Periorbital rejuvenation is technically evolving as we gain a better understanding of eyelid anatomy and the anatomic changes which occur with aging. For over 100 years, surgeons have perhaps simplistically attempted to improve the hallmarks of periorbital aging (i.e., weathered lower eyelid skin and herniated lower lid fat) through fat removal and lower lid skin excision. In the late 1970s, Loeb and Furnas focused attention on the limitation of this basic approach to surgery of the lower lid, emphasizing the importance of aesthetic blending of the lid-cheek junction and the possibility of improving malar bags.1–4 Over the past decade, many sophisticated approaches have been described by surgeons seeking to produce a youthful blending of contour across the lid-cheek interface.5–12

Despite the plethora of techniques currently available to improve periorbital aesthetics, surgery of the lower eyelid remains challenging. To increase our knowledge of periorbital anatomy and thereby improve surgical results, the authors’ scientific investigations have helped to elucidate the pathogenesis of the contour deformities associated with the aging lower lid and upper cheek. Although numerous important anatomic points are clearly defined in these articles, from our perspective, we would like to highlight certain findings for their clinical relevance:

**The Lower Lid in Youth**

As the authors describe, the retaining ligaments that support the orbicularis oculi to the underlying orbital rim and cheek serve to fixate this muscle tightly against the underlying facial framework. In youth, the orbicularis retaining ligament corresponds to the location of the infraorbital rim. There is no herniation of orbital fat, and the lateral orbicularis oculi blends with the malar pad. Malar bags are rarely apparent in the young face. Overall, there is a smooth blending of contour between the preseptal and preorbital orbicularis, which appears as a flat surface without depressions or bulges. In youth, there is relatively more suborbicularis lower lid fat and more subcutaneous cheek fat. This soft-tissue fullness helps to make the lower lid appear soft and smooth without the sharp demarcation between eyelid and cheek that become obvious with aging.

Despite the lack of a sharp demarcation between the eyelid and cheek in the young face,
careful inspection reveals the transition between the pigmented thin skin of the central lower lid and the thicker, nonpigmented skin of the cheek. With animation, the orbicularis oculi of the lower lid concentrically flattens and moves superiorly, defining the infraorbital rim (and the orbicularis retaining ligament that is situated at the rim) and demonstrating the lateral extent of the orbicularis overlying the malar fat pad (Fig. 1). To summarize the relevant fixation of the lower eyelid in youth:

1. The orbicularis retaining ligament functions centrally to keep the overlying preseptal and preorbital junction of the orbicularis oculi tight against the infraorbital rim.
2. The central lid-cheek junction (junction of the thin, pigmented lower lid skin with the cheek) is obvious in youth and appears relatively fixed to the deeper facial framework. We speculate that this is secondary to the superficial fascia that lines the posterior aspect of the orbicularis oculi adhering to the fascia overlying the origins of the elevators of the upper lip (levator labii superioris and levator labii superioris alaeque nasi) in this region. The junction between the central, thin, pigmented skin of the lower lid and cheek represents not only a point of transition but also a point of fixation that continues to be present in the aging face.
3. The lateral orbicularis oculi extending over the malar pad appears tightly bound to the underlying deep fascia in the youthful face. The (potential) glide space discussed by the authors regarding malar mounds is rarely clinically obvious in youth, and in our opinion, the fascia lining the posterior aspect of the orbicularis oculi in this region remains adherent to the fascia overlying the elevators of the zygomaticus major and minor (described by Mendelson et al. as the floor of this glide space). Because of the adherence between superficial and deep fascia in this region, malar mounds are absent in most young patients.

The Aging Lower Lid

The pathogenesis of aging within the lower lid is multifactorial and varies among patients. Nonetheless, certain common changes are noted in most individuals over time, as summarized below.

Orbicularis Retaining Ligament

As the authors note, the orbicularis retaining ligament is stout, both medially where it gets its origin from the medial infraorbital rim, and laterally where it blends with the dense adherence occurring in the region lateral to the lateral commissure, which the authors term the lateral orbital thickening. Centrally, this ligament maintains its attachment to the infraorbital rim but becomes more distensible, allowing the aging orbicularis oculi to be pulled both anteriorly and inferiorly from the facial skeleton.

The most poorly supported part of the orbicularis oculi is the preseptal portion. Pretarsally, the orbicularis is tightly adherent to the underlying tarsus; although this area may become hypertrophied over time (through chronic animation and blinking), this portion of the muscle shows little tendency toward descent. The preorbital portion of the orbicularis oculi has cephalad attachments to the orbital rim along...
the orbicularis retaining ligament and along its caudal margin to the fascia enveloping the origin of the elevators of the upper lip. The areolar relationship that exists between the preseptal orbicularis and the underlying orbital septum provides poor structural support for this portion of the muscle. One must only consider dissecting a skin-muscle flap to realize how easily the orbicularis is separated from the underlying septum. It is this portion of the orbicularis that shows the greatest tendency toward descent. As the retaining ligament becomes more distensible along the central orbit with aging, the herniated lower lid fat becomes situated not only anteriorly but also inferiorly below the orbital rim. This is most apparent along the central fat pad, although in some individuals it can be noted medially as well. It is uncommon in most patients to note a lateral fat pad that becomes situated inferior to the infraorbital rim. In our opinion, this is secondary not only to the septum being thicker along the lateral orbit but also to the stoutness of the lateral retaining ligament and its blending with the lateral orbital thickening in this region, both of which offer great support against the fat leaving the confines of the lateral orbit.

After central fat herniation, the inferior limit of the central fat pad coincides with the caudal extent of the central orbicularis retaining ligament. In young patients before fat herniation, this ligament lies at the infraorbital rim. With limited fat herniation, the fat and the ligament lie inferior to the infraorbital rim but superior to the transition between the thin, pigmented eyelid skin and the thicker cheek skin along the central lower lid (the central lid-cheek junction). With greater fat herniation, the central lower lid fat, orbicularis retaining ligament, and central lid-cheek junction lie at essentially the same level (Figs. 2 and 3).

Central Lid-Cheek Junction

In most patients there is very little change in descent of the central lid-cheek junction interface with aging. Examination of photographs of patients in youth and in aging demonstrates that the increasing demarcation along the central lid-cheek junction results predominantly from involution of soft tissue. Typically, the skin thins in this region, the color change between eyelid and cheek skin becomes more obvious, and there tends to be a loss of fat caudally on the cheek side of the lid-cheek interface. The vertical expansion of the lower lid is more illusionary than real. In many patients the pigmented border of the lower lid skin seems stable for decades. What changes is the slope of transition from lid to cheek, the lowering shadow of the fat pads, both of which increase the apparent demarcation and sharp boundaries between eyelid and cheek.

Lateral Orbicularis Oculi–Malar Pad Interface

The lateral extent of the orbicularis onto the cheek has defined aesthetic effects in terms of the contour of the aging lower lid. As noted, the orbicularis retaining ligament is tight along the lateral infraorbital rim such that there is little fat herniation into the lateral cheek. Chronic animation produces lateral eyelid rhytides in most patients. Malar fat descent or involution along the lateral orbital rim, com-
bined with the overlying skin changes, tends to produce an abrupt transition between eyelid and cheek in this region with aging. Compounding this problem is the tendency for malar bags to develop in some patients. Mendelson et al. elegantly describe the limits of the malar glide space that exists between the posterior orbicularis oculi and the membrane enveloping the elevators of the upper lip. What leads to this space becoming more apparent with aging remains undetermined. Certainly, chronic orbicularis animation may be a factor in the radial separation of the lateral orbicularis (i.e., outward projection) from its deeper attachments along the floor of the prezygomatic space. There is also a tendency for fluid accumulation in this region and, perhaps, limited lymphatic drainage potentiates this space once the separation occurs. One must only note the prolonged presence of bruising and pigmentation in this region following trauma or surgery to recognize the possibility of persistent edema potentiating the presence of malar bags.

The clinical implications of these articles emphasize the importance of an accurate understanding of the anatomic changes that occur with aging when performing periorbital rejuvenation. Regarding the herniation of lower lid fat, although plastic surgeons have largely focused on an attenuation of the orbital septum, Mendelson et al. clearly point out the composite nature of this problem, related to attenuation of support from the central orbicularis retaining ligament. It is not uncommon in patients undergoing blepharoplasty to note exposure of the infraorbital rim following fat excision. In our opinion, this exposure of the rim is not just secondary to fat resection; rather, it represents an incomplete surgical solution to the anatomic problem that exists in the aging lower lid. Fat removal without orbicularis repositioning relocates the lower lid fat back to the confines of the orbit, but it does not address the overlying laxity in the SMAS orbicularis skin complex. Surgeons, in an effort to improve blending of contour across the rim have transposed fat,1,2 grafted fat,1,2 and imbricated the orbital septum5,6 in an attempt to preserve lower lid fat, thereby minimizing exposure of the rim. Although these approaches are useful in improving periorbital aesthetics, the need to reposition the descended preseptal orbicularis and restore the relationship of the orbicularis to the infraorbital rim is perhaps as important in improving eyelid aesthetics as how the orbital fat is handled.

Despite the many technical solutions that attempt to blend the contour between the eyelids and the cheek, we agree with Mendelson et al.’s perspective that in principle the descent of the orbicularis oculi (which is invested by the superficial musculoaponeurotic system [SMAS]) is analogous to the principles of midface SMAS repositioning in facial rejuvenation. As Mendelson delineated,14 the mechanical principles governing SMAS repositioning are:

1. Surgical release of ligaments. The amount of release required to mobilize the orbicularis and allow it to be repositioned without undue tension will vary among patients. As demonstrated in the authors’ cadaver dissection, there is a good deal of variability in terms of the density of the lateral orbital thickening and orbicularis retaining ligament between young and old patients. We agree with the authors that, in general, mobilizing the orbicularis oculi requires dissection along the lateral orbital rim adjacent to the lateral canthus, and extending the dissection laterally onto the deep temporal fascia to a point just medial to the temporal branches of the facial nerve. This portion of the dissection releases the lateral thickening. The retaining ligament is then released inferiorly along the inferior aspect of the lateral orbital rim, extending medially to-
ward the lateral limbus. Once the orbicularis is mobilized, it typically moves quite freely (similar to the experience noted in SMAS release of the midface). We would point out that orbicularis movement is separate from cheek movement, and that grasping superficially along the orbicularis will demonstrate a differential amount of mobility compared with the deeper soft tissues that lie just superficial to the periosteum (where little movement will be noted following release of the lateral orbital thickening and orbicularis retaining ligament). The deeper cheek soft tissues at this point of the dissection remain fixated by the zygomatic cutaneous ligaments.

2. Vectors. We agree with Mendelson et al. that the predominant vector of orbicularis draping should be vertical to correct the V-shaped deformity that develops with aging. We prefer a direct approach of orbicularis re-elevation through the lateral lower lid, although as the authors state, a temporal approach can be similarly effective.

3. Fixation. As in all facial rejuvenation, the problem of fixation is important and often the most difficult to solve. The advantage of approaching orbicularis repositioning through the lower lid is that the fixation is close to the structure being repositioned, and that the lateral orbital rim periosteum and deep temporal fascia offer good soft tissue for suturing. Re-elevation of the orbicularis not only effects soft-tissue blending across the infraorbital rim, but it also aids in canthopexy support, which we use to shape the lower lid margin. Secure orbicularis fixation isolates the weight of the cheek from the canthoplasty, allowing the surgeon more artistic control in terms of canthal placement, thereby leading to greater control in terms of long-term lower lid position and shape.

The major issue requiring clarification is the amount of surgical release required not only to restore the anatomic relationship between the orbicularis oculi and the orbital rim but also to surgically correct the malar mounds and blend the central lid-cheek junction. If the pathogenesis of malar mounds is related to the separation of the orbicularis oculi from the fascia overlying the elevators of the upper lip, elevation of the orbicularis through release of the orbicularis retaining ligament will allow the surgeon to reposition the orbicularis tightly to the underlying soft tissue along the lateral cheek, thereby flattening the malar mound. The question remains, Which patients require release not only of the orbicularis retaining ligament but also of the zygomatic ligaments? Although this more extensive dissection within the prezygomatic space may be beneficial in some individuals, the surgical morbidity associated with dissection within the prezygomatic space must be considered. Lysis of the zygomatic cutaneous ligaments through the lower lid also increases the need for strong fixation, because once the zygomatic ligaments are divided, the support of the mobilized upper cheek and midface rests on the suture fixation obtained intraoperatively. If fixation is poor and does not hold postoperatively, the cheek can re-descend and bring the lower lid with it, leading to lower lid malposition (even if a strong canthoplasty or canthopexy has been performed).15,16 (Fig. 4). The aesthetic benefits or disadvantages of elevating cheek skin up onto the eyelid also must be considered, because most individuals show little descent of central eyelid skin with aging. We would point out that if a face lift is being performed at the time of lower lid surgery, descended malar fat can be re-elevated along the lateral orbital rim through a high SMAS dissection, thereby allowing the surgeon to approach orbicularis repositioning separately from malar fat elevation.

In summary, we have experienced consistent results using the following algorithm (Fig. 5):

1. A transconjunctival approach to lower lid fat, performed in combination with fat resection, transposition, or grafting across the inferior orbital rim. We think it is important
to leave the orbicularis innervation intact and that the transconjunctival approach is less injurious to orbicularis function.

2. A limited incision in the orbicularis just lateral to the lateral commissure, which allows rapid release of both the lateral orbital thickening and orbicularis retaining ligament and ample access for re-elevation and intraoperative fixation. This limited lateral incision of the orbicularis allows muscle mobilization while preserving innervation.

3. Retinacular canthopexy to control lid shape and prevent lid malposition.17

4. Dissection of a skin flap of the lower lid to treat redundant lower lid skin and dermal elastosis. In the sun-damaged patient, a subsequent erbium laser resurfacing (Sciton USA, Palo Alto, Calif.) of the lower lid can be performed 3 to 4 months after the initial surgery.

5. High extended SMAS dissection as the method to reposition descended cheek fat back over the zygomatic eminence and lateral orbital rim.

It is not just one of these factors that produces periorbital rejuvenation but rather a combination of factors, including fat blending, orbicularis repositioning, and treatment of weathered lower lid skin, that allows the surgeon to control lower lid shape and aesthetically blend the lid-cheek junction.

In summary, we congratulate the authors on what we consider to be classic articles that define periorbital anatomy and the anatomic changes that occur with aging. As these changes become more completely understood, new technical solutions for improving periorbital aesthetics will emerge. As in other areas of facial rejuvenation, technical solutions remain subservient to the aesthetic destination, with the ultimate goal being to artistically control shape and contour of the lower lid while minimizing signs that a surgical procedure has been performed.

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REFERENCES


