The Lateral Transorbital Canthopexy for Correction and Prevention of Ectropion
Report of a Procedure, Grading System, and Outcome Study

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Background: There are numerous approaches to correcting laxity of the lateral canthal tendon, each with advantages and drawbacks. Critical evaluation of these techniques is not possible, however, as there is no grading system currently in use to describe this condition or to report outcomes, and prospective trials are lacking.

Objectives: To report and assess a new procedure for repair of the lateral canthus (lateral transorbital canthopexy) and to describe the Ectropion Grading Scale (EGS), with a prospective outcome analysis of their use.

Design: Prospective outcome study of 15 consecutive patients (16 procedures).

Setting: Tertiary referral center in Zurich, Switzerland.

Patients: Consecutive sample of patients referred for treatment of ectropion of various causes.

Interventions: Preoperative and postoperative EGS grades were recorded, a preoperative and postoperative patient-based questionnaire was administered, and lateral transorbital canthopexy was performed.

Main Outcome Measures: Outcome was determined by improvement in EGS grade and results of the patient-based symptom questionnaire.

Results: There were no surgical failures or complications in the study. An average of 83% reduction in patient-reported discomfort was achieved. Two patients with facial paralysis needed medial canthal repositioning. The EGS allowed clear recording of lower eyelid position before and after lateral transorbital canthopexy, and the procedure was uncomplicated to perform.

Conclusions: Lateral transorbital canthopexy is an effective technique for the correction of lower eyelid laxity and appears to allow refined, durable adjustment of the lateral canthus. Self-reported patient satisfaction confirmed the high rate of success of the procedure in this study. The EGS permits critical evaluation and reporting of results and may assist in predicting which patients will need concomitant correction of the medial canthus.

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The lower eyelid acts in conjunction with the upper eyelid as a shield that protects and maintains a balanced moisturization of the eye. It has 2 primary supports: the medial and the lateral canthal tenoligamentous complexes. While both can stretch, the medial canthal tendon is a rather short and stout structure and is less commonly a cause of eyelid dysfunction. The longer lateral canthal tendon (LCT), however, is the weakest portion of the eyelid, and thus is more susceptible to laxity or increased tension. Dysfunction of the LCT has numerous causes, including facial paralysis, aging, iatrogenic insult, trauma, congenital abnormality, or medical illnesses, such as scleroderma and dermatitis. The resulting ptosis can lead to either entropion or, more commonly, ectropion, with medial, anterior, and inferior displacement of the lateral canthus. The ensuing symptoms are varied, depending on the cause and position of the eyelid; epiphora, photophobia, and erythema are common. Symptoms due to conjunctival irritation and corneal exposure may also occur.

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Historically, there have been numerous procedures to correct laxity of the LCT dating back at least to Adams’ resection of a full-thickness eyelid triangle in 1812. Most of these have involved partial eyelid resection, and have shared the complications of unfavorable scarring, phimosis (shortening of the horizontal aperture), trichiasis, and blunting of the lateral canthus. Also, they may further stretch the already lax LCT, leading to recurrence of the problem. A major advance was made in 1977, when Tenzel et al described the lateral sling canthoplasty repair for ectropion, focusing attention on tightening and...
elevating the slack lateral tendon. This method was modified by Anderson in 1981 into the tarsal strip procedure, which is often used today. A tarsal strip procedure includes a lateral canthotomy and cantholysis; excision of skin and conjunctiva, leaving a free strip of tarsus; fixation of the tarsal strip to the periosteum of the lateral orbital wall; and reconstruction of the lateral canthus to create the appropriate height and tension of the lower eyelid.

There are several problems with the latter procedure, however. Dysfunction of the lower eyelid is typically attributable to malposition rather than to excess tissue, and resection of one or more layers of the eyelid can cause recurrence or exacerbation of the problem. Furthermore, disruption of the lateral canthal angle can lead to dehiscence, overlapping of the eyelids, failure of proper eyelid positioning, trichiasis, alteration of eyelid contour, obstructive scarring, rounding of the canthus, and loss of cilia. Also, excision of tissue is not reversible should overcorrection occur.

These drawbacks prompted the development of the anterior canthopexy (rather than canthoplasty) for tightening of the LCT. In this procedure, through anterior incisions in the upper or lower eyelids, the LCT is fixed to the lateral orbital wall in a somewhat elevated position without resection of the components of the eyelid or canthus. Anterior canthopexy prevents many of the complications that are associated with resection techniques. But the procedure is still suboptimal. If the LCT is simply sutured to the lateral periosteum, there is a risk of recurrent laxity. This problem may be overcome by fixation of the LCT through drill holes in the lateral wall. However, the anterior approach does not allow a proper angle for drilling and can lead to skin damage. If the access is through the upper eyelid, an additional separate subciliary approach is required for releasing the tethering inferior orbital septum. Also, because the lateral horn of the levator aponeurosis is continuous with the LCT, an anterior approach through the upper eyelid has been associated with ptosis resulting from entrapment of the aponeuroses with the canthopexy suture. Finally, an anterior approach mandates the creation of operative trauma and distortion directly in the area that must be meticu-
conjunctiva between the eyelid and the globe and displac- ing the LCT laterally. The tissue is then palpated through the incision with another forceps, and the tendon is located by palpation of its fibrous adhesions with the lateral orbital wall in the region of the Whitnall tubercle. Once identified, the LCT is transected at its lateral insertion. It is important to realize that the lateral insertion of the LCT is approximately 7 mm in vertical extent, and the conjoined attachment of the lateral aspect of the levator aponeurosis at its superior border adds approximately 3 mm, for a total width of 10 mm. To prevent problems of eyelid overlapping or entrapment, we transect the LCT together with the lateral levator aponeurosis from their lateral attachment, maintaining their integrity as a functional unit. When the complex has been freed over its full vertical extent, the lateral canthus and lower eyelid become freely mobile when manipulated with a forceps (Figure 4, A and B). If an element of tethering remains, the lower lateral orbital septum may be further incised in a caudal direction. The tendon is separated from the lateral orbital wall with a craniocaudal vertical incision (ie, cantholysis), but a horizontal canthotomy is not per- formed. It is maintained fully intact to avoid disruption of attachment of the upper and lower eyelids and to preserve the attachment of the check ligament of the lateral rectus muscle, which can be confirmed by preservation of lateral motion of the lateral canthus on extreme lateral gaze. If the tendon is excessive in its length, a lateral portion may be trimmed so that its bulk does not prevent adequate tightening against the orbital wall.

The lateral orbital periosteum is raised with a septal elevator to expose the bone in the region where the canthus is to be reattached. Two permanent 4-0 sutures are placed through the medial aspect of the LCT at the canthal angle and adjacent to or through the lateral inferior tarsal plate (Figure 4, B, black dots adjacent to the lateral canthus). The ends are left 10 cm long and are clamped with a small hemostat, and the needle is removed. Two 1-mm-diameter holes are bored in the lateral orbital wall 1 to 2 mm posterior and superior to the Whitnall tubercle in the region of the frontozygomatic suture, angled dorsally to 2 mm posterior and superior to the Whitnall tubercle in the region of the frontozygomatic suture, angled dorsally stretching postoperatively, using transosseous suture fixa- tion to prevent dehiscence. Finally, the procedure is rapid; it can be performed under local anesthesia without need for sedation; and, because there is minimal disturbance of the eyelid itself, and there is no incision through the conjunctiva, there is little postoperative discomfort, edema, or chemosis.

A grading system was needed to enable an accurate description of the type and severity of ectropion. On review of the literature, we found no suitable scale, so we developed the Ectropion Grading Scale (EGS) (Table 1). To add greater detail if desired, documentation can be added on the distance between the eyelid margin and the central corneal reflex or on the distance between the ciliary margin and the globe.

Fifteen consecutive patients undergoing 16 procedures (patient 15 underwent simultaneous bilateral repair) were evaluated prospectively with photographic documenta-
tion and preoperative and postoperative questionnaires evaluating and rating their symptoms (Table 2). Their age, underlying diagnosis, and grade of ectropion before and after surgery are shown in Table 3. Five patients were not available for the 6-month postoperative follow-up visit.

The average patient age was 68 years (age range, 55-88 years). The usual time to complete the procedure was 30 minutes, depending on the severity of the underlying process. There were no surgical complications and no instances of infection, problems in wound healing, unfavorable scarring, or instances of eyelid malfunction. The patients experienced minimal postoperative pain, and the mild postoperative edema resolved within 1 week. No patients required reoperation of the lateral canthus. One patient (EGS grade IV LM) underwent placement of a lacrimal stent for persistent epiphora due to stenosis of the lacrimal duct, and another patient (EGS grade, III LMr) required a medial blepharorrhaphy to reposition the punctum. No patient who was available for follow-up of 6 months or more had a recurrence of symptoms (although 1 patient developed gustatory lacrimation that was unrelated to the procedure), and there was no evidence on physical examination of dehiscence or weakening of the repair.

Of the 10 patients who were available for at least 6 months of follow-up, the average improvement in the subjective severity of the main symptom was 2.5 out of a possible 3 points (diminution from severity 3 to 0 representing a 3-point improvement), or an 83% reduction in discomfort. It must be noted, however, that many patients had multiple symptoms, and this analysis was based on their most severe symptom only. Furthermore, a patient with facial paralysis should not expect complete resolution of symptoms, as the active function of the lacrimal system does not return.

**COMMENT**

The symptoms caused by dysfunction of the LCT can be extremely annoying to a patient, ranging from continuous epiphora to an exposed, irritated eye with damage of the cornea. The causes of epiphora are numerous, including reflex hypersecretion\(^\text{14}\); punctal stenosis from conjunctival irritation\(^\text{15}\); diminished

![Figure 1](http://example.com/figure1.png)  
*Figure 1. Preoperative lateral photograph of grade III L ectropion, right eye, with patient sitting.*

![Figure 2](http://example.com/figure2.png)  
*Figure 2. A, Patient in supine position, from surgeon’s view, incision marked. B, Normal anatomy from an intraoperative perspective. C, Axial plane viewed from below.*

![Figure 3](http://example.com/figure3.png)  
*Figure 3. A and B, Exposure of orbital rim; stay sutures on wound edges. C, Orbital septum is transected, and lateral canthal tendon is exposed.*
medially directed tear conduction due to caudal displacement of the lateral canthus from its normal position approximately 2 mm cranial to the medial canthus (normal values vary individually and by ethnic origin), loss of apposition of the eyelid margin to the globe, and vertical shortening of the inferior fornix or an adynamic lacrimal pump due to laxity and temporal sagging of the eyelid. Repositioning of the LCT complex is an effective means of correcting these underlying causes of eyelid malfunction. This abnor-

Figure 4. A and B, Mobilized lateral canthal tendon held with stay suture. C, Placement of permanent 4-0 fixation sutures medially through lateral canthal tendon adjacent to lateral canthus.

Figure 5. A and B, Two fixation holes are drilled adjacent to frontozygomatic suture. B, Black dots indicate points of fixation. C, Fixation suture is placed adjacent to lateral canthus; fixation hole is being drilled. D, Fixation suture is externalized through a hole in the lateral orbital wall by use of a suture "noose."

Figure 6. A, Fixation sutures are externalized through the lateral orbital wall (note visible traction on lower eyelid). B, Fixation sutures are tied in place (black dots represent points of attachment). C, Lateral canthal tendon is fixed in the desired position.

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mality is not rare; indeed, eyelid retraction and ectropion are the most common complications of lower eyelid blepharoplasty, and those who treat disorders involving the facial nerve are quite familiar with the manifestations. Earlier attempts to correct lower eyelid malfunction, based on excising a perceived overabundance of tissue, were fraught with difficulties that were partly overcome by the development of canthopexy and then anterior canthopexy.

We believe that this has now been further improved and simplified by the development of the LTC, which maintains the anatomical and functional integrity of the LCT, including the ability of the lateral check ligament of the lateral rectus muscle to abduct the canthal angle on lateral gaze. By not detaching the lateral horn of the levator aponeurosis from the LCT when it is repositioned, normal functional relationships are maintained and postoperative eyelid malfunction is eliminated.

Subjectively, the patients in this study were satisfied with the procedure postoperatively, obtaining on average an 83% reduction in the severity of their symptom score. Objective analysis of preoperative and postoperative ptosis/ectropion grading demonstrated an improvement in grade in every case. There were no complications, problems with wound healing, or failures to properly reposition the canthus.

We found that the EGS was simple to use and that there was excellent interobserver agreement in patient grading. Furthermore, the system aided in preoperative planning, in that for patients with grade I through III ectropion, no further procedures other than LTC were required; however, in patients with grade III Mr, IV M, or V M ectropion, a procedure directed at the medial canthus, such as medial blepharorrhaphy, should strongly be considered. It should be noted that not all patients attained a postoperative EGS grade of 0. This is because grade 0 means that the patient has had complete resolution of symptoms. In a patient with facial paralysis where the orbicularis muscle is nonfunctional and the lacrimal system functions only passively, the patient cannot be expected to be completely symptom free. In these cases, the goal is EGS grade I.

We believe that the use of a grading system is essential both to enable the surgeon to thoroughly evaluate his or her results and to allow accurate reporting of outcomes and comparisons of various surgical techniques.

Because eyelid retraction and ectropion are frequent complications of lower blepharoplasty, attention should be directed toward preventing this problem. While it has been suggested that lower eyelid tightening be performed routinely with or as a substitute for blepharoplasty, it seems reasonable that predisposition to this problem should be sought through the tests discussed above before blepharoplasty is performed; then, LTC may be performed as indicated. We have performed LTC at the same time as blepharoplasty through an extension of either the upper or lower eyelid incision, without difficulty or increased tissue trauma.

Thorough preoperative patient evaluation is necessary to establish the cause of the ptosis and to rule out additional underlying conditions that may require treatment, as well as to plan proper eyelid positioning. Furthermore, patients with long-standing ectropion of advanced grade IV or V may also require adjustment of the medial canthus for full restoration of eyelid contour.
Table 3. Patient Data*

<table>
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<tr>
<th>Patient No./Sex/Age, y</th>
<th>Etiology†</th>
<th>Primary Symptom</th>
<th>Severity of Symptoms,‡ Preop/Postop</th>
<th>Ectropion Grade,§ Preop/Postop</th>
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<tr>
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<td>II Lr/0 r</td>
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<td>Epiphora</td>
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<td>I/O r</td>
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<td>Epiphora</td>
<td>3/?</td>
<td></td>
</tr>
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<td>Paralysis</td>
<td>Epiphora</td>
<td>3/?</td>
<td></td>
</tr>
<tr>
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<td>&quot;Dry eye&quot;</td>
<td>3/?†</td>
<td>V LM/?f</td>
</tr>
<tr>
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<td>3/?†</td>
<td>V LM/?f</td>
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<tr>
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<td>Visual disturbance</td>
<td>3/?‡</td>
<td>V LM/?r</td>
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<td>II Lr/0 r</td>
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<td>III Lr/1 r</td>
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<td>V Lr/r</td>
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<tr>
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<td>Involution</td>
<td>Epiphora</td>
<td>3/0†‡</td>
<td>I/O r †‡</td>
</tr>
</tbody>
</table>

*Preop indicates preoperative; postop, postoperative; s/p Bleph, status postblepharoplasty; and s/p XRT, status postirradiation for epipharyngeal carcinoma.
†Paralysis and paresis refer to facial nerve function.
‡See Table 2 for explanation of scoring.
§See Table 1 for explanation of ectropion grades.
¶Could not complete questionnaire because of mental illness.
††Underwent bilateral procedures; results were symmetrical.
‡‡Underwent other cause before follow-up.
§§Not available for follow-up.

REFERENCES


CONCLUSIONS

We describe a new method for repositioning the lateral canthus and a grading system for evaluating the type and severity of ectropion. The posterolateral surgical approach may allow more surgical precision and refinement than did previous procedures, while preserving the anatomical relationships and function of the LCT and minimizing postoperative discomfort. Also, increased durability of the repair can be expected, as direct fixation of the lateral canthus through bone virtually eliminates dependence on the LCT, the weakest portion of the eyelid. Prospective analysis has confirmed the effectiveness of the procedure through marked subjective relief in the patient-based symptom severity analysis, as well as through objective improvement in the EGS grade.

It is our hope that use of the EGS will aid in personal evaluation and reporting of results and encourage objective comparison and prospective study of future improvements in technique.

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This project is dedicated to the memory of John R. Moe.

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