Involutional Entropion Repair by Posterior Lamella Tightening and Myectomy

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Summary: Involutional entropion is a common eyelid malposition of diverse etiology that may recur after surgical repair. Laxity of the tarsoligamentous complex combined with posteriorly directed rotational force exerted by the orbicularis, in our view, seems to be the most important in the production of entropion. A surgical technique has been developed that is carried out through a standard transcutaneous lower eyelid blepharoplasty incision. It includes tarsoligamentous tightening at the lateral canthus, bolstering of the lateral canthal tendon, and partial orbicularis myectomy. Forty-two procedures in 35 consecutive patients (29% for recurrent entropion) have been performed and evaluated (mean follow-up, 33 months). There have been no recurrences, and the esthetic outcome has been very good. Key Words: Involutional entropion—Canthal reconstruction—Periosteal flap—Orbicularis myectomy.

Involutional entropion occurs as the viscoelastic properties of various constituents of the internal lamellae of the lower eyelid undergo change during aging. The pathophysiologic abnormalities that have been proposed to account for this acquired eyelid malposition include horizontal (1-7) and vertical (3,7,8) tarsoligamentous laxity, tarsal rotation as a result of orbicularis oculi hypertrophy (9) and vertical translation (5,6,10), attenuation or disinsertion or both of the lower lid retractors (4,7,11,12), and orbital fat atrophy with secondary enophthalmos. These alterations, either alone or in concert, result in the characteristic posterior rotation of the lower eyelid margin that causes the eyelashes to abrade the conjunctiva and cornea.

Operative procedures that address correction of involutional entropion are numerous (2,13). Among these surgical techniques are creation of a full-thickness scar within the anterior lamella of the eyelid (14,15), outward rotation of the eyelid margin by advancement of the eyelid retractors to the anterior tarsus (16), horizontal eyelid shortening (17-19), lower retractor plication (11), redirection of orbicularis oculi muscle fibers (20) and modifications (21,22), lengthening of the posterior lamella with an ear cartilage graft (4), and combinations of the foregoing approaches (4,8,12,23-25). These methods have a common premise: creation of vector forces that inhibit inward rotation of the eyelid margin. Their effectiveness is reflected in their rates of recurrence, which range between zero and 30% (Table 1).

The surgical technique reported here restores tarsoligamentous tone and neutralizes overaction of the orbicularis oculi muscle. It evolved from consideration of the potential causes of entropion and the outcomes of other reparative techniques. It was first used in the management of recurrent cases, and a high success rate and the excellent aesthetic result led to its application to the treatment of primary involutional entropion. This report discusses the details of the repair and its incidence of recurrence, complications, and esthetic outcomes.

SUBJECTS AND METHODS

Forty-eight eyelids of 39 consecutive patients with involutional entropion were repaired between
1986 and 1991. Four patients (six eyelids) were lost to follow-up and were thus excluded from the study. Complete follow-up data were provided for 35 patients (16 men and 19 women) who underwent 42 procedures (seven patients had bilateral disease). The initial 12 procedures (29%) were performed on patients that had undergone previous surgical corrections and were referred to us because of recurrence. The average age of the patients was 75.1 years (range, 65–94 years), and the average follow-up was 33 months (range, 5–58 months). Follow-up was conducted by examination during the first year postoperatively and then by telephone contact at the time of the study. The patients were asked to report evidence of recurrence or return of their initial symptoms.

**TABLE 1.**

<table>
<thead>
<tr>
<th>Author</th>
<th>Procedure</th>
<th>Lids</th>
<th>Follow-up</th>
<th>Recurrences</th>
<th>Complications/comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fox (1951; 20)</td>
<td>Lateral tarsorrhaphy &amp; lateral tarsal resection</td>
<td>12</td>
<td>2–20 mo</td>
<td>0</td>
<td>1 overcorrection (spontaneously resolved)</td>
</tr>
<tr>
<td>Weis (1954; 20)</td>
<td>Marginal rotation of the eyelid lamellae</td>
<td>40</td>
<td>8 yr</td>
<td>0</td>
<td>Precise number of lids treated &amp; follow-up data not available</td>
</tr>
<tr>
<td>Hill/Feldman (1967; 21)</td>
<td>Orbicularis stabilization &amp; tissue barrier creation above &amp; horizontal lid shortening</td>
<td>12</td>
<td>45.2 mo</td>
<td>2 (16.7%)</td>
<td>1 trichiasis (7.1%)</td>
</tr>
<tr>
<td>Quickert and Rathbun</td>
<td>Suture placement</td>
<td>12</td>
<td>5 yr</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>(1971; 20)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hargiss (1973; 20)</td>
<td>Orbital septum tuck; inferior aponeurosis tuck</td>
<td>50</td>
<td>55 mo</td>
<td>8 (16%)</td>
<td>1 undercorrection/1 trichiasis</td>
</tr>
<tr>
<td>(1973; 20)</td>
<td></td>
<td>46</td>
<td>8 mo</td>
<td>0</td>
<td>1 revision/1 overcorrection</td>
</tr>
<tr>
<td>Sider (1973; 20)</td>
<td>Orbicularis stabilization</td>
<td>10</td>
<td>&gt;24 mo</td>
<td>3 (30%)</td>
<td></td>
</tr>
<tr>
<td>Leone (1975; 20)</td>
<td>Tarsal resection above &amp; myectomy</td>
<td>15</td>
<td>NA</td>
<td>1 (6.6%)</td>
<td>2 undercorrections</td>
</tr>
<tr>
<td>(1975; 20)</td>
<td></td>
<td>22</td>
<td>NA</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Leber and Cramer</td>
<td>Orbicularis stabilization</td>
<td>10</td>
<td>11–19 mo</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>(1977; 23)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collin and Rathbun</td>
<td>Marginal rotation of eyelid lamellae &amp; horizontal lid shortening</td>
<td>27</td>
<td>30 mo</td>
<td>1 (3.7%)</td>
<td>1 cyst in surgery line/1 small conj, hematoma</td>
</tr>
<tr>
<td>(1978; 20)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 entropion spontaneously regressed</td>
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<tr>
<td>Rainin (1979; 20)</td>
<td>Horizontal eyelid shortening &amp; suture placement</td>
<td>20</td>
<td>27 mo</td>
<td>1 (5%)</td>
<td>1 overcorrection (spontaneously resolved)</td>
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<tr>
<td>Wesley and Collins</td>
<td>Lower retractor tuck; horizontal lid shortening</td>
<td>26</td>
<td>6–32 mo</td>
<td>0</td>
<td>3 overcorrections (spontaneously resolved)</td>
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<tr>
<td>(1983; 20)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jackson (1983; 20)</td>
<td>Horizontal lid shortening &amp; suture barrier creation or retractor tuck</td>
<td>28</td>
<td>27 mo</td>
<td>0</td>
<td></td>
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<tr>
<td>Hau and Liu (1985; 2)</td>
<td>Pteral orbicularis fixation</td>
<td>172</td>
<td>14 mo</td>
<td>0</td>
<td>2 overcorrections/2 lid hematomas (spontaneously resolved)</td>
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<tr>
<td>Siegel (1988; 2)</td>
<td>Creation of “necktesus” with ear cartilage graft</td>
<td>15</td>
<td>36 mo</td>
<td>0</td>
<td>1 overcorrection/1 lid hematoma</td>
</tr>
<tr>
<td>Carol and Allen (1991; 2)</td>
<td>Variation of Quickert procedure</td>
<td>127</td>
<td>33 mo</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Lance and Wilkins (1991; 2)</td>
<td>Weis procedure above &amp; horizontal lid shortening</td>
<td>66</td>
<td>&gt;6 mo</td>
<td>7 (11%)</td>
<td>2 overcorrections</td>
</tr>
<tr>
<td>Dresner and Karesh (1993; 20)</td>
<td>Lower retractor advancement, myectomy, horizontal shortening (transconjunctival approach)</td>
<td>29</td>
<td>&gt;6 mo</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**TECHNIQUE**

Regional anesthesia is employed consisting of 2% lidocaine (Xylocaine) hydrochloride containing 1:100,000 epinephrine mixed with hyaluronic acid (Wydase) in a 1:10 ratio. A protective corneal cover is inserted under topical anesthesia. A subciliary incision is used as in blepharoplasty, extending along the lower eyelid, and for 8.0 mm into the lateral canthal region. The eyelid is separated into two laminae in the potential plane between the posterior orbicular fascia and the orbital septum, allowing the skin and muscle to be retracted inferiorly. The lateral attachments of the lower tarsus to the orbital rim are then divided, allowing the eyelid to be stretched laterally over the orbital rim.
A portion of the lateral tarsus is resected at the point at which it crosses the plane of the medial aspect of the lateral rim (Fig. 1). One needle of a double-armed, nonabsorbable suture (e.g., 4-0 Polydek, ME-2 needle) is advanced vertically through the cut edge of the lower tarsal plate. The second needle engages the superior crus of the lateral canthal tendon at the terminus of the upper tarsal plate (Fig. 2). The periosteum that overlies Whitnall’s tubercle is exposed (this point is somewhat indistinct but is recognized as the thickest periosteum of the anterior lateral wall), and both needles are passed through this point ~3.0 mm posterior to the rim (Fig. 3). A 6-0 double-armed polyglactin suture is then placed within the lateral tarsus, traversing it from the conjunctival surface as a horizontal mattress stitch. A rectangular periosteal flap is elevated.
FIG. 5. The periosteal flap is attached to the anterior tarsus by a horizontal mattress 6-0 polyglactin suture, which is passed from posterior to anterior, engaging the full thickness of the tarsus.

from the lateral zygoma and advanced toward the orbital rim, where it remains fixed (Fig. 4). The tarsal sutures are tightened, securing the tarsus to the lateral periosteum, and the periosteal flap is attached to the anterior tarsus using the previously positioned polyglactin sutures (Fig. 5). The pretarsal and the upper preseptal orbicularis is then trimmed, leaving about one half of the muscle mass in situ (Fig. 6). Bleeding from the musculocuta-

FIG. 6. About one half of the mass of the upper preseptal and pretarsal orbicularis oculi muscle is trimmed by using straight iris scissors.

neous perforating vessels that course vertically on the posterior surface of the muscle is expected, and its sources are identified by evertting the skin-muscle composite and gently irrigating its posterior surface with saline. Bipolar coagulation is applied to the hemorrhagic points. The incision is closed with fine nonabsorbable sutures.

A potential technical pitfall that may occur is the shedding of the periorbital during needle passage. Additionally, in older patients, the periorbital may be too attenuated to retain the sutures. In these cases, a direct tarsoseous union is established as follows: Two 1.0-mm holes are drilled at the lateral orbital rim at a point ∼1 mm superior to the plane of the medial canthal tendon. This point is best determined by first delineating by marker the plane of the medial canthal tendon on the lateral orbital rim. The surgeon’s point of view is optimally at the patient’s head during this maneuver to avoid parallax. Using a caliper, the location of the holes to be drilled is marked 1 mm above the first mark. The holes are drilled to a common medial opening. Using a 30-gauge folded wire as a guide, the tarsal sutures are brought through the holes and securely tied on the lateral surface of the zygoma (Fig. 7).

RESULTS

Of the 42 eyelids in this study, there have been no recurrences. The mean follow-up is 33 months (range, 5–58 months). Overcorrection did not occur in any case. Patient satisfaction with the esthetic result has been good. Prolonged tenderness to palpation over the site of the periosteal flap has been
noted by many patients but has typically resolved within 6 months. One patient developed postoperative chemosis of unknown etiology that resolved spontaneously. Another developed two asymptomatic trichiasis eyelashes. A pyogenic granuloma required excision and removal of the Polydek suture material in two patients.

**DISCUSSION**

Multiple pathophysiologic abnormalities have been implicated in involutional entropion. Orbicularis oculi overaction and mobility, horizontal eyelid laxity, and retractor dehiscence are dominant forces (1–7). Most reconstructive techniques incorporate horizontal eyelid tightening (3,8,12,17,19,24). However, when such shortening was the only procedure performed by us in 12 patients, we observed two recurrences (unpublished data). Our analysis of the cause of recurrence pointed to overaction of the preseptal and pretarsal portions of the orbicularis oculi muscle, because the tarsoligamentous apparatus remained taut, and retractor dehiscence was not identified intraoperatively. Leone (26) reported a similar experience with one recurrence (6.6%) and two undercorrections (13.2%) in 15 entropic eyelids treated by tarsal resection alone. When orbicularis myectomy was added, no recurrence was observed.

The method employed to restore tone to the tarsoligamentous component of the lower eyelid may be an additional factor that favors recurrence of entropion. The fibrous attachments that secure the tarsus to the lateral orbit become attenuated with time. Tightening of the posterior lamella by the method of tarsal resection alone without enhancement of the tarsoperiosteal attachment adds stress to these ligaments, perhaps leading to dehiscence and recurrence of entropion.

Cadaveric dissections have demonstrated that the lower tarsal plate is bound to the orbital rim by complex attachments that may be dehisced from the tarsus in older specimens. One of these elements, the posterior limb of the lateral canthal tendon, inserts to the periosteum over the lateral orbital tubercle (of Whitnall), ~3 mm behind the orbital rim (27). An anterior component continues in close association with the fascia that overlies the periosteum of the lateral orbital rim, inserting on the lateral anterior tarsal surface. Therefore, lateral tarsal reattachment to the orbital rim ideally involves both an anterior and a posterior component. In the technique described, the posterior tarsoperiosteal reconstruction is achieved by approximating the tarsus to the periosteum with sutures. The anterior bolster is created from a strip of periosteum developed from the anterior zygoma. This “periosteal tongue” was first described by Smith and Cherubini (28) in the reconstruction of lateral eyelid defects. In entropion repair, this flap serves two functions: (a) during healing, scar contracture and fibrous tissue formation increase the tensile strength of the flap, adding further support to the lateral tarsal attachment, and (b) it covers the Polydek suture, minimizing the chance of pyogenic granuloma formation.

Earlier studies on the pathophysiology of involutional entropion have demonstrated the superior and forward migration of the preseptal orbicularis, which overrides the pretarsal part of the muscle and creates an inward rotation of the eyelid (5,6,10). The final step of the procedure involves a subtotal pretarsal and preseptal orbicularis oculi myectomy.
The myectomy weakens the force of orbicularis contraction and also reduces migration potential of the muscle by fostering adhesions between the muscle and tarsus.

Although this procedure addresses two dominant mechanisms of entropion production, it does not include repair of the lower eyelid retractors, whose contribution to the creation of involutional entropion has been implicated by several authors. Plication of the retractors has not been necessary when the operation is performed as we have described. However, the subciliary incision provides excellent exposure of the retractors, should their advancement be deemed necessary by the surgeon.

This surgical technique has produced excellent results in the management of complicated, recurrent involutional entropion and also primary cases (Fig. 8). The method employs an incision familiar to most ophthalmic surgeons, that of a transcutaneous lower eyelid blepharoplasty, and may easily be incorporated in their therapeutic armamentarium.

REFERENCES