Nasal Fat Preservation in Upper Eyelid Blepharoplasty

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Introduction: Traditional upper blepharoplasty is a subtractive form of surgery that involves the excision of variable amounts of skin, muscle, and fat from the eyelid. The goal of surgery is to improve field of vision and/or appearance. While surgical debulking of the eyelid may improve appearance early on, the volume loss inherent to this process (especially fat excision) can contribute to a hollowed appearance with an associated deep and sunken superior sulcus. This skeletonized look may be mitigated by repositioning a prominent nasal fat pad, if present, to the central upper eyelid.

Methods: The charts of patients who underwent upper blepharoplasty with repositioning of the nasal fat pad (as described in this manuscript) to the central arcus marginalis of the superior orbital rim during surgery were reviewed. Patients with a history of previous eyelid surgery or trauma or who had concurrent ptosis or other eyelid malpositions were excluded from the study. Also excluded were patients who did not manifest prominent nasal fat pads at surgery. Postoperative interval follow up was consistent until 6 months after surgery and more sporadic thereafter, as patients more frequently missed appointments. Postoperative healing issues, patient complaints, complications, and subjective physician and patient satisfaction assessments were noted. Final results were gauged on each patient's final visit after surgery.

Results: Seventy-six patients were included in the study. Forty-eight patients (63%) were women, and 28 patients (37%) were men. The surgical procedure was uneventful in all patients. The average patient age was 66 years and the mean follow up was 11 months (range 6–22 months). There was one case of postoperative pseudo-Brown syndrome, which resolved with steroid injections. There were 2 cases of postoperative presumed mechanical ptosis, early in the series, lasting for 2 weeks, which in both cases responded to oral steroids. Subjectively, there was no new or worsening superior sulcus hollowness observed by patient or surgeon at last follow up in all cases.

Conclusions: Volume loss and the value of fat preservation in lower blepharoplasty are well-documented and accepted among eyelid surgeons. The affect of iatrogenic volume depletion in upper eyelid blepharoplasty, while understood, has gained less attention. Repositioning the prominent nasal fat pad of the upper eyelid to the central sulcus adds little time to surgery, allows preservation of upper eyelid fat during surgery, and may be a useful adjunct to the upper blepharoplasty surgeon. While further studies are needed to more critically assess eyelid volumetric changes, this technique holds promise as a preventative measure for superior sulcus hollowing after surgery.

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Upper blepharoplasty, whether for functional or cosmetic reasons, is one of the most common facial surgical procedures performed today.[1] There are a myriad of complications which can occur postoperatively. The most serious of these are related to function of the eye and vision. These include visual loss, dry eye symptoms, ocular exposure, poor eyelid closure, and eyelid malposition.[2] Traditional upper blepharoplasty has consisted of subtractive surgery with the excision of variable amounts of skin, muscle, and fat. This can contribute to the added complication of postoperative volume depletion with superior sulcus depression.[3] Preventing sulcus depression requires appropriate preoperative assessment of upper eyelid volume status and thoughtful surgical planning and execution.

Over the last decade, our understanding that volume loss is a major component of facial and periorbital aging has become increasingly accepted, particularly with regard to the region of the lower eyelid and midface.[4,5] This has led to a paradigm shift in lower eyelid rejuvenation, with an emphasis placed on volume preservation via repositioning of native fat,[6–9] fat grafting,[10,11] or the use of fillers.[12–14] Until recently, this paradigm shift has lagged behind in regard to upper blepharoplasty. Currently, this trend is changing toward similar volume preservation or restoration procedures in upper eyelid surgery.[1,15–17] Herein, I describe a simple upper eyelid blepharoplasty modification which redirects native nasal fat to the central upper eyelid compartment to preserve volume with the intent of slowing or preventing postoperative hollowness. The procedure is described in detail, with results and complications reviewed.

METHODS

The charts of all patients who underwent cosmetic or functional upper eyelid blepharoplasty with nasal fat repositioning, in the solo private practice of the author, over a 2.5-year period (2008–2010) were reviewed. This study adhered to the principals of the Declaration of Helsinki, and is HIPAA compliant. All patients who underwent previous upper eyelid surgery, had a history of previous trauma affecting the upper lids, had concurrent upper eyelid ptosis, had a history of thyroid or other orbital or eyelid disease, or did not manifest a prominent nasal fat pad intraoperatively were excluded from the study. Each patient was seen at 1 week, 3 weeks, 2 months, and 6 months after surgery. Further follow up of patients was sporadic but attempted at 1 and 2 years after surgery if applicable. On each follow up, patients were assessed for wound healing, infection, swelling, pain, and eyelid position and function and had full eye examinations (except for fundus evaluation). Any abnormal findings were charted.

Surgical Procedure. All procedures are performed under local, conscious sedation or general anesthesia depending on patient prefer-

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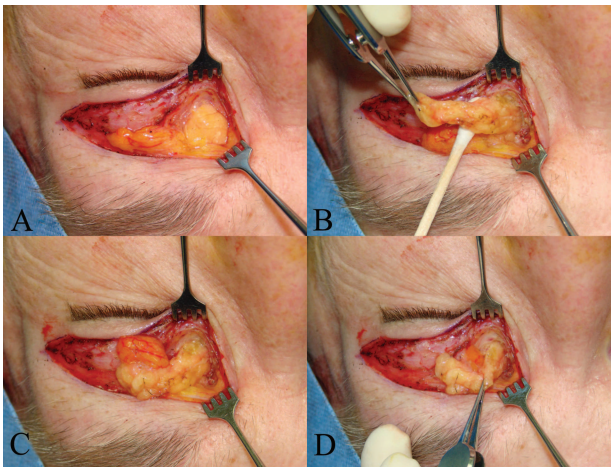

FIG. 1. **A,** Exposure of nasal (lighter, more robust) and central (yellower) fat pads of the upper eyelid. **B,** Nasal fat pad made into a freely mobile fat pedicle. **C,** Nasal fat pedicle translocated to central upper eyelid. **D,** Nasal pedicle easily elevated off underlying tissue, ensuring no undue tension (mechanical restriction) on the levator aponeurosis.

ence and the complexity of associated surgeries (i.e., brow lift, lower blepharoplasty). The upper eyelid crease is marked with the patient in the supine position after surgical preparation and draping. Using the pinch technique, an ellipse of skin to be excised is drawn bilaterally. The skin is infiltrated subcutaneously with 2 ml of Xylocaine 1% with 1:100,000 epinephrine. The temporal skin is first infiltrated to create a wheal of anesthesia. Gentle pressure on the skin allows hydrodissection of the anesthetic fluid along the demarcated skin ellipse. This allows fewer skin perforations with the needle to attain anesthesia. I find a second injection nasally (with deeper administration to the fat pad) is helpful to anesthetize the more anesthetically resistant nasal fat compartment. After giving appropriate time for hemostasis and anesthesia to take effect, a scalpel blade is used to score the skin ellipse. The temporal skin is elevated with a toothed forceps and excised from the orbicularis muscle with the cutting mode of the electrocautery unit (Valleylab, Boulder, CO, USA) using a Colorado tip microdissector (Kalamazoo, MI, USA). Any bleeding is controlled with the coagulation mode of the same unit. Two lacrimal rakes are used to elevate and separate the nasal skin edges of the wound for surgical exposure. The nasal orbicularis muscle and orbital septum are divided to identify the nasal and central fat pads (Fig. 1A). The nasal fat pad is isolated and fashioned in a pedicle by lysing all connective tissue attachments at its base (Fig. 1B). Once all restrictive bands are freed, a dynamic release of the nasal pedicle is felt. This is a critical step in the procedure, as the nasal fat pad must be made free to come forward for central repositioning.

The nasal pedicle is now a free fat flap, which is draped over the levator aponeurosis of the central eyelid and secured to the arcus marginalis periosteum, orbital septum, or undersurface of the orbicularis muscle with a 6-0 nylon suture (Fig. 1C). I use this suture for fat pedicle fixation to save on cost, as I routinely use the same 6-0 Nylon suture for skin closure. In older patients, the nasal fat can be excessive and is typically easily spread across the eyelid. In cosmetic patients, who are typically younger, there tends to be less fat. In these patients, the pedicle is secured as far centrally as is necessary to be made continuous with the central fat. It is important to ensure that there is no undue tension of the nasal fat pad on the levator aponeurosis. In patients under sedation or general anesthesia, this can be confirmed by lifting the fat pedicle off the aponeurosis, which should occur easily (Fig. 1D). In awake patients, asking them to look up and observing free eyelid elevation can also confirm this. Once the nasal fat pad has been

FIG. 2. Preoperative (left) and postoperative (right) results of 3 patients who underwent upper eyelid blepharoplasty with nasal fat repositioning. **A,** Woman who had functional upper eyelid blepharoplasty. **B,** Man with functional upper eyelid surgery in addition to cosmetic lower blepharoplasty. **C,** Woman who had cosmetic upper eyelid blepharoplasty. No patient developed new or worsening superior sulcus hollowing.

secured, any remaining prominent nasal fat can be sculpted as needed. The prolapsing central fat pad can now be draped over or under the repositioned nasal fat pedicle and the wound closed in the standard way. Figure 2 depicts typical postoperative results of 3 patients who underwent upper eyelid blepharoplasty with nasal fat repositioning.

RESULTS

Seventy-six patients were included in this study. Forty-eight patients (63%) were women, and 28 patients (37%) were men. The average age of the patients studied was 66 years. The average follow up was 11 months (range 6–22 months). One patient (1.3%) developed immediate postoperative vertical diplopia consistent with pseudo-Brown syndrome. This resolved over 4 months with 2 separate injections of 0.3 ml of Kenalog 40 mg/ml. Two patients (3%) developed postoperative ptosis that was mechanical in nature and resolved over 1 month with oral steroids (Medrol dose pack). Four patients (5%) developed excessive and persistent upper eyelid swelling. Two (50%) of these 4 patients are those who also developed postoperative ptosis. All excessive swelling resolved with a Medrol dose pack over a 6-week time frame. All of these complications occurred in the first 12 cases in the series. In the final 64 patients, there were no complications related to fat translocation. Four patients (3%), all undergoing functional surgery, had mild (2-mm) residual temporal eyelid skin on one or both eyelids. All of these functional patients had improvement of their field of vision (successful surgery) but desired a mild revision for appearance. These patients underwent in-office revision at 6 months after surgery without complication. No patients reported residual upper eyelid fullness or were found on examination to have over-retention of eyelid fat. All patients were subjectively observed to have significant improvement in upper eyelid appearance after surgery. In addition, no cases were noted to have developed superior sulcus depression, and there were no patient complaints of postoperative hollowness or sulcus depression. Seventy-four of the 76 patients (97%) stated satisfaction with the surgical outcome (even those with skin revisions) on their last

follow up. The 2 patients that did not reported postoperative eyelid asymmetry unrelated to fat repositioning or blepharoplasty. In each case, a brow lift was necessary to achieve the desired outcome. This was discussed with each of these patients before surgery, and both patients refused the procedure.

DISCUSSION

Facial aging is a complex, multifactorial process involving changes in the skin (rhytids, loss of elasticity, actinic damage), descent and sagging of soft tissue, and loss of bone and soft tissue volume (support).[4,5] In the eyelids and periorbital area, these changes are distinct, manifesting as true or apparent tissue excess, herniation/pseudoherniation of fat, tissue laxity, and contour irregularities and depressions.[10,18] Traditionally, surgical rejuvenation of the eyelids has consisted of tissue excision and redraping. This has, in many cases, iatrogenically accelerated the normal volume depletion of aging. While there is a place for removal of eyelid tissue in blepharoplasty surgery, it should no longer be viewed in isolation. Over the last decade, surgeons from various disciplines have identified that volume preservation or augmentation is an essential part of blepharoplasty surgery. Most of the emphasis has centered on lower eyelid surgery, with numerous descriptions of fat preservation (repositioning), fat grafting, and the use of nonautologous fillers.[6–14] Similar descriptions in upper blepharoplasty have been generally lacking. This is most likely a result of importance and awareness. In the author's opinion, postoperative upper eyelid hollowness in blepharoplasty, while not uncommon, has been much more accepted, or neglected, by the patient and surgeon than have similar changes in the lower eyelids. This could be because the changes are not as obvious, or because the appearance is not as objectionable. It could also be that the immediate postoperative tissue debulking inherent to surgery imparts such a dramatic improvement in eyelid "thinning," that hollowness is easily forgiven. Unfortunately, while this form of surgery does reduce overhanging upper eyelid tissue (skin and prolapsed fat), oftentimes the long-term result is of a deep superior sulcus, an A-frame deformity, and generalized hollowness. This is an enhancement of the aging process—not a restoration of youth. Clearly a shift in thinking is as critical when approaching upper eyelid surgery, as it has been in our evolution of lower eyelid surgery. This shift is occurring as volume preservation is becoming more accepted in upper blepharoplasty surgery.[1,15–17]

The nasal fat pad of the upper eyelid is an anterior extension of extraconal orbital fat. It is not separated from the deeper orbital fat by the levator aponeurosis. This is why excision of nasal fat can be approached transconjunctivally without damaging the aponeurosis.[19] This is not true of the central eyelid fat, which is preaponeurotic in nature and has no continuity with the deeper orbital fat. The nasal compartment is whiter and denser and has more connective tissue bands than the freer, yellower central compartment. Recently, Korn et al.[20] have shown that the nasal compartment of fat is richer in stem cells than the central compartment and that it tends to become more prominent with age, while the central compartment involutes with age.[21] With these findings in mind, translocating the prominent, and potentially more abundant, nasal (orbital) fat to the volume-depleted central upper eyelid space makes inherent sense and is the basis of the fat realignment and preservation described in this manuscript.

Recently, Sozer et al.[1] published results on repositioning central upper eyelid fat as a pedicle to the temporal space to create lateral fullness. They described excellent results with no complications. I have also performed a similar procedure, but only in selected cases in which a prominent prolapsed lacrimal gland has been repositioned into the fossa and a potential dead space has been created. In general, I feel this procedure may worsen the central hollows. As previously stated, involution of fat in the central eyelid is a normal consequence of aging. Further depleting fat in this area may accelerate the process.

In the same time frame as the publication of the work of Sozer et al.,[1] Park et al.[16] described freeing the upper eyelid fat pads to the level of Whitnall's ligament and transposing them inferiorly to the conjoined attachment of the levator aponeurosis and orbicularis muscle. They termed this "orbital fat relocation." Their study consisted of Korean and Chinese women only. They also reported excellent outcomes without complications. The procedure described in this manuscript is a variation of the fat pedicle translocations described in the 2 manuscripts mentioned above. In this technique, the denser nasal fat that tends to become more excessive with age is used to fill the central upper eyelid space, which tends to involute with age. This not only preserves volume but also reorganizes fat inequities in the upper eyelid. It does require dissection in the deeper nasal eyelid space with complete release of connective tissue bands that limit pedicle transposition. Early in the series, I was very cautious with the nasal pedicle release to avoid trauma to the trochlea and devascularization and disruption of the base of the pedicle. Incomplete pedicle mobilization in these early cases probably led to pressure on the levator aponeurosis, accounting for prolonged swelling and mechanical ptosis. In the study by Sozer et al.,[1] the nasal fat pad was undisturbed as it was not translocated, and in the study by Park et al.,[16] less extensive dissection was needed nasally as the nasal fat pad did not require this degree of mobilization. This most likely accounts for the early complications I experienced, which those studies did not. As my experience with the procedure grew, I became more proficient with pedicle release and the aforementioned complications seen early in the series did not occur in the final 64 cases.

With experience, the addition of nasal fat repositioning to standard upper blepharoplasty is straightforward, takes only a few minutes, and should not lead to additional complications or healing time. All complications related to fat repositioning described in this series, 2 cases of ptosis, one pseudo-Brown syndrome, and 4 cases of excessive swelling, occurred within the first 12 cases performed. They resolved completely with oral or injectable steroids, which reduced inflammation and edema. As mentioned, each of these complications was avoided in the final 64 cases with more meticulous dissection and release of the nasal fat pedicle. The critical element of this procedure is to completely release all connective tissue bands at the base of the nasal fat pedicle so that it can freely be moved without undue tension on the levator aponeurosis. In addition, surgery (traction, cautery) at the base of the nasal pedicle must be performed with caution as not to cause damage to the trochlea and reduce blood supply to the fat pedicle. These steps are not difficult to master with experience with the procedure.

There is a possibility that nasal fat repositioning, as described in this manuscript, may lead to subtle degrees of postoperative enophthalmos. As nasal fat is an extension of deeper orbital fat, releasing and mobilizing it to a more superficial location may allow the globe to recess, as with orbital fat decompression for thyroid-associated exophthalmos. I did not measure globe prominence in this study, and I did not notice this to be an issue to general inspection. In standard blepharoplasty, a degree of nasal fat is typically excised. I reposition more fat than is standardly excised, so a subtle shift toward relative enophthalmos may occur. Further study with Hertel exophthalmometry measurements would provide the hard data

for this issue. Whether or not it would be clinically relevant remains to be seen. In line with this thinking, if the globe were to recess slightly, the vertical palpebral fissure may become smaller. Again, I did not measure for this and did not notice it clinically. This too can be studied further.

Nasal fat repositioning in upper blepharoplasty can be added to traditional surgery to potentially help prevent postoperative superior sulcus depression. I currently do not believe this is better than standard blepharoplasty surgery. I do, however, feel that the addition of fat preservation to upper eyelid rejuvenation is a normal evolution of upper blepharoplasty surgery. The purpose of this study is an initial description of the technique and an evaluation of its safety. Further studies, with longer follow up, are needed to compare patients who undergo this variant of blepharoplasty and those that do not. In doing so, appropriate study design with identification of variables that allow appropriate volumetric conclusions would be beneficial.

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