In the last 4 years, there have been a few reports concerning unconventional management of the fat posterior to the orbital septum (intraorbital) as well as periorbital fat located superficial to the orbital septum in a plane both superficial and deep to the orbicularis oculi muscle. With reference to intraorbital fat, some reports suggest that this fat be preserved and mobilized to other areas to recontour the lower lid, while other authors suggest repositioning the fat within the bony orbit. To address these new concepts, a discussion of the theories behind these approaches is needed.

**FAT REPOSITIONING**

An excellent anatomical study of the intraorbital fat has confirmed that the infraocular (below the globe) fat is continuous and not separated into compartments. However, the fat mass as it encircles the extraocular muscles causes it to be divided into 3 areas: nasal, central, and lateral. Although they are not true separate compartments, this concept of compartmentalization is useful in describing surgical excision of the fat and clinical descriptions of fat protrusion. In the past, protrusion of intraorbital fat manifesting as lower-lid bags was attributed to congenital excess fat or more commonly weakening of the orbital septum and attenuation of the orbicularis oculi muscle, allowing the intraorbital fat to protrude. In 1988, de la Plaza and Arroyo first proposed the theory that fat protrusion is not related to these factors but is due to a weakening of the support system of the globe, allowing it to descend and causing enophthalmos and lower-lid pseudoherniation (bags). In support of this theory, Camirand et al. believe that weakening and descent of the “Lockwood suspensory ligament,” rather than a weakened orbital septum, causes the globe to descend, reducing the space between it and the floor of the orbit. This phenomenon presumably causes forward projection of the extraconital orbital fat, creating pseudoherniated fat pads and resulting in enophthalmia. In regard to enophthalmia, Manson et al. have shown that removing 2.5 cm<sup>3</sup> of intramuscular fat lowers the globe 1 mm and moves the globe backward 2 mm. Camirand and associates advocate repositioning the intraorbital fat behind the inferior orbital rim. It is secured in position by sewing the posterior capsulopalpebral flap, created by a transconjunctival approach, to the arcus marginalis to reduce and contain the herniated fat. A lateral canthoplasty is also performed to enhance support of the globe by tightening the Lockwood suspensory ligament. They argue that intraorbital fat should never be removed but relocated in the bony orbit to improve enophthalmia of aging and give the globe a position and projection of youth.

**FAT MOBILIZATION**

Hamra has noted that in youth the eyelid-cheek complex is a single mildly convex...
line on profile. Aging causes descent of the globe and subsequent pseudoherniation of intraorbital fat, producing a double-convex lower eyelid contour on profile. Aging also causes attenuation and descent of the orbicularis oculi and cheek fat. The inferior and lateral descent of these structures results in an increased distance from the lower-lid margin to the inferior aspect of the orbicularis oculi, producing an orbit that appears deeper with a wider diameter. This progressive ptosis and an attenuation of soft tissue coverage (skin and muscle) produces skeletonization of the entire orbital area and reveals the topographical contours of the inferior bony orbital rim. Loeb was first to describe the technique of mobilizing intraorbital fat from the nasal compartment over the bony orbital rim. He used it to fill and thus camouflage the nasojugal groove. Hamra expanded this concept by advocating mobilization of fat from all 3 compartments of the lower eyelid to camouflage the bony orbital rim, thereby restoring a thicker soft tissue coverage of the rim. Through a skin muscle flap, Hamra performs a complete release of the arcus marginalis, partial resection of the septum, and mobilization of the intraorbital fat over and well below the infraorbital rim, thus hiding the bony framework that becomes apparent with normal aging. He stresses that this maneuver must be accompanied by repositioning of the orbicularis oculi in a superior medial direction, either via a composite rhytidectomy or by using a lateral-based orbicularis muscle flap, which is turned superiorly under the raphe and sutured under extreme tension to the periosteum of the lateral orbital rim. This moves the entire lower eyelid muscle in a superior medial vector. Even in the postblepharoplasty patient who has an iatrogenic sunken-eye appearance, Hamra has found that complete release of the arcus marginalis has been beneficial in giving the eyelid a more convex, youthful contour.

Eder agrees with Hamra that, under most circumstances, fat should not be removed during lower-lid blepharoplasty. She reported on more than 200 cases in which the arcus marginalis was released and fat was mobilized over the bony orbital rim, suturing it to the periosteum of the maxilla and to the suborbicularis oculi fat (SOOF). Following this maneuver, if an excess of fat was still apparent, it was removed or coagulated.

**REPOSITIONING VS MOBILIZATION**

Repositioning the intraorbital fat back into the bony orbit and securing it there is similar to reduction of an inguinal hernia and repairing the inguinal dehiscence. The theoretical advantage is that it may restore the globe to a more superior position, creating a more youthful appearance to the eyelid. The disadvantage of this approach is that it does not provide assistance in camouflaging the progressive visibility of the lower bony orbital rim seen with advancing age. The advantage of intraorbital fat mobilization is that it provides soft tissue coverage of the rim, helping to reverse skeletonization of the bony orbit. Fat repositioning vs mobilization is in direct contrast with traditional approaches to lower-lid blepharoplasty, which stresses removal of fat to correct pseudoherniation. The question at hand, then, is whether these new approaches should replace conventional blepharoplasty and, if so, which technique should be selected: repositioning or mobilization? It is probably too early in the collective experience of plastic surgeons to answer this question, but I would like to suggest some criteria that might be helpful in choosing the patient most likely to benefit from fat mobilization. This is offered to surgeons who wish to try this approach and desire some guidance as to the best surgical candidates. This article explains fat mobilization in lower-lid blepharoplasty performed through a transcutaneous approach as well as through a transconjunctival approach. The transconjunctival approach combined with fat mobilization from all 3 compartments of the lower eyelid has not previously been reported.

**TECHNIQUE**

**Transcutaneous Approach**

Unless there is muscle hypertrophy that requires trimming, I prefer injecting the lower eyelid skin with a local anesthetic containing hyaluronidase and performing a pinch excision of the skin. A standing ridge of skin is created immediately below the eyelashes. The ridge is excised exposing the orbicularis oculi. (Figure 1). The eyelid margin is then retracted upward with suture suspension, and the muscle is pen-
etrated at the inferior border of the skin excision with microcautery electrodissection, preserving the underlying pretarsal muscle (Figure 2). A skin muscle flap is dissected inferiorly to the bony orbital rim. The dissection should extend approximately 1.5 cm below the rim from medial to lateral canthi, exposing the SOOF located under the lateral half of the inferior aspect of the orbicularis oculi muscle (Figure 3). It is important to extend the dissection below the attachments of the levator labii superioris alaeque nasi to the upper part of the frontal process of the maxilla to extend the dissection below the nasojugal groove. The dissection below the orbital rim can be accomplished by blunt dissection with a cotton-tip applicator. Although the infraorbital nerve is not usually visualized, care must be taken in the area of the nerve to preserve it. Migration of the SOOF inferiorly and laterally with age will cause clinical demarcation of the lateral orbital rim. If this finding is present, the dissection must extend for approximately 2 cm or more lateral and inferior to the rim to expose the SOOF.

At this stage, microcautery electrodissection is used to incise the orbital septum at its junction with the arcus marginalis from medial to lateral canthi. Although the septum does not need to be excised, it must be divided sufficiently to allow the intraorbital fat to be freely mobilized over the bony orbital rim with ease and without drawing the septum inferiorly (Figure 3). To assist in this mobilization, the arcuate expansion is usually divided. The fat is then draped evenly over the bony orbital rim and this, together with the inferior aspect of the septum, is sutured with 5-0 polyglactin suture to the periostium of the medial half and the SOOF of the lateral half of the dissection (Figure 4). Care must be taken not to create irregularities from uneven fat distribution or they will be visible following healing. Incorporating the inferior septum with the mobilized fat assists in providing a smooth contour. Elevating the periostium of the maxilla just below the rim and placing the fat deep to the periostium may reduce postoperative eyelid contour problems. On completion of the mobilization, the skin muscle flap is redraped, the head is elevated, and the contour of the lower eyelids is assessed. In patients with an abundance of fat in the nasal compartment, occasionally a fullness of the medial eyelid will be evident. In such instances, limited fat removal or fat coagulation is indicated in the area of excess. If a pinch-skin excision has not been previously performed, then the skin or skin and muscle is resected as in conventional lower-lid blepharoplasty. The lateral aspect of the muscle should be suspended to the periostium of the lateral orbital rim to support the lower lid. Any indication for lower-lid tightening is not obviated by fat mobilization and therefore should be performed as part of the blepharoplasty.

Wound closure and postoperative wound care is the same as in conventional techniques.

**Transconjunctival Approach**

Adequate surgical exposure for fat mobilization is more difficult through a transconjunctival approach than a transcutaneous approach and should be reserved for patients with greater eyelid laxity, although a lateral canthotomy and cantholysis could be performed to improve visibility, if desired. This was not necessary in the patients described in this article. A transconjunctival incision is made with microcautery electrodissection 3 to 4 mm from the inferior border of the tarsal plate. Electrodissection continues through the lower-lid retractors. The proximal conjunctival flap is then suspended upward over the cornea with a suture. With the eyelid on traction and holding the conjunctival flap upward, elec-
trossection continues in a preseptal plane down to the inferior orbital rim. This can also be readily accomplished with blunt dissection using a cotton-tip applicator. A Desmarres retractor is inserted, exposing the bony orbital rim. The dissection then continues inferiorly over the orbital rim just above the periosteum. Below the rim, the extent of dissection is the same as that described for the transcutaneous approach. At this stage, the bulging intraorbital fat is released by incising the orbital septum from medial to lateral canthi. The fat is then mobilized and secured in a fashion identical to that described for the transcutaneous approach. The transconjunctival incision is closed with a few absorbable 6-0 sutures. A pinch-skin excision or laser resurfacing of the lower eyelids can now be performed at the surgeon’s discretion.

RESULTS

Sixteen patients have undergone lower-eyelid blepharoplasty with fat mobilization, with a follow-up ranging from 4 to 19 months. Average follow-up is 12 months. Fourteen patients were female and 2 were male. One patient had undergone previous upper- and lower-lid blepharoplasty 18 years earlier. Thirteen had a transcutaneous approach and 3 had a transconjunctival approach with pinch-skin excision. Four patients had concomitant canthoplasties (lateral tarsal strips) and 5 had tarsal tucks to tighten the eyelids.14 Nine patients also had concomitant subperiosteal midface lifts. The age of the patients ranged from 42 to 73 years. In the early postoperative period, bruising and swelling is variable but is greater than that observed for conventional transcutaneous lower-lid blepharoplasty. It also took considerably longer for the lower-eyelid edema to completely resolve (≤6 weeks). One patient developed an ectropion that resolved within 1 month without treatment. All patients had close-up photographs preoperatively and from 3 to 10 months postoperatively, using identical positioning and lighting. Frontal views of the eyes in superior gaze and frontal, oblique, and lateral views in primary gaze were obtained. Photographs were analyzed by an ophthalmic plastic surgeon not involved with the cases as well as by me. Results were rated on a scale of 1 to 4. Ratings were as follows: (1) minimal or no improvement of eyelid contour, (2) improvement of lid contour with obvious persistent visibility of intraorbital fat or bony orbital rim in at least 1 view, (3) improvement of lid contour with subtle visibility of intraorbital fat or bony orbital rim in at least 1 view, and (4) perfect lid contour with no visibility of fat or bony orbital rim in all views.

Similar to conventional techniques, the best results were observed in those patients with the least degree of fat protrusion and bony orbital rim skeletonization. Nine cases were rated 4, and 4 were rated 3. Three cases were rated 2. One patient who was rated 2 required revision blepharoplasty to remove minimal fat to reduce apparent fat protrusion. Another patient was rated 2 because of a persistent nasojugal groove, judged to be the result of a technical error in which fat from the nasal compartment was inadequately mobilized below the attachment of the levator labii superioris alaeque nasi. This maneuver is necessary to completely efface the groove. To reduce bleeding and trauma to the muscle, it may be beneficial to elevate this area in a subperiosteal plane. The location of residual fat protrusion was equally likely to be nasal and temporal. No patient demonstrated postoperative deepening or concavity of the inferior palpebral sulcus. The double-convex eyelid contour noted on profile was improved in 12 patients. Three patients were judged to have results superior to those attainable by conventional fat excision techniques. Two of these patients had marked visibility of the inferior bony orbital rim as a result of attenuation of the overlying soft tissue coverage (Figure 5). The other patient had underdevelopment of the bony orbital rims. Depending on the abundance of fat in the lateral compartment, I have, in some cases, found it difficult to mobilize sufficient fat to reach

Figure 5. A, B, and C, Preoperative photographs of patient who had upper- and lower-lid blepharoplasty 18 years earlier. (Note double convex profile of lower lid and attenuation of soft tissue coverage of inferior orbital region.) D, E, and F, Six months following revision lower-lid blepharoplasty with fat mobilization. (Note single slightly convex profile of lower lid and reversal of skeletonization of the inferior bony orbital rim.)
the SOOF over the zygoma during fat mobilization. This occurs in patients who have more marked ptosis of the midface. In such cases, although the lateral orbital bony rim is camouflaged with the mobilized fat, there still persists a depressed contour between the inferior border of the mobilized fat and the ptotic malar fat pad. This can presumably be avoided by performing a concomitant subperiosteal midface lift. In spite of this, however, 2 patients having had midface lift with lower-lid fat mobilization continued to manifest a slight depressed contour just lateral to the inferior orbital bony rim.6

COMMENT

Judging from the results of this limited study, one can appreciate that there is a learning curve in using this technique. Inexperience accounted for the failure to perform graded fat resection in the patient requiring revision surgery. However, I believe fat preservation and mobilization in lower-lid blepharoplasty may have merit in patients with 1 or more of the following physical manifestations:

1. Significant bony rim visibility as a result of a thin soft tissue coverage or ptosis of the SOOF and malar fat pad. This is frequently observed in advanced age. Using the periorbital fat to provide a thicker cover to the bony orbital rim will reduce skeletonization and enhance the youthful appearance of the periorbital region.

2. Prominent eyes and hypoplasia or underdevelopment of the infraorbital bony rims, usually associated with hypoplasia of the zygomatic complex. Even modest fat removal in such patients may synergistically emphasize the prominent appearance of the globe. Mobilizing fat over the rim enhances the coverage of the orbital bony rim serving to augment the projection of the rim and camouflage some of the prominence of the globe.

3. Prominent nasojugal groove. Mobilized orbital fat below the attachment of the levator labii superioris alaeque nasi will help to efface the contour of this depression.

4. Deep-set eyes with fat protrusion. Removing fat as in a standard blepharoplasty risks producing a sunken-eye appearance by unmasking the inferior bony orbital rim previously obscured by the prolapsed fat.

Conventional lower-lid blepharoplasty involves removal of the intraorbital fat, which usually provides an adequate contour of the lid for several years. A sunken-eye appearance may develop, however, if excessive intraorbital fat is removed during lower-lid blepharoplasty in patients with a visible nasojugal groove, deep-set eyes, or underdevelopment of the malar complexes. Even in younger patients without these manifestations, fat removal may cause a sunken-eye appearance as the SOOF, malar fat pad, and orbicularis oculi descend with age downward as a unit away from the orbital rim.13 Over time, this descent and attenuation of soft tissue causes delineation of the bony orbital rim and a slight concavity just inferior to the rim. Removal of orbital fat only makes this hollow deeper, enhancing the “tired” look.6 The long-term results of conventional blepharoplasty has not been studied, but I have observed patients having had blepharoplasty 10 to 20 years earlier. In this group of patients, skeletonization of the bony orbital rims appears more marked than in patients not having had blepharoplasty but who were of similar age and with similar skin and soft tissue coverage of the facial skeleton. Eder6 has argued that only a small percentage of younger patients have baggy eyelids due to real excess of orbital fat. Increased orbital fat can also be found in rare cases of Graves disease.8 These 2 conditions, according to Eder, represent the only true indications for fat removal.

It seems reasonable to use the intraorbital fat to assist in effacing the inferior bony rim if clinically visible and to try thereby to prevent or retard this manifestation of progressive aging. Most candidates undergo a transcutaneous approach; however, a transconjunctival approach is also effective. Repositioning the orbital fat back in the bony orbit and strengthening the suspension of the globe may also have merit. However, this approach does not have the advantage of camouflaging the topography of the inferior orbital bony rim. The long-term success of either of these approaches has not been established. Is it better to preserve the intraorbital fat, and use it to enhance the thickness of the soft-tissue covering the lower bony orbit to assist in preventing the changes that take place in this area with age? Or will progressive atenuation of the overlying tissues with age simply reveal the mobilized fat as an abnormal bulge? These questions remain to be answered. One must consider the disadvantages of fat mobilization, which include prolonged edema of the lower eyelids, increased operative time, and a potential increase in the risk of lower-eyelid retraction.

Accepted for publication November 2, 1998.

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