique view (b and d) Postoperative photograph frontal and right oblique view (3 months postoperative lower lid blepharoplasty)

eyelid blepharoplasty are bruising, superficial hematoma or ecchymosis, dry eyes, corneal trauma during surgery, infections, insufficient lipectomy, damage to the inferior oblique causing diplopia, postoperative periocular pigmentation, and eyelid asymmetry. Table 1 shows the preference for the different surgical techniques of lower lid blepharoplasty along with the complication rates.

In terms of safety and efficacy, Garcia *et al.* reported that transcutaneous lower eyelid blepharoplasty with fat excision is the time-tested method for addressing the undesirable sequelae of the aging eye with virtually nonexistent ill effects.^[51]

Guo *et al.* advocated for the transconjunctival blepharoplasty as the prime choice for isolated eyelid bags as it has minimum complications and advocated the transcutaneous approach for senile lid changes associated with excessive skin.^[52] Moreover, he advocated fat replacing or transposition technique during lower blepharoplasty in tear trough deformity and obvious skeleton rim.

Though transposition of the orbital fat or autologous fat grafting in either approach of lower blepharoplasty is preferred by many authors and can cause lumps or contour problems; fluid retention, pedicle vascular insufficiency, and resorption, however, Jason *et al.* reported no significant changes in the amount of fat resorption or percentage of volume retention in patients undergoing fat filling following rhytidectomy and lower blepharoplasty.^[53]

While caution, and complication avoidance, are of greatest importance, surgical decision-making is based on the balance of clinical findings and the risk/benefit profile.

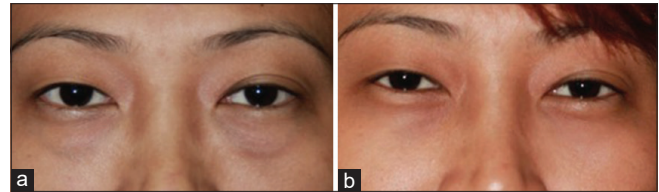


Figure 9: (a) Preoperative photograph (b) Postoperative photograph (5 years postoperative lower lid blepharoplasty)

The authors' experience with 540 patients and operating on 1000 eyelids in the last 18 years has shown good effacement and a smooth transition of lower eyelid cheek interface with transconjunctival lower lid blepharoplasty [Figs. 8 and 9]. The absence of skin scarring and the smooth effacement of the lower lid to malar transitions in the transconjunctival approach was an added advantage in patients seeking cosmetic marvels. Of the fat repositioning techniques, the supra-periosteal or suborbicularis transposition of the fat pads allows for the segue from the lower eyelid region to the malar regions. This avoids the occurrence of postoperative festoons as well as localized tissue mounds.

Thus, current esthetic trends in lower lid blepharoplasty focus in the effacement of lid-cheek junction along with the reduction of the lower eyelid fat bulges. A survey by William *et al.* supports these trends as a majority (80%) of surgeons perform fat relocation and repositioning in lower eyelid blepharoplasty. Around 17% preferred suprapariosteal fat relocation as it is a faster and technically less demanding procedure.^[54] Though fat repositioning is done in both the transconjunctival and the transcutaneous approach, some amount of fats is being excised in both approaches to fashion the optimum pedicle flaps for transposition down to the SOOF.

Limitations of the Literature and Further Research

The primary limitation is that most included studies in this review could not come to a consensus decision on the best fit surgical technique of lower lid blepharoplasty as per the age and ethnicity.

Another limitation in comparing the outcomes of the included studies is the multiple variants in surgical techniques of lower blepharoplasty. In some, the exact method of fat transposition has not been described. Few highlighted the transposition of a customized number of fat pedicles whereas few highlighted redistribution of all three fat pedicles.^[18,37,38,43,52,54,55]

Though lower blepharoplasty has been performed extensively as esthetic surgery, there is no general agreement regarding which procedure is most suited for a particular blepharoplasty and which patient. The rationale for the integrated approach of lower blepharoplasty with a lateral canthopexy and SOOF lift, lateral canthopexy and SMAS (superficial musculoaponeurotic system) lift, or lower blepharoplasty with downward rotation technique of the CPF, OS, and orbital fat complex or with septal reset with zygomaticus-orbicularis repositioning remains unclear.^[8,46,47,48,49]

In theory, left-right comparative studies may result in more evidence-based outcomes.^[56] A left-right comparative study by Kiang *et al.*^[57] and a split-face pilot study by LoPiccolo *et al.*^[58] has been conducted for upper lid blepharoplasty but there have been no published articles on left-right comparative studies or split face studies in lower blepharoplasty with one side undergoing fat excision and the other fat relocation or one side undergoing transcutaneous and the other side transconjunctival lower blepharoplasty.

Conclusion

In conclusion, conservative excision of intraorbital fat in either transcutaneous or transconjunctival lower blepharoplasty has proven to be a predictable and esthetically acceptable procedure for rejuvenation of the lower eyelid and, optimal preservation of orbital fat is a better alternative than complete excision of the prolapsed orbital fat. Though the transconjunctival approach is often preferred, however, in certain cases of excessive skin redundancy transcutaneous lower lid blepharoplasty technique is imperative.^[45]

High patient satisfaction with the least postoperative complications is the objective of every surgeon. With the proper patient selection, adequate surgical training and meticulous dissection consistently reproducible esthetic outcome and harmony in facial rejuvenation following lower blepharoplasty can be accomplished

Thus, there is no best or most correct approach to lower eyelid blepharoplasty surgery. Proper knowledge of the patient's requirements and surgical trends is the sine qua non for any esthetic surgeon. As such, much of the information suggested in terms of the ideal approach to lower lid blepharoplasty is anecdotal at best and the trends do exist to continue.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Sri Kanchi Sankara Health and Educational Foundation.

Conflicts of interest

There are no conflicts of interest.

References

1. Seckel BR, Kovanda CJ, Cetrulo CL Jr, Passmore AK, Meneses PG, White T. Laser blepharoplasty with transconjunctival orbicularis muscle/septum tightening and periocular skin resurfacing: A safe and advantageous technique. *Plast Reconstr Surg* 2000;106:1127-41.
2. The American Society for Aesthetic Plastic Surgery Cosmetic surgery national databank statistics. *Aesthet Surg J*. Available from: <http://www.surgery.org/sites/default/les/ASAPStats2015>. [Last accessed on 2019 Sep 04].
3. Wolfort FG, Colon F, Wolfort S. The history of blepharoplasty. In: Wolfort FG, Kanroe WR, editors. *Aesthetic Blepharoplasty*. Boston: Little Brown; 1995. p. 1-16.
4. Bourguet J. Notre traitement chirurgical de "poches" sous les yeux sans cicatrice. *Arch Fr Belg Chir* 1928;31:133.
5. Furnas DW. The orbicularis oculi muscle. Management in blepharoplasty. *Clin Plast Surg* 1981;8:687-715.
6. Hidalgo DA. An integrated approach to lower blepharoplasty. *Plast Reconstr Surg* 2011;127:386-95.
7. Loeb R. Fat pad sliding and fat grafting for leveling lid depressions. *Clin Plast Surg* 1981;8:757-76.
8. Hamra S. The role of the septal reset in creating a youthful eyelid cheek complex in facial rejuvenation. *Plast Reconstr Surg* 2004;113:2124-41.
9. Choo PH, Carter SR, Seiff SR. Lower eyelid volume augmentation with fat pearl grafting. *Plast Reconstr Surg* 1998;102:1716-9.
10. Shorr N, Christenbury JD, Goldberg RA. Free autogenous "pearl fat" grafts to the eyelids. *Ophthal Plast Reconstr Surg* 1988;4:37-40.
11. Tonnard P, Verpaele A, MD, Zeltzer A. Augmentation blepharoplasty: A review of 500 consecutive patients. *Aesthet Surg J* 2013;33:341-52.
12. Silkiss RZ, Baylis HI. Autogenous fat grafting by injection. *Ophthal Plast Reconstr Surg* 1987;3:71-5.
13. Taban MR. Lower lid blepharoplasty in eyelids previously injected with hyaluronic acid gel filler. *Am J Cosmetic Surg* 2017. doi: 10.1177/0748806816687605.
14. Glat PM, Jelks GW, Jelks EB, Wood M, Gadangi P, Longaker MT. Evolution of the lateral canthoplasty: Techniques and indications. *Plast Reconstr Surg* 1997;100:1396-405.
15. Tan KS, Oh S-R, Priel A, Korn BS, Kikkawa DO. Surgical anatomy of the forehead, eyelids, and midface for the aesthetic surgeon. In: Massry GG, Murphy MR, Azizzadeh B, editors. *Master Techniques in Blepharoplasty and Periorbital Rejuvenation*. New York: Springer; 2011. p. 11-24.
16. Hwang K, Lee DK, Lee EJ, Chung IH, Lee SI. Innervation of the lower eyelid in relation to blepharoplasty and midface lift: Clinical observation and cadaveric study. *Ann Plast Surg* 2001;47:1-5.
17. Hwang K, Nam YS, Choi HG, Han SH, Hwang SH. Cutaneous innervation of lower eyelid. *J Craniofac Surg* 2008;19:1675-7.
18. Golan S, Levine B, Lelli GJ. Lower eyelid blepharoplasty. *J Ophthalmol Clin Res* 2019;3:1-4.
19. Kakizaki H, Jinsong Z, Zako M, Nakano T, Asamoto K, Miyaishi O, *et al.* Microscopic anatomy of Asian lower eyelids. *Ophthal Plast Reconstr Surg* 2006;22:430-3.
20. Hawes MJ, Dortzbach RK. The microscopic anatomy of the lower eyelid retractors. *Arch Ophthalmol* 1982;100:1313-8.
21. Hornblase A. *Oculoplastic, Orbital and Reconstructive Surgery*. Baltimore: Williams & Wilkins; 1988. p. 9-10.
22. Lim WK, Rajendran K, Choo CT. Microscopic anatomy of the lower eyelid in Asians. *Ophthalmic Plast Reconstr Surg* 2004;20:207-11.
23. Muzaffar AR, Mendelson B, Adams W. Surgical anatomy of the ligamentous attachments of the lower lid and lateral canthus. *Plast Reconstr Surg* 2002;110:873-84.
24. Kikkawa DO, Lemke BN, Dortzbach RK. Relations of the superficial musculoaponeurotic system to the orbit and

- characterization of the orbitomalar ligament. *Ophth Plast Reconstr Surg* 1996;12:77-88.
25. Pessa JE, Zadoo VP, Adrian EK, Woodward R, Garza JR. Anatomy of a "black eye": A newly described fascial system of the lower eyelid. *Clin Anat* 1998;11:157-61.
 26. Goldberg Robert A. The Three periorbital hollows: A paradigm for periorbital rejuvenation. *Plast Reconstr Surg* 2005;116:1796-804.
 27. Duke Elder S, Wybar KC. The eyelids. In: Duke Elder S, editor. *System of Ophthalmology: Anatomy of the Visual System. Vol 2.* St Louis, MO: C V Mosby CO; 1961.
 28. Loeb R. Nasojugal groove leveling with fat tissue. *Clin Plast Surg* 1993;20:393-400.
 29. Flowers RS. Tear trough implants for correction of tear trough deformity. *Clin Plast Surg* 1993;20:403-15.
 30. Jiang J, Wang X, Chen R, Xia X, Sun S, Hu K. Tear trough deformity: Different types of anatomy and treatment options. *Postepy Dermatol Alergol* 2016;33:303-8.
 31. Shome D, Vadera S, Khare S, Ram MS, Ayyar A, Kapoor R, *et al.* Aging and the Indian face: An analytical study of aging in the Asian Indian face. *Plast Reconstr Surg Glob Open* 2020;8:2580-92.
 32. Naik M, Honavar S, Das S. Blepharoplasty: An overview. *J Cutan Aesthet Surg* 2009;2:6-11.
 33. Codner MA, Hanna MK. Applied anatomy of the eyelids and orbit. In: Nahai F, editor. *The Art of Aesthetic Surgery: Principles and Techniques.* St Louis: Quality Medical Publishing; 2005. p. 634-8.
 34. Dutton JJ. *Atlas of Clinical and Surgical Anatomy.* Philadelphia: W.B. Saunders; 1994. p. 95-6.
 35. Shah M, Lee G, Levebvre DR, Pasquale LR. A cross-sectional survey of the association between bilateral topical prostaglandin analogue use and ocular adnexal features. *PLoS One* 2013. doi: 10.1371/journal.pone.0061638. Print 2013.
 36. Baker SR. Orbital fat preservation in lower-lid blepharoplasty. *Arch Facial Plast Surg* 1999;1:33-7.
 37. Hamra ST. The role of orbital fat preservation in facial aesthetic surgery. A new concept. *Clin Plast Surg* 1996;23:17-28.
 38. Kossler AL, Peng GL, Yoo DB, Azizzadeh B, Massry GG. Current trends in upper and lower eyelid blepharoplasty among American Society of ophthalmic plastic and reconstructive surgery members. *Ophthalmic Plast Reconstr Surg* 2018;34:37-42.
 39. Mendelson BC. Fat preservation technique of lower-lid blepharoplasty. *Aesthet Surg J* 2001;21:450-9.
 40. Mühlbauer W, Holm C. Orbital septorhaphy for the correction of baggy upper and lower eyelids. *Aesthetic Plast Surg* 2000;24:418-23.
 41. Parkes M, Fein W, Brennan HG. Pinch technique for repair of cosmetic eyelid deformities. *Arch Ophthalmol* 1973;89:324-8.
 42. Appling WD, Patrinely JR, Salzer TA. Transconjunctival approach vs subciliary skin-muscle ap approach for orbital fracture repair. *Arch Otolaryngol Head Neck Surg* 1993;119:1000-7.
 43. Hamra ST. Arcus marginalis release and orbital fat preservation in midface rejuvenation. *Plast Reconstr Surg* 1995;96:354-62.
 44. Yoo DB, Peng GL, Massry GG. Transconjunctival lower blepharoplasty with fat repositioning: A retrospective comparison of transposing fat to the subperiosteal vs supraperiosteal planes. *JAMA Facial Plast Surg* 2013;15:176-81.
 45. Massiha H. Combined skin and skin-muscle flap technique in lower blepharoplasty: A 10-year experience. *Ann Plast Surg* 1990;25:467-76.
 46. Khan A, Aziz K, Javed A. Modified lower eyelid blepharoplasty improves aesthetic outcomes in patients with hypoplastic malar prominences. *Plast Aesthet Res* 2017;4:228-35.
 47. McCord CD, Boswell CB, Hester TR. Lateral canthal anchoring. *Plast Reconstr Surg* 2003;112:222-37.
 48. Jelks GW, Glat PM, Jelks EB, Longaker MT. The inferior retinacular lateral canthoplasty: A new technique. *Plast Reconstr Surg* 1997;100:1262-70; discussion 1271-5.
 49. Huang Z, Lee Y, Yan G, Wang K. Downward rotation of the capsulopalpebral fascia, orbital septum, and orbital fat complex: A new technique for lower eyelid rejuvenation. *Plast Reconstr Surg Glob Open* 2019;7:e2335.
 50. Rancati A, Jacovella P, Zampieri AE. Lower blepharoplasty review, transconjunctival vs. transcutaneous approach. *Modern Plast Surg* 2015;5:1-8.
 51. Garcia RE, McCollough EG. Transcutaneous lower eyelid blepharoplasty with fat excision: A shift-resisting paradigm. *Arch Facial Plast Surg* 2006;8:374-80.
 52. Guo L, Bi H, Xue C. Comprehensive considerations in blepharoplasty in an Asian population: A 10-year experience. *Aesthetic Plast Surg* 2010;34:466-74.
 53. Meier JD, Glasgold RA, Glasgold MJ. Autologous fat grafting long-term evidence of its efficacy in midfacial rejuvenation. *Arch Facial Plast Surg* 2009;11:24-8.
 54. Williams ZY, Oester AE, Stinnett SPH, Morris C, Woodward JA. Cosmetic surgery survey of American Society of oculoplastic and reconstructive surgery members and a 6-year comparison. *Ophthalmic Plast Reconstr Surg* 2010;26:95-9.
 55. Murri M, Hamill EB, Hauck MJ, Marx DP. An update on lower lid blepharoplasty. *Semin Plast Surg* 2017;31:46-50.
 56. Hollander MHJ, Contini M, Pott JW, Vissink A, Schepers RH, Jansma J. Functional outcomes of upper eyelid blepharoplasty: A systematic review. *J Plast Reconstr Aesthet Surg* 2019;72:294-309.
 57. Kiang L, Deptula P, Mazhar M, Murariu D, Parsa FD. Muscle sparing blepharoplasty: A prospective left-right comparative study. *Arch Plast Surg* 2014;41:576-83.
 58. LoPiccolo MC, Mahmoud BH, Liu A, Sage RJ, Kouba DJ. Evaluation of orbicularis oculi muscle stripping on the cosmetic outcome of upper lid blepharoplasty: A randomized, controlled study. *Dermatol Surg* 2013;39:739-43.