viable cells. Based on our findings, significantly and severely crushed grafts may have heterogeneous regions of cell viability, and thus variable graft survival owing to focal areas of cell death, which may lead to unanticipated contour irregularities. By extension, slightly crushed grafts will have more uniform tissue survival and appearance.

This study was limited by its small sample size and inability to address long-term chondrocyte viability, which is technically challenging to perform with tissue explants. At our institution and in our local area, most surgeons do not perform submucous resection (SMR) in septoplasty surgery and are equally conservative in rhinoplasty operations. Large SMR specimens are also more difficult to obtain, and hence additional specimens for study are difficult to acquire.

Our results support the findings of Cakmak and Buyuklu1 and Cakmak et al2-3 that aggressive morselization reduces chondrocyte viability, although we believe their results likely underestimate the degree of chondrocyte injury. With the Cottle crusher method, there is a tradeoff between crushing cartilage to a clinically useful pliability and maintaining chondrocyte viability in the graft. Thus, the degree and intensity of morselization need to be thoughtfully considered. Other approaches besides the Cottle method may produce the same mechanical changes in cartilage with less graft injury. We advocate performing the least aggressive morselization of cartilage necessary to achieve the desired cosmetic outcome based on our results and experience.

In conclusion, crushed cartilage grafts are often used to soften transitions, conceal irregularities, and fill defects. Increasing the intensity of morselization using the Cottle method results in increased chondrocyte death. Nondelayable cells appeared to group in clusters, and these clusters increase with the severity of crushing. Aggressive crushing of cartilage grafts should be avoided because it causes significant chondrocyte cell death and clinically unpredictable grafts. Slight to moderate crushing of cartilage likely results in the most functional and reliable graft.

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**Combined Transconjunctival Release and Midface-lift for Postblepharoplasty Ectropion Repair**

Ectropion associated with blepharoplasty is a clinical challenge for even the most experienced surgeon. The etiology of postblepharoplasty ectropion is multifactorial, and the need for a thorough preoperative blepharoplasty analysis, including checking lower eyelid laxity with a snap test, is critical and can alert the surgeon to the need for an adjunctive procedure at the time of blepharoplasty. Even with a complete preoperative analysis in the most experienced surgeon’s hands, postoperative ectropion may occur, necessitating correction.

There is a relative paucity of grading scales for assessing ectropion. One grading scale, described by Moe and Linder,1 quantitatively grades ectropion using a numerical scale, simplifying the ability to analyze the effectiveness of a correction technique (see the scale in the “Methods” section).

Postblepharoplasty ectropion is most commonly due to scarring and contracture of the middle lamella, resulting in eyelid retraction and/or aggressive skin excision techniques, and resulting in anterior lamellar deficiency. This often occurs in the absence of preoperative lateral canthal tendon laxity.2

Repair of postblepharoplasty ectropion includes many techniques: lateral tarsal strip procedures, lateral canthal repositioning/suspension procedures, skin grafts, spacer grafts, volume augmentation of the lower eyelid, full-thickness lower eyelid excision techniques, and midface-lifting techniques.1,4 The lateral tarsal strip procedure was a major advance in the repair of ectropion, but it has drawbacks, including phimosis, trichiasis, ectropion recurrence, lateral canthal rounding, and epiphora caused by overcorrection. This led to lateral canthal tendon repositioning and suspension procedures that avoided many of the drawbacks to the lateral tarsal strip procedures.1 Lateral canthal procedures still have a significant risk of failure with postblepharoplasty ectropion because most of these patients have some degree of middle lamellar scarring with retraction and
anterior lamellar deficiency, which draws the eyelid down even when the tendon is resuspended or shortened.\textsuperscript{3} Additional adjunctive procedures in postblepharoplasty repair have been described to support the lower eyelid to oppose the downward vertical tension associated with postoperative cicatricial ectropion, and they include skin grafts, spacer grafts, volume augmentation (including fillers), and midface-lifting techniques.\textsuperscript{2,4} Most subperiosteal adjunctive midface-lifting techniques are performed through a blepharoplasty incision failing to adequately release the midface soft tissues and have an associated 20\% complication rate, including a high degree of lower eyelid malposition and ectropion.\textsuperscript{3,5} In this study we report the effectiveness of a transconjunctival middle lamella scar release combined with an extended centrolateral subperiosteal transtemporal endoscopic midface-lift to correct anterior lamellar deficiency in postblepharoplasty ectropion repair. We use preoperative and postoperative digital photography analysis and an objective ectropion grading scale.

**Methods.** We performed retrospective case series review at a tertiary care academic practice (by the senior author [A.A.J.]) of 13 consecutive female patients, having had their primary procedure performed by another surgeon, with postblepharoplasty ectropion without lateral canthal tendon laxity undergoing a transconjunctival scar release combined with a transtemporal midface-lift between March 2003 and July 2008. The ectropion was graded according to an ectropion grading scale adapted from a previously developed grading scale by Moe and Linder.\textsuperscript{1}

- **0**, Normal eyelid appearance and function
- **1**, Normal appearance but symptomatic; eyelid laxity present on examination
- **2**, Scleral show without eversion of lower eyelid
- **3**, Ectropion without eversion of lacrimal punctum
- **4**, Advanced ectropion with eversion of lacrimal punctum from lacrimal lake
- **5**, Ectropion with complication (eg, conjunctival metaplasia, retraction of anterior lamella, or stenosis of lacrimal system)

Statistical analysis was performed using a paired \( t \) test, assuming unequal variance to determine the significance of the preoperative and postoperative measurements.

The surgical procedure is as follows: One-half of a cubic centimeter of lidocaine hydrochloride, \( 1\% \), with 1:100,000 epinephrine bitartrate mixed in equal parts with bupivacaine hydrochloride, \( 0.25\% \), was injected into the fornix. A Colorado tip microbovie was used to make an incision through the conjunctiva approximately 1 cm from the fornix. A scleral protector was used to protect the eye, and an eyelid retractor was used to retract the eyelid downward. Cicatricial release of the lower eyelid was performed with blunt dissection to the level of the orbital rim, after which the subperiosteal plane is entered, and dissection continued over the maxilla and zygoma.

Next, the midface dissection was performed as described by Quatela and Jacono.\textsuperscript{6} The midface was suspended at the periosteum anterior to the temporal branch of the facial nerve and just lateral to the zygomaticofacial nerve, with a 0 vicryl suture. Two more 0 vicryl suspension sutures were placed, one just above the Patan-guay line and the other at the temporal incision. These were anchored to the deep temporal fascia superiorly to support the cheek and lower eyelid complex.

**Results.** All 13 patients were female with a mean age of 59 years (range, 45-78 years). The average preoperative ectropion grade was 2.85, and the average postoperative ectropion grade was 0.69, and the difference was statistically significant (\( P < 0.001 \)). All 13 patients had an improvement in their postoperative ectropion grade. The average time period between initial blepharoplasty and repair by the author was 91 months (range, 8-216 months). The average length of time of postoperative digital analysis was 13.7 months (range, 8-23 months). Twelve of 13 patients had undergone 1 previous blepharoplasty prior to repair, and 1 patient had undergone an initial blepharoplasty followed by 3 lateral tarsal strip procedures and a spacer graft by the initial surgeon.

**Comment.** Although transblepharoplasty midface-lifting has been well described as an adjunctive procedure for postblepharoplasty ectropion repair, the technique often provides an inadequate release of the midfacial soft tissues failing to correct the downward vertical tension on the lower eyelid and is associated with postoperative complication rates as high as 20\% and an unacceptably high risk of subsequent ectropion.\textsuperscript{2,3} The transtemporal endoscopic subperiosteal midface-lift\textsuperscript{7} has previously been reported to increase the forces required to distract the lower eyelid from the globe by 2-fold,\textsuperscript{8} counteracting the forces placed on the lower eyelid by midfacial descent. This approach anchors the midface to the deep temporal facia and provides support to the lower eyelid from a superior position to the lateral canthal tendon as opposed to traditional transblepharoplasty approaches in which the primary support of the midface is below the lateral canthus.

Important to restoring eyelid function and repair of postoperative cicatricial ectropion is counteracting the downward vertical forces placed on the lower eyelid. The 2 primary components of postoperative ectropion are anterior lamellar deficiency secondary to aggressive skin excision along with middle lamella scarring, resulting in eyelid retraction.\textsuperscript{2} Release and resuspension of the midface with the transtemporal endoscopic midface-lift widely releases the midfacial soft tissues over the entire maxilla and zygoma decreasing vertical tension on the lower eyelid, improving anterior lamellar deficiency by an average of 5 mm\textsuperscript{8} intraoperatively and 2.5 mm long term (A.A.J., unpublished data), and increasing the force required to distract the lower eyelid from the globe 2-fold.\textsuperscript{6} Transconjunctival dissection through the retracted middle lamellar scar, followed by a subperiosteal dissection over the orbital rim connecting the eyelid to the midface dissection, allows for release of the cicatricial scarring. The support of the midface-lift places the eyelid in a higher position while healing occurs, both adding vertical height to the anterior lamella and resisting scarring and retraction. It also adds infraorbital volume by placing the ptotic midfacial soft tissues in the infraorbital region, which further supports the lower eyelid (Figure 1 and Figure 2).

While there is no single best way to repair postblepharoplasty ectropion, understanding the etiology of the ec-
She had previously undergone blepharoplasty by an outside surgeon. Additional procedures included 3 lateral tarsal strip transconjunctival scar release. A, Preoperative view; B, postoperative view.

**Figure 1.** Views of a patient who underwent a transtemporal midface-lift with transconjunctival scar release. A, Preoperative view; B, postoperative view. She had previously undergone blepharoplasty, 3 lateral tarsal strip procedures, and a spacer graft performed by an outside surgeon.

**Figure 2.** Views of a patient who underwent a transtemporal midface-lift with transconjunctival scar release. A, Preoperative view; B, postoperative view. She had previously undergone blepharoplasty by an outside surgeon.

tropion preoperatively and planning surgery accordingly will facilitate optimal outcomes. We believe that a combined transconjunctival scar release combined with a transtemporal extended subperiosteal midface-lift is an excellent procedure in the armamentarium of postblepharoplasty ectropion repair.

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**COMMENTS AND OPINIONS**

**A Reference Section Update for “Orbicularis Suspension Flap and Its Effect on Lower Eyelid Position”**

O ur recent article titled “Orbicularis Suspension Flap and Its Effect on Lower Eyelid Position: A Digital Image Analysis” had an inadvertent omission in the “References” section. Early in the senior author’s (D.B.R.) surgical training, Norman J. Pastorek, MD, introduced the orbicularis muscle suspension technique in lower lid blepharoplasty and instructed him in the development of such an approach. In addition, Dr Pastorek has published book chapters and peer-reviewed articles describing his well-known lower-eyelid suspension technique.2-3 We wish to credit him with his contribution to our community.

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