Minimal Access Lateral Approach in Lower Eyelid Blepharoplasty for Three-Dimensional Recontouring

Grady B. Core, MD[a,*], Andrew W. Steele, MD, MS[a,b,1]

KEYWORDS

• Lateral access • Lower eyelid recontouring • Blepharoplasty • Canthopexy

KEY POINTS

- Lateral access avoids lagophthalmos.
- Recontouring versus skin resection.
- Fat preservation causes lid-cheek blending.
- Muscle lifting provides support.
- Canthopexy when indicated.

INTRODUCTION

Surgical rejuvenation of the lower eyelids has undergone significant evolution over the past several decades to improve esthetic outcomes while minimizing comorbidities and complications. Advances in anatomic understanding of the critical lower eyelid structures have led to the development of new, innovative procedures and approaches. Traditionally, lower eyelid blepharoplasty was subtractive in nature, involving removal of excess skin, orbicularis oculi, and fat via skin or skin-muscle flaps. Today's techniques, in contrast, generally seek to preserve orbital fat and transpose it over the infraorbital rim for improved lid-cheek junction contour, and skin and muscle excision is minimal. These maneuvers may be performed through transcutaneous or transconjunctival incisions and are often combined with lower lid support procedures such as canthopexy or canthoplasty and muscle lifting in appropriate patients. However, due to occasional incidence of lower lid retraction, the senior author began using a lateral access only approach in 2007 which has resulted in lowering the incidence of post opearative lower lid retraction to zero.

PATHOLOGIC ANATOMY OF THE AGING LOWER EYELID

The aging lower eyelid is characterized by several anatomic changes related to both the skeletal and soft tissue structures. In younger patients, there is a smooth convexity from the tarsus to the cheek with no underlying sign of the orbital rim or other bony landmarks. As aging progresses, attenuation of the orbital septum leads to pseudoherniation of orbital fat over the orbital rim, resulting in the appearance of bulging fat bags. A depression develops between the fat bags and cheek, resulting in a double convexity, with one smaller convexity overlying the orbital fat and the other larger convexity over the cheek.[1]

Initially named the *tear trough deformity* by Flowers,[2] Stutman and Codner[3] have previously outlined the complicated terminology regarding

[a] Core Plastic Surgery, Birmingham, AL 35243, USA; [b] Lehigh Valley Hospital - Pocono, 200 Plaza Court, 447 Office Plaza, Suite B, East Stroudsburg, PA 18301-8529, USA
[1] Present address: 219 Brookwood Forest Drive, Blythewood, SC 29016.
* Corresponding author. Core Plastic Surgery, 3595 Grandview Parkway #100, Birmingham, AL 35243.
E-mail address: gcore@gcoremd.com

Clin Plastic Surg 52 (2025) 73–81
https://doi.org/10.1016/j.cps.2024.08.008

this condition as well as the history surrounding the improved understanding of its anatomy. Ultimately, they suggest that the term tear trough deformity be applied to the medial periorbital hollow extending from the medial canthus to the medial limbus.[3] Lateral to this, the depression contour irregularity should be referred to as the *palpebromalar groove, nasojugal groove, or lid-cheek junction*.[3,4] It was the anatomic work of Haddock and colleagues[5] that showed the tear trough to correlate superficially with the junction between the preseptal and preorbital portions of the orbicularis oculi. Furthermore, they found that medially the orbicularis oculi fibers were attached firmly to their maxillary origin at the location of the tear trough deformity.[5]

However, laterally, over the lid-cheek junction, there was a ligamentous attachment between the orbicularis oculi and maxilla.[5] This attachment was first described by Kikkawa and colleagues,[6] who termed it the *orbital malar ligament*. Mendelson and colleagues[7] have since referred to this as the *orbicularis retaining ligament* because of its identified attachments to the zygoma. Muzaffar and colleagues[8] have detailed additional anatomy of the orbicularis retaining ligament, noting that it separates the preseptal and orbital portions of the orbicularis oculi as it courses superficially. Furthermore, the length of the ligament was greatest at the arcuate expansion of the orbital septum where it was 10 to 14 mm and also 1.5 to 5 mm in thickness. The ligament itself does not lie at the orbital rim or arcus marginalis, but instead lies caudal to the rim, being 4 to 6 mm below the rim at the midpupillary line and 2 to 4 mm below toward the lateral canthus.[5]

This clarification of terminology regarding the tear trough deformity, lid-cheek junction, and orbicularis retaining ligament along with their detailed anatomy are critical in understanding surgical treatment options and required operative maneuvers. Indeed, selection of a specific technique should be tailored to addressing the underlying anatomic abnormality. In young patients with pseudoherniation of lower eyelid fat pads but with minimal skin laxity, there will almost always be early tear trough formation. Most surgeons will recommend a judicious fat pad removal as all that is required, which is generally performed via a retroseptal, transconjunctival approach. However, we believe this approach unnecessarily reduces fat volume and can make the patient actually look hollow and more aged, especially in later years. Patients who have only mild skin excess in addition may be managed with procedures such as skin pinch excision, laser resurfacing, or chemical peel.[9]

With more advanced periorbital aging, including substantial pseudoherniation of fat pads, tear trough deformity, and midface volume loss and descent, more intensive procedures may be indicated. Described techniques include orbital fat repositioning, muscle and midface lifting, fat and other soft tissue grafts, implants, and hyaluronic acid fillers. The traditional skin-muscle flap popularized by Rees and Dupuis[10] in 1969 addressed lower eyelid bags through direct excision using a transcutaneous, subciliary incision. Several investigators have since used this incision and approach to improve the contour of the tear trough and lid-cheek junction by different maneuvers. Transposition of lower eyelid fat pads has proved to be a powerful technique for blending the lid-cheek junction and correcting the tear trough deformity. Loeb[11] was the first to describe fat transposition over the medial infraorbital rim to address nasojugal grooves, and he also used free fat grafts for middle and lateral depression treatment. Hamra[1] extended this procedure to include a complete arcus marginalis release with fat pad transposition of all 3 compartments and fixation below the entire infraorbital rim. He further evolved his technique to include orbital septum reset.[12]

Nonetheless, others, including this author, have had difficulty reproducing those results. Goldberg[13] introduced fat transposition into the subperiosteal plane via a transconjunctival incision to decrease the potential visibility of the edges of the transposed fat as well as for ease of dissection in a bloodless plane. Several fixation techniques have been described, including internal fixation with absorbable or nonabsorbable suture or temporary transcutaneous fixation with or without bolsters. The authors have performed this approach with our lateral access-only incision but found it to be fraught with bleeding issues in the medial aspect where it was necessary to transpose the medial fat pad.

Other investigators have advocated for correction of lower lid deformity with implants or autologous fat grafting. Flowers introduced the alloplastic tear trough implant with several different designs.[14] Loeb used free fat grafts transplanted through an incision over the nasojugal groove.[11] Later, Coleman[15] described injection of small aliquots of fat for tear trough deformity correction through blunt-tipped cannulas. This author has not been able to produce consistent results with fat grafting in this area, and it should be noted that Yoshimura and Coleman[16] followed up their early reports with significant complications in the lower eyelid from fat grafting methods, which can be very difficult to correct.

Common adjunctive procedures include lateral canthal suspension and muscle lifting. Canthal suspension techniques are generally indicated either to address lower eyelid malposition or as a preventative measure in lower eyelid surgery. Canthopexy or canthoplasty may be required in patients who need restoration of canthal tilt, who have a negative vector, those with a poor preoperative snap-back test, in those with lower lid laxity (>6 mm of distraction), or to support the lower eyelid in the early postoperative healing period. Flowers[17] advocated for the routine use of canthopexy because it helps restore youthful tone of the lower eyelid and may reduce or eliminate the need to resect lower eyelid skin. Several investigators have also recognized the significant role of malar support of the lower eyelid.[18,19] Orbicularis oculi muscle lifting and fixation in the appropriate vector may also be performed in conjunction with canthal tightening or in isolation to improve lower lid contour and to provide midface lift.[20]

LATERAL ACCESS RECONTOURING OF THE LOWER EYELID

Surgical lower eyelid rejuvenation procedures combining several of these individual techniques are often performed depending on indications. Most surgeons consider only the transconjunctival approach (posterior) or the skin-muscle flap approach (anterior). However, having performed both skin-muscle flap and transconjuctival approaches for years, I continued to find occasional patients who would experience lower lid retraction after these procedures, although this complication was low at approximately 2% for both methods. I found it interesting that a posterior approach was just as much of an issue as the anterior approach and surmised that the problem was not the septum, as noted by Massry, but was most likely due to transgressing functional muscle, orbicularis from the front and the retractors from behind.[21] Indeed, I (Core) agree with these investigators because my experience has been that the septum plays little role, if any, in lid retraction issues and a complete release of the septum all the way across has not led to increased lid retraction in my practice. It was also frustrating because even one patient with scleral show was discouraging and potentially could result in litigation. Early in my experience I had come to prefer the skin muscle flap approach with fat pad transposition, which allowed me much more room to blend the lid-cheek junction using fat transposition techniques introduced by Loeb, and also to perform a midface lift over the fat transfers if needed.[11] I termed this technique the "transblepharoplasty midface lift," presented in 1996 at the Emerging Technologies meeting at New York University (NYU).[22] Despite excellent cosmetic results in most patients, I continued to experience a consistent rate of mild scleral show of 5%. I finally decided to find a procedure that could avoid transecting functional layers in the central lid area, the orbicularis anteriorly and the retractors posteriorly. The only approach in which central lid functional structures were not located was laterally, so after experimenting with a lateral endoscopic approach, which turned out not to be feasible due to the small suborbicularis space, I discovered that a lateral access incision of 2 cm could be used to visualize the entire field with the use of 4.5 power loupes. Essentially, I found I could accomplish everything I could through this minimally invasive approach using this small lateral access incision.

We initially only offered this approach for mild contour deformities with deep nasojugal groves and available fat to transpose. I also added to this laterally based orbicularis muscle lifting with canthopexy, which significantly improved contour. This approach was presented in Boston at the 2010 meeting of The American Society of Aesthetic Plastic Surgery.[23] In the ensuing years we expanded the indications to include more extensive deformities of aging as well as in revision cases and now use this approach almost exclusively. The technique was developed in 2007 and published in 2013 after a 6-year experience, and now we have a 16-year experience detailed herein.[24]

PATIENT SELECTION

Because we use the technique for most cases it would benefit the reader more if we outlined the contraindications, which include prior surgery with excision of fat pads, which would now preclude lateral access and muscle lifting but would require fat grafting as opposed to fat pad transfer. Patients who are good candidates are those with deep nasojugal grooves and/or bulging lower lid fat pads, in other words, not only those with skin laxity but also those with contour deformities, hence the name of the procedure (**Table 1**).

TECHNIQUE

The incision begins 1 cm lateral to the canthus at a level even with the subciliary line and extends medially under the lashes to a total length of 2.0 to 2.5 cm to approximately the level of the lateral limbus. This incision is slightly longer than the original description,24 but we have found that as long as the incision does not extend beyond this point there has been no lid retraction (**Fig. 1**). We have

Table 1
Stages of periorbital aging and indicated procedures

Stage 1	Early signs of periorbital aging: mild rhytids, early visibility of lower lid fat compartments, nasojugal grooves becoming visible, lower lid with good tone, and no canthal laxity	Lateral access lower eyelid recontouring with fat transposition
Stage 2	Obvious signs of periorbital aging: rhytids increasing, fat compartment herniation easily visible, deep nasojugal grooves, and lower lid tone normal or with mild laxity	Lateral access lower eyelid recontouring with fat transposition; ± canthopexy and/or muscle lift depending on lower lid tone and canthal tilt
Stage 3	Advanced signs of periorbital aging: extensive rhytids with excess skin, bulging lower lid fat obvious, deep and long nasojugal grooves, canthal laxity with medial displacement, lower lid laxity, and if present, festoons	Lateral access lower eyelid recontouring with fat transposition, canthopexy, and muscle lift; severe cases may require other procedures including skin pinch resection, canthoplasty, lateral tarsal strip, or lower lid wedge resection

since noted the study by Choi and Kim[25] beautifully demonstrating the path of the lateral branch of the lower palpebral nerve, which explains anatomically why lateral access prevents denervation of the subciliary orbicularis muscle.

The incision develops a lateral skin muscle flap, and the dissection extends down to the orbital rim and then medially in the bloodless plane of the preseptal space anterior to the septum. A ribbon retractor is placed for full visualization with 4.5 power loupes necessary for good visualization. The bloodless dissection extends all the way medially to the point where the medial fat pad, whiter in color, is easily visible. The suborbicularis fascia is seen as a thin sheet connected to the orbital rim and extends upward along the undersurface of the orbicularis, and this layer will need to be divided with sharp scissors just above the orbital rim to allow for fat pad transposition. The medial attachments of the orbicularis to the orbital rim are then divided with care taken to avoid veins that may be found here. The release of the arcus marginalis medially along with the most medial orbicular muscle attachments to the orbital rim releases the nasojugal groove and creates a space for fat pad transposition. Caudal and supraperiosteal undermining a short distance of no more than 5 mm along the inferior orbital rim under the orbicularis muscle and suborbicularis oculi fat pad is done just enough to create spaces for the transposition of each fat pad. The fat pads are then identified beginning medially. The overlying medial septum is then opened with fine tip scissors, and the pad is teased out into the preseptal space and is then transposed over the orbital rim. A 6-0 nylon suture is passed through the external skin 1 to 2 cm below the nasojugal groove beginning at the juxtaposition of the nasal sidewall and medial cheek and then extends into the suborbicularis space and is passed through the fat pad and then back out where it is tied over the skin. This process is repeated for the central fat pads, which may require 2 to 3 sutures depending on the amount of fat pad present and resulting in several visible external sutures tied in a horizontal row to the upper cheek (**Fig. 2**). In less than 15 cases where there has been extensive excess fat we have removed some with needle tip cautery before

Fig. 1. Incision planning: 2- to 2.5-cm lateral access lower eyelid incision.

Fig. 2. Completed lower eyelid fat pad transposition with transcutaneous suture fixation.

Fig. 3. Placement of lateral cathopexy suture; white arrow indicates location of suture placement into lateral orbital rim periosteum.

transposing the rest. The lateral fat pad can be addressed under direct vision, and it is released and transposed over the orbital rim and sutured into place with a 5-0 Vicryl suture. This step completes the fat transposition portion of the procedure, and at this point the surgeon should see a flat floor of smooth fat lying in the lower floor of the dissection extending under the orbicular muscle. The fat should be free of the septum, and the operator needs to be sure the septum is not retracted caudally with any of the fixation sutures.

The second portion of the procedure is the canthopexy, which is a 6-0 polydioxone suture (PDS) suture that extends from the lateral periosteum in the inner surface of the bone approximately 5 mm above the midpoint of the lateral orbital rim. This suture extends down and through the lateralmost aspect of the lower lid just under the tarsus and back up such that it goes around the lateral canthal ligament (**Fig. 3**); this will elevate the lower lid and tighten it and sharpen the lateral canthus. Slight overcorrection is indicated because there will be some settling of the fixation. We perform this fixation in all patients who have lid laxity. This step can be omitted in patients with no laxity. Despite initiating this suture independently in 2007, I later discovered that Kontoes and colleagues[26] described this exact technique in 2007, which they later called the single suture traction technique.[27]

The final portion of the procedure is the lateral muscle lift. Muscle lifting was initially described by Hinderer[28] in the 1970s, and various modifications have been described since that time. In our first presentation of the technique in 2010, we described the various stages of aging and how muscle lifting should be applied depending on the stage.[23] Our modified classification is outlined in **Fig. 1**.

One will note that no lift is indicated in early-stage recontouring. In the beginning we used a laterally based orbicularis flap but have found that leaving continuity with the medial orbicularis muscle helps shape the lower lid better, and more recently we simply place the lifting suture through the lateral orbicularis and lift vertically attaching the suture to the lateral temporal fascia just posterior to the orbital rim (**Fig. 4**).

In stage 3 patients in whom there is skin laxity it may be necessary to excise 2 to 3 mm of subciliary skin extending medially, but it is never necessary to divide the muscle any further medially going past a line extending vertically from the lateral limbus. It should be noted that skin pinch surgery is extremely rare and is done in cases in which the patient refuses laser treatment. Thus the incidence of skin excision is rare with no more than 20 cases in the entire 17-year history of the procedure because the main emphasis is on *recontouring* as we found that most patients really do not have excess skin but actually just poor skin,

Fig. 4. Muscle lift; note slight overcorrection of canthal tilt.

Fig. 5. Completed lift with fat pad transposition, lateral canthopexy, and muscle lift.

which can be revitalized with improved contours and if needed, laser resurfacing and/or nanofat grafting.[29] If nanofat grafting is done it should be done before the transposition of the fat pads so that the application of the nanofat does not disrupt the transposition sutures.

At the conclusion of the procedure, one should open the upper lids and check the level of the lower lids and compare the sides to be sure the lift is symmetric (**Figs. 5** and **6**). Slight overcorrection will be noted but settles in 2 weeks. Frost sutures can be added, which we place in patients with advanced lid laxity and remove at 3 days. Postoperative care is mainly focused on the upper lid if done because the lower lid procedure in and of itself requires no special care other than making sure the patient understand not to press on the cheek area where the transposition sutures are located.

These sutures remain in place for 8 to 10 days and require no bolsters as we used in the beginning because we have not seen any scarring from having the sutures that length of time. We think that a shorter length of time does not allow the transposed fat to adhere firmly enough to prevent recurrence if they are removed too soon. In the early days we saw 5 cases of recurrent fat pads, and it was always in the patient who had the transposition sutures removed in less than 8 days.

Results: Patients in all 3 stages of aging are shown in (**Figs. 7–9**).

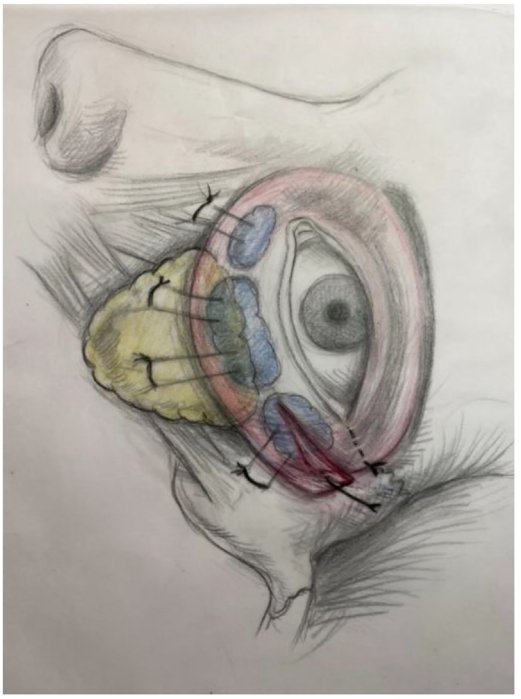

Fig. 6. Completed lift with fat pad transposition, lateral canthopexy, and muscle lift showing suture placement locations.

Fig. 7. (*A*) Pre-op: Deep nasojugal grooves in a 25 year old patient. (*B*) Post op{ Corrected with minimal access fat transposition for recontouring of the lid cheek junction. No skin removal.

COMPLICATIONS

Of the total cases (350 since 2007) the most common complication has been edema, which can persist for several weeks. The lower lid is rich in lymphatics, and thus it is important to use meticulous dissection and not use so many transposition sutures such that the lymphatics are strangulated. Prolonged edema has occurred in up to 10% of the patients until we began using fewer transposition sutures and became more adept at the dissection, and now we see 5% incidence of lower lip edema lasting longer than 3 weeks.

Recurrence is defined as partial relapse of lower lid fat pad bulging and was an issue earlier in the series with a 7% recurrence rate, which was lowered to 4% with improved technique and strict instructions not to massage or even touch the lid cheek junction. Complete recurrences have been rare because most are partial and in most cases the patients have not even noticed as this is my own criticism. Patients who noticed and requested revision were 5 in total, so the preoperative rate for recurrence is less than 2%.

There has been a zero incidence of lower lid retraction, which was the original reason for the development of the procedure, and no instances of enophthalmos. There have been no other serious complications. One minor complication was a strangulated fat pad that required direct excision at a later date, and there have been 10 later eyelid scar reasons and 5 cases in which patients requested we remove the PDS anchoring suture due to palpability at the lateral orbital rim.

Fig. 8. Patient B, stage 2: nasojugal groove correction with removal of lower lid fat pad herniation and blending of lid cheek junction.

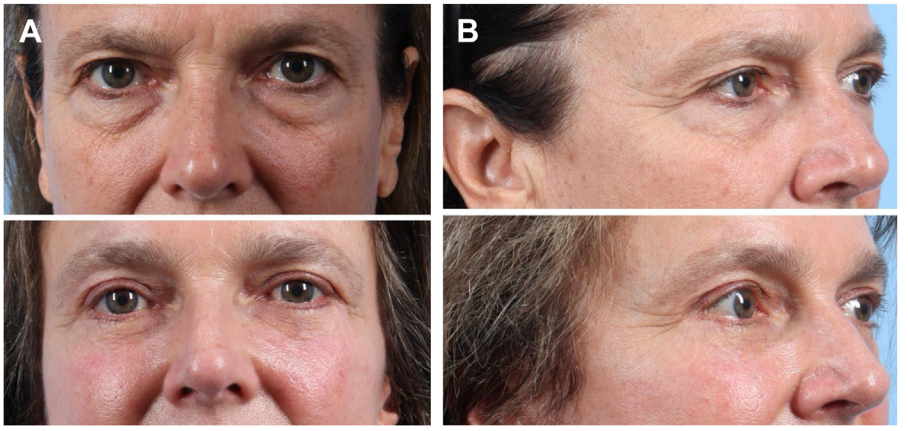

Fig. 9. Patient C, stage 3: nasojugal groove correction with removal of fat pad herniation and blending of lid cheek junction and tightening of skin laxity without skin excision.

SUMMARY

Overall, this has been a satisfactory procedure with minimal complications; we believe it indicates that the best way to avoid lower lid retraction is to use minimal access incisions from the lateral approach, avoid transecting the muscles of the anterior and posterior lamellae in the central portion of the of the lid as well as avoid injury to the lower palpebral nerve, and then provide the necessary support when indicated.

CLINICS CARE POINTS

- Lateral subciliary incision avoids transection of functional components of the lower lid in the central lid region.
- Avoids denervation of the subciliary orbicularis.
- Periosteal suture fixation of the lateral canthus supports the lower lid during healing.
- Muscle lifting helps support and contour the lower lid.

DISCLOSURE

None.

REFERENCES

1. Hamra ST. Arcus marginalis release and orbital fat preservation in midface rejuvenation. Plast Reconstr Surg 1995;96(2):354–62.
2. Flowers RS. The tear trough deformity and its correction. Essay presented at the Annual meeting of the California. Monterey, CA: Society of Plastic Surgeons; 1970.
3. Stutman RL, Codner MA. Tear trough deformity: review of anatomy and treatment options. Aesthetic Surg J 2012;32(4):426–40.
4. Duke-Elder S, Wybar KC. System of ophthalmology: the anatomy of the visual systems, 2. St. Louis, Mo: Mosby; 1961.
5. Haddock NT, Saadeh PB, Boutros S, et al. The tear trough and lid/cheek junction: anatomy and implications for surgical correction. Plast Reconstr Surg 2009;123(4):1332–40.
6. Kikkawa DO, Lemke BN, Dortzbach RK. Relations of the superficial musculoaponeurotic system to the orbit and characterization of the orbitomalar ligament. Ophthalmic Plast Reconstr Surg 1996;12(2):77–88.
7. Mendelson BC, Muzaffar AR, Adams WP. Surgical anatomy of the midcheek and malar mounds. Plast Reconstr Surg 2002;110(3):885–96.
8. Muzaffar AR, Mendelson BC, Adams WP Jr. Surgical anatomy of the ligamentous attachments of the lower lid and lateral canthus. Plast Reconstr Surg 2002;110(3):873–84.
9. Kawamoto HK, Bradley JP. The tear "TROUF" procedure: transconjunctival repositioning of orbital unipedicled fat. Plast Reconstr Surg 2003;112(7):1903–9.
10. Rees TD, Dupuis CC. Baggy eyelids in young adults. Plast Reconstr Surg 1969;43:381–7.
11. Loeb R. Fat pad sliding and fat grafting for leveling lid depressions. Clin Plast Surg 1981;8:757–76.
12. Hamra ST. The role of the septal reset in creating a youthful eyelid-cheek complex in facial rejuvenation. Plast Reconstr Surg 2004;113(7):2124–44.
13. Goldberg RA. Transconjunctival orbital fat repositioning: transposition of orbital fat pedicles into a subperiosteal pocket. Plast Reconstr Surg 2000;105(2):743–8.

14. Flowers RS. Tear trough implants for correction of tear trough deformity. Clin Plast Surg 1993;20(2): 403–15.
15. Coleman SR. Facial recontouring with lipostructure. Clin Plast Surg 1997;24(2):347–67.
16. Yoshimura K, Coleman SR. Complications of fat grafting: how they occur and how to find, avoid, and treat them. Clin Plast Surg 2015;42(3):383–ix.
17. Flowers RS. Canthopexy as a routine blepharoplasty component. Clin Plast Surg 1993;20:351–65.
18. Jelks GW, Jelks EB. Preoperative evaluation of the blepharoplasty patient: bypassing the pitfalls. Clin Plast Surg 1993;20:213–23 [discussion 224].
19. Hirmand H, Codner MA, McCord CD, et al. Prominent eye: operative management in lower lid and mid-facial rejuvenation and the morphological classification system. Plast Reconstr Surg 2002;110: 620–8 [discussion 629–634].
20. Hinderer UT. Additional procedures in aesthetic eyelid surgery. In: Ohmori S, editor. Transactions of the IX ISAPS instructional course. Tokyo: Colomar; 1977. p. 365–70.
21. Schwarcz R, Fezza JP, Jacono A, et al. Stop blaming the septum. Ophthalmic Plast Reconstr Surg 2016; 32(1):49–52.
22. Core - the transblepharoplasty midface lift. Presented at Emerging Technologies meeting, New York University, Monterey, CA, 1996.
23. Core GB. Progressive indications in muscle lifting. Presented at the annual meeting of the American Society of Aesthetic Plastic Surgery, 2010, Monterey, CA.
24. Core GB. Lateral access recontouring blepharoplasty for rejuvenation of the lower lids. Plast Reconstr Surg 2013;132(4):835–42.
25. Choi Y, Kim IB. Avoiding pretarsal denervation in lower blepharoplasty incisions: refined pretarsal motor nerve anatomy. Plast Reconstr Surg 2024;154(1): 81–93.
26. Kontoes PP, Lambrinaki N, Vlachos SP. Laser-assisted blepharoplasty and inferior lateral retinaculum plication: skin contraction versus skin traction. Aesthetic Plast Surg 2007;31(5):579–85.
27. Kontoes P. State of the art in blepharoplasty : from surgery to the avoidance of complications. New York, NY: Springer; 2017.
28. Hinderer UT. Blepharocanthoplasty with eyebrow lift. Plast Reconstr Surg 1975;56(4):402–9.
29. Tonnard P, Verpaele A, Peeters G, et al. Nanofat grafting: basic research and clinical applications. Plast Reconstr Surg 2013;132(4):1017–26.