The Sigmoid Upper Eyelid Blepharoplasty: Redefining Beauty

John P. Fezza, M.D.*†

*Center for Sight, Sarasota; and †Department of Ophthalmology, University of South Florida, Tampa, Florida, U.S.A.

Purpose: A youthful female upper eyelid contour includes a concave medial portion of the upper eyelid along with a fuller, convex lateral eyelid. The skin in the lateral eyelid is tight without hooding. This is a sigmoid shape in 3-dimensional terms. With aging, fatty herniation medially along with redundant, hooded, ptotic lateral skin creates the exact opposite eyelid curve. The sigmoid blepharoplasty is a novel surgical technique that recreates a youthful upper eyelid.

Method: A retrospective chart review of 142 female patients who underwent the sigmoid blepharoplasty was conducted. To recreate a youthful eyelid in 3 dimensions, the medial eyelid concavity is achieved by removing a strip of medial orbicularis oculi muscle along with selective medial fat removal. Excess skin and hooding is removed, and fat grafts from the medial eyelid are placed laterally below the muscle to achieve a fullness and tight skin.

Results: All patients achieved a pleasant, rejuvenated upper eyelid as assessed by photographs and chart records. The sigmoid blepharoplasty restored a youthful eyelid appearance by recreating a concave medial eyelid and fuller lateral eyelid. There were no infections, and fat grafts took uniformly.

Conclusions: The sigmoid upper eyelid blepharoplasty technique recreates a truly youthful eyelid with novel eyelid concepts. The surgery is safe and reproducible, and consistent results are achievable.


Upper blepharoplasty is one of the most common cosmetic surgeries performed, but the procedure does not receive a proportionate amount of discussion in medical literature. This may be due to the fact that the standard blepharoplasty procedure of removing skin and fat yields good results and high patient satisfaction. Articles tend to focus more on lower blepharoplasty, which may be secondary to a higher complication rate and the inability to achieve consistent results. The artistic aspects of plastic surgery have posed all surgeons to review the concepts of true beauty and to reassess techniques.

Concepts of volume loss in the face in addition to deflation have shifted focus from excising tissue to reinflating. This premise is also true in the upper eyelid, but evaluation in this area has not been assessed critically. Frontal photographs demonstrate a successful upper eyelid blepharoplasty with removal of tissue, creation of a tarsal platform and a brighter, more open-eyed appearance. This limited view of the eyelid does not allow for a keen appreciation of the deflation and volume shifts that occur in the upper eyelid with age.

A youthful female eyelid has several distinct features, which have gone largely unmentioned. These features are unique to the female eyelid, and applying to the male eyelid may be perceived as too feminizing or unnatural. The key female features are tight skin, a medial concavity, and lateral convexity with fullness absent of hooding. In 3 dimensions, this medial slope concavity rising to a laterally full convexity is a sigmoid shape. A sigmoid shape by definition refers to a curve in 2 directions forming the letter “S.” It can be noted best on oblique views, which may detect subtle shadows and contour changes. With age, the weakening in the orbital septum allows for a herniation of medial fat, whereas ptosis and atrophy of the lateral eyelid-brow fat pad complex create a deflation laterally. The medial fullness and flattening laterally is the opposite of a youthful eyelid. To restore a true sigmoid shape, advanced techniques can be applied to not only brighten the eyes, but also to truly achieve a youthful eyelid.

METHODS

A retrospective, nonrandomized study of 142 female patients who underwent a sigmoid blepharoplasty by 1 surgeon (J.P.F.) to restore a youthful upper eyelid appearance were assessed. Only female patients underwent the procedure because the sigmoid shape is more indicative of a youthful female eyelid, and all patients underwent informed consents. No patients had brow lift or ptosis surgery because these procedures were felt to alter upper eyelid anatomy and contour and cloud the true essence of the effectiveness of the sigmoid procedure. Other exclusion criteria included pre-existing trauma and thyroid eye disease. Forty-eight patients had concomitant lower blepharoplasty because lower eyelid surgery was not deemed to directly affect the upper eyelid sigmoid outcome. Follow up was at 1 week, 1 month, and 6 months. Photographs from frontal, 3-quarter (oblique), and side angles along with chart reviews at each visit were assessed by the surgeon and 2 nurse observers.

SURGICAL TECHNIQUE

Marking is started with a low eyelid crease, typically at 9 mm to 10 mm in women. Using a lower eyelid crease is critical to achieve better long-term results because the crease can migrate cephalad. A youthful crease is usually lower as noted by others.1–3 Another important aspect of the incision design is to flare the lateral incision upward in a crow’s foot crease to avoid a downward lateral scar. Particularly, when an upper blepharoplasty is performed in conjunction with a lower eyelid tightening procedure, the lateral canthus is adjusted upward, and this affects the position of the upper eyelid curve. In these situations, the lateral section of the upper eyelid marking has to turn upward to avoid the unwanted, downturned, crescent-shaped appearance.
The sigmoid procedure entails 5 key steps. In step 1, the excess skin is conservatively removed from the upper eyelid in a typical elliptical fashion. It is paramount when the skin is removed to keep the orbicularis oculi muscle intact to maintain lateral fullness. In step 2, the orbicularis oculi muscle is removed only medially, and an additional strip of orbicularis muscle is removed (orbiculectomy) under the medial skin edge to further debulk and accentuate a concavity (Fig. 1). After medial muscle removal, step 3 involves medial fat removal with preservation of most central fat. Only the central fat that encroached in the medial eyelid is removed, but the remaining fat is left intact to maintain fullness. In step 4, a 1-cm horizontal incision is then made in the lateral orbicularis below the brow arch to create a pocket to place a fat graft (Fig. 2). In step 5, the medial eyelid fat is then placed as a free graft in the recipient site beneath the lateral orbicularis muscle in the preperiosteal plane of the bony lateral orbital rim. The fat is immobile in this pocket and is further secured by suturing the muscle over it with a 6-0 plain suture (Fig. 3). Placing the graft below the muscle bed in this fashion provides an excellent vascular bed and almost a complete fat take. For this reason, the area is not overinflated initially. The graft is placed below the brow arch to accentuate fullness in this area and aid in lifting and supporting the brow upward and outward. The wound is closed with a running 7-0 monofilament suture. Patients are placed on antibiotic ointment, and sutures are removed in 1 week. Patients were assessed in the clinic by the surgeon and by 2 blinded nurse observers using front, oblique, and side photographs for a sigmoid and youthful upper eyelid contour. Patients were followed closely for complications, such as bruising, infection, lumpiness, and dehiscence.

RESULTS

All patients were pleased with their outcomes. No patient thought the lateral eyelid area was too full. The surgeon and 2 nurse observers noted excellent outcomes and appearance to the upper eyelids, and a sigmoid youthful curve was achieved (Figs. 4–6). Bruising and swelling were the same as traditional blepharoplasty, despite the fact that orbicularis muscle was removed medially. There were no cases of infection, hemorrhage, ocular motility restrictions, diplopia, or induced ptosis. Two patients had a unilateral small wound dehiscence 1 day after suture removal. These patients were resutured without consequence.

DISCUSSION

Despite the fact that the upper eyelid surgery is so common, little is written to describe the details of a youthful upper eyelid shape. This may be in part because traditional surgery is straightforward and often yields satisfied patients. Another fact is that most upper eyelid surgery outcomes are judged by 2-dimensional frontal photographs, and contour irregularities cannot always be appreciated from this view. A 3-quarter angle view is typically most revealing when analyzing volume shifts.

The female upper eyelid has several defining aspects that characterize its youthful shape. A critical eyelid assessment reveals potential deficiencies in current approaches. As in other

FIG. 1. Step 1 involves retaining the orbicularis oculi muscle after the eyelid skin is removed. Note that the lateral muscle is left intact to maintain fullness. In step 2, the orbicularis oculi muscle is then removed medially and stripped under the upper medial skin edge to provide a more concave surface. The forceps is holding a strip of muscle in the process of the orbiculectomy with removal from the undersurface of the skin.

FIG. 2. Step 3 demonstrates medial fat removal from the upper eyelid. Note its pale, fibrous appearance. This figure also illustrates step 4, which shows a cutting cautery making a 1-cm horizontal incision in the orbicularis muscle below the brow arch to create a recipient bed for the fat graft.

FIG. 3. Step 5 involves placing a free fat graft taken from the medial eyelid below the muscle in preperiosteal pocket in the lateral eyelid region. The fat graft is secured in this tight pocket by suturing the muscle over it with a 6-0 plain suture. The muscle is sutured over the fat to cover and encircle it in a rich blood supply to augment the fat take.
areas of the body, simply excising and lifting may not address the complete picture to achieve rejuvenation. The eyelids have gravitational droop as in the rest of the body, but they also are affected by deflation and volume shifts. The aging eyelid is heralded by not only hanging, ptotic tissue, but also a deflation of the fat in the lateral eyelid-brow complex.

Landmark studies on facial fat compartments have given surgeons a greater awareness of the role that fat has on the aging

FIG. 4. A, A 62-year-old woman with frontal view before surgery. B, Frontal view 6 months after sigmoid upper eyelid surgery (lower eyelids were also done). Brow height and arch are maintained. The tarsal platform is exposed medially, but the eyelid is not skeletonized. C, Three-quarter side right view before surgery. Note medial fullness and lateral deflation and hooding to the upper eyelid. D, Three-quarter side right view 6 months after sigmoid blepharoplasty surgery. Note sigmoid shape to the upper eyelid with medial concavity and lateral fullness to achieve a more youthful appearance.

FIG. 5. A, A 59-year-old woman with frontal view before surgery. B, Frontal view 6 months after sigmoid upper eyelid surgery (lower eyelids were also done). Brow height and arch are maintained. The tarsal platform is exposed medially, but the eyelid is not skeletonized. C, Three-quarter side left view before surgery. Note medial fullness and lateral deflation and hooding to the upper eyelid. D, Three-quarter side left view 6 months after sigmoid blepharoplasty surgery. Note sigmoid shape to the upper eyelid with medial concavity and lateral fullness to achieve a more youthful appearance.
Fat is present in distinct areas of the face and may atrophy and reallocate in predictable patterns. Traditional blepharoplasty involves excising tissue and can leave some patients looking hollowed and older. In fact, several earlier techniques described debulking or excising lateral eyelid or brow fat to create more tarsal show in selected cases. Present concepts are more conservative with less removal of soft tissue, which is similar to concepts of preserving fat in other areas of the face. Volume is maintained or restored and not removed because a youthful eyelid is full.

Previous analysis of the upper eyelid contour has provided insightful observations to recapture a youthful upper eyelid. Fagien emphasized that maintaining a full eyelid is paramount, whereas skeletonizing an eyelid is aging. His technique involves retaining orbicularis muscle and imbricating the muscle to counteract eyelid deflation. He also describes button holing the muscle medially to remove medial fat conservatively. Many feel excising and over-resecting fat creates a hollow upper eyelid surgery, with stigmata of surgery. A conservative approach is embraced, “or less is more.”

Volume preservation alone is an important concept, but does not apply universally to all aspects of a youthful upper eyelid shape. Although maintaining volume is important, the medial eyelid can be an exception. Fullness to an eyelid in and of itself does not always impart an attractive appearance, and a uniformly full eyelid can have an unattractive sausage shape. In fact, medial contours of a youthful eyelid are concave and should be appreciated to avoid an overinflated eyelid without contour. In addressing the medial eyelid, debulking orbicularis muscle (orbiculectomy) and fat sculpts out a concavity medially. Medial orbicularis muscle is a significant component of the fullness in the medial eyelid. Simply debulking fat may not satisfactorily sculpt the medial eyelid, but extirpating the medial orbicularis alleviates this fullness. A uniformly full upper eyelid is not youthful, but a gentle sigmoid shape is.

The sigmoid shape is used to describe the 3-dimensional shape of a youthful upper eyelid contour. This “S” shape involves a medial upper eyelid concavity and a lateral fullness with tight skin (Fig. 7). This concept of pleasing facial curves

**FIG. 6.** A, A 71-year-old woman with frontal view before surgery. B, Frontal view 6 months after sigmoid upper eyelid surgery. Brow height and arch are maintained. The tarsal platform is exposed medially, but the eyelid is not skeletonized. C, Three-quarter side left view before surgery. Note medial fullness and lateral deflation and hooding to the upper eyelid. D, Three-quarter side left view 6 months after sigmoid blepharoplasty surgery. Note sigmoid shape to the upper eyelid with medial concavity and lateral fullness to achieve a more youthful appearance.

**FIG. 7.** An attractive, youthful upper eyelid demonstrating a sigmoid shape. This is considered to be a desired upper eyelid contour. The eyelid is full laterally and gently slopes into a sculpted medial concavity. A youthful, attractive eyelid has a sigmoid shape in 3 dimensions. The dotted “S” shaped line on the left upper eyelid highlights the sigmoid shape.
has also been heralded in other areas of the face, particularly in describing the ogee of the youthful face. This refers to a desirable oblique view of the midface that demonstrates a convex area in the upper cheek reversing gracefully to a brief concave area in the lower face. The opposite is an aged eyelid, which is fuller medially and atrophied laterally giving a comma shape (Fig. 8). The attractive features of an upper eyelid are often emphasized by makeup artists shadowing the medial eyelid to provide depth and highlighting the lateral eyelid to allow it to “pop out” (Fig. 9).

Although the lateral eyelid and brow fat may deteriorate over time, the deeper medial eyelid fat may herniate forward. This creates a fullness medially and sunken concavity laterally, which are hallmarks of the aging upper eyelid. Recent studies by Oh et al. noted similar observations in aging eyelids in patients older than 70 years. They reported that there is a typical archetype in the aging upper eyelid that involves medial fat prominence accompanied by atrophy of the central and lateral eyelid structure. In fact, the medial fat may increase with age, whereas the lateral eyelid deflates. To counteract this, excess fat and muscle tissue have to be removed medially. The implication for upper eyelid rejuvenation surgery involves reducing the nasal fat pad and possibly adding back volume centrally or laterally. This is consistent with the rare patient complaints after upper traditional blepharoplasty, which usually involves either residual nasal fullness or slight excess lateral hooding.

Previous surgeons have noted that a youthful eyelid is full laterally and have stressed the importance of maintaining volume to achieve a convexity in this area. Some surgeons described using fat pedicles taken from the medial upper eyelid and transferred laterally to maintain fullness and to avoid a hollowed superior sulcus. This serves to alleviate medial fullness while emphasizing lateral volume. Massry recently reported a nasal fat pedicle transferred to the central eyelid to avoid the skeltonized “A” frame postoperative appearance. He noted 1

![FIG. 8. An aged upper eyelid showing medial fullness and lateral hooding and deflation. This older patient has an inverted comma appearance shown by the dotted line as opposed to a youthful sigmoid shape.](image)

![FIG. 9. Makeup applied to the upper eyelid to accentuate attractive features, highlighting a sigmoid shape. The medial eyelid is lightened to create the illusion of fullness and a convex surface.](image)

case of vertical diplopia, 2 cases of mechanical ptosis, and 4 cases of excessive swelling. Earlier Sozer et al. detailed freeing and transferring a central fat pedicle to the lateral eyelid to achieve fullness. This was performed in 31 patients with success to recreate the lateral fullness of youth. Only patients with sufficient central fat were candidates, and no complications were reported. It is the author’s opinion that even with sufficient central fat, stealing volume from this area may accentuate a hollowed, depressed central eyelid.

Although it is appealing to maintain blood supply to the fat, creating a freely mobile untethered fat pedicle may be technically difficult. Fat pedicles may cause undue eye motility problems, either from working deeply around the trochlea or restrictive adhesions from the translocated connective tissue. Free fat grafts have several advantages over a fat pedicle. Notably Coleman et al. have previously described the advantages of free fat grafts in the upper eyelid. The free fat grafts have an excellent take, do not require tedious pedicle creation and transfer, are easy and quick to place, and do not cause undue tethering or swelling. No evidence of impaired ocular motility was encountered in this series using free fat grafts. Also the sigmoid technique uses placement of solid fat pearls from the same eyelid, which may offer some advantages over the microinjection techniques described earlier by Coleman. The injection of fat requires processing of fat often from distant sites, which is then prepared for injection. This injected fat is not placed as precisely and may be more prone to infection, poor take, or hard granuloma formation than the direct fat placement. The placement of free fat pearls described in the sigmoid procedure offers the benefits of augmentation without some problems mentioned with injected fat.

Nasal fat may contain abundant progenitor cells and may be a better source for free fat grafting. This has been the experience of this author because the firmer nasal fat has an excellent take and is more predictable than the softer central, yellow fat in regard to free fat grafts. The take of the fat graft placed laterally under an orbicularis muscle pocket with a rich blood supply appears to be almost complete, and therefore, overfilling is not necessary.
Retaining orbicularis muscle laterally preserves tissue, and fat grafts recycled from the excised medial eyelid offer an effective way to further augment the lateral eyelid. The fat is typically discarded but is a valuable tool to create a convex eyelid surface. The free fat graft offers the freedom of accentuating any area, and precisely placed it under the brow arch can act to feminize and support an elevated brow curve.

Achieving medial concavity is more challenging than anticipated in some patients. Solely removing fat from this area may not achieve a concave contour. Oversculpting fat can lead to problems with deep bleeding or damage to the delicate trochlea along the superior medial orbital wall. Removing orbicularis muscle can solve some of this problem, and orbicularis stripping below the superior medial eyelid skin in a conservative fashion can thin the tissue and provide a natural appearing concavity. Aggressive over-resection of muscle should not be performed to avoid an overly deep, unnatural concavity. Loeb37 likewise noted stripping the orbicularis oculi muscle in the lower eyelid can alleviate some bulkiness. The combination of selective medial orbiculocutectomy along with medial fat sculpting provides the most consistent method for achieving a smooth, concave, and youthful medial eyelid. Muscle removal can induce more bleeding, but with meticulous hemostasis bruising is no different than a traditional blepharoplasty.

One limitation of this article is the absolute inability to quantitate degrees of improvement of the sigmoid surgical technique against earlier techniques. Also, although the author’s patients were satisfied with the sigmoid blepharoplasty, no numerical quantitative scale was incorporated to determine patient satisfaction. Whereas traditional upper blepharoplasty can provide satisfactory results, the sigmoid blepharoplasty truly recreates a youthful eyelid. A natural and youthful 3-dimensional approach can achieve a gently sloped medial concavity and lateral convexity. The principles of the sigmoid blepharoplasty are found in the concepts inherent in the aging face, such as the desirable curvilinear ogee appearance.8,14 Primarily, that there is fat loss and volume shifts and to restore a natural eyelid, a 3-dimensional approach is paramount. The extra time and effort required to perform the surgery is rewarded with consistent and excellent results.

REFERENCES