

Lateral Tarsal strip technique for correction of lower eyelid Ectropion.

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Abstract: Purpose: To evaluate lateral tarsal strip technique as a simple procedure that can be used in the presence of lateral canthal tendon laxity or malposition. The technique was used in this study on cases of involutional , paralytic, and cicatricial ectropion .The surgical outcome from different types of ectropion was compared and evaluated. **Patients and methods:** This retrospective study reviewed records of 30 patients (41 lids) who had undergone lateral tarsal strip from January-2008 to June-2010. All records were examined to determine the indications, management, outcome, postoperative complications and success rate. **Results:** A total of 17 males and 13 females made up the study groups. The mean age of the cohort was 59.15 +/- 6.2 yrs (range 4- 65 years).The average follow up period was 24 weeks .The patients were divided into 3 groups:Group A: 10 patients with bilateral involutional ectropion (20 lids). Group B: 10 patients with unilateral paralytic ectropion (10 lids). Group C: 10 patients with cicatricial ectropion 9 unilateral and 1 bilateral (11 lids). Most common presenting feature was persistent tearing, which was seen in all patients, others included lid laxity, lagophthalmos and unacceptable cosmesis. Thirty-five lids obtained satisfactory correction of eyelid ectropion with a simple lateral tarsal strip surgical procedure, while six lids required additional intra operative ancillary procedures to correct the remaining skin laxity, scleral show and residual ectropion. Common ancillary procedures used were excision of skin and muscle strip, lateral tarsorrhaphy and scar revision in severe cicatricial ectropion. Good aesthetic and functional results were achieved in 85% of cases.**Conclusions:** Lateral tarsal strip is a simple technique, which can be used in different types of eye lid ectropion. The technique is directed at correcting the anatomical defect, preserving the natural anatomy and maintaining the integrity of tear passage and outflow, rendering excellent cosmetic and functional results. The ancillary procedures used in our study are suggestive of a very specific role for lateral tarsal strip as a sole treatment in correcting various types of eyelid ectropion.

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1. Introduction

The lateral tarsal (LTS) strip is a simple procedure that can be used in the presence of lateral canthal tendon laxity or malposition. Most cases of laxity and non-cicatricial ectropion are caused by lateral or medial canthal tendon laxity or elongation. The eyelid shortening procedure generally involves removal of the mid tarsal portion of eyelid, which may cause notching, damaging tear passage or tear outflow structures and results in displacement of lacrimal punctum without addressing the cause of the defect. (1)The lateral tarsal strip technique is directed at correction of the anatomical defect, preserving the natural anatomy and maintaining the integrity of tear passage and outflow.

Involutional ectropion is the most common form of lower lid ectropion in which turning out of the lower eyelid causes tearing, conjunctival exposure, redness, and photophobia. Rarely, untreated ectropion may result in a corneal ulcer. The main factor giving rise to involutional ectropion is the progressive degeneration of elastic and fibrous tissues within the lid occurring with increased age.

This causes an imbalance between the usual forces acting on the lower eyelid, and the resulting eyelid laxity, both horizontal (tarsal plate and orbicularis) and vertical (lower eyelid retractors and orbital septum), allows the punctual eversion to occur first, then medial portion of the lid will turn outwards, finally the entire lid will turn causing frank ectropion.

Medical treatment with lubricants offer only temporary relief of symptoms (2,3,4); surgery remains the mainstay for permanent treatment. (5-11) Different operations have been described that address the pathophysiologic factors with apparently acceptable surgical outcomes. (11-27) So many operations have been described that it raises the question of whether surgical correction is ever 100% curative. It is generally accepted that, for the best results, surgery should address both horizontal and vertical laxity. (9,10,17,18,19,20,21,24,26,28-33)

Follow-up is particularly difficult in the group of elderly patients because they may be too unwell to report for follow-up, they may move, or

they may die. Often, the clinical follow-up is too short to establish the long-term results. (11)

There is a need for involitional malposition to be corrected with minimal surgical intervention and morbidity, producing an effective, sustained result. (34,35,36)

Patients with keratitis from paralytic ectropion pose a functional and aesthetic oculoplastic challenge. There is dysfunction with upper and lower eyelid retraction as well as horizontal laxity resulting in lower eyelid ectropion or sag, lagophthalmos, and a significant risk of exposure keratopathy. (37,38,39,40) This is greatest when there is coexistent corneal anesthesia and a greatly reduced vertical palpebral aperture that is needed to reduce the lagophthalmos.

The aims of rehabilitative eyelid surgery are multiple: to reduce the vertical palpebral aperture and not to shorten the horizontal palpebral aperture unduly and to improve eyelid closure, ocular surface lubrication, and the aesthetic appearance of the patient.

This technique is also useful in mild to moderate cicatricial lid ectropion as a single-step surgical procedure or even in severe cicatricial ectropion with ancillary procedures to remove the traction, being very important for reconstructing the normal position, anatomical structure and lid function. (41)

The approaches for accessing the inferior orbital rim and orbital floor are transconjunctival, subciliary, subtarsal, and subpalpebral to manage orbital trauma and lower lid blepharoplasty, all these methods have advantages and disadvantages, and the choice is usually a matter of personal preference. Regardless of the approach, malposition of the lower eyelid is a common long term complication. (42, 43, 44, 45) The malposition may include retraction of the lower eyelid to show the sclera inferiorly, or frank ectropion. (42, 43) The result is cosmetically unacceptable and may be associated with tearing, irritation, and other symptoms of exposure keratitis. Factors that contribute to such malposition include horizontal laxity of the lower eyelid, and scarring of the skin and middle lamella (orbital septum). To correct this malposition, we disinsert the lower eyelid, and use a lateral tarsal strip to tighten and replace the lateral canthus. This provides horizontal and vertical support to the lower eyelid. The tarsal strip technique is relatively simple, and can correct the malposition after operations for trauma. (46,47,48)

The aim of this study is to evaluate the surgical outcome of LTS technique in different types of lower eyelid ectropion .

2. Patients and Methods

This retrospective study reviewed records of 30 patients, 17 males and 13 females, with lower eyelid ectropion , 11 bilateral and 19 unilateral cases, with a total of 41 lids, who had undergone lateral tarsal strip from January-2008 to June-2010. All records were examined to determine the indication, management, outcome, postoperative complications and success rate. They all received an informed consent for the procedure. Thirty-five lids were corrected with a simple LTS surgical procedure, while six lids required an additional intra operative ancillary procedures to correct the remaining skin laxity, scleral show and residual ectropion.(Table 1)

Patients were divided into 3 groups :

Group A: 10 patients with bilateral involitional ectropion, 9 were corrected with a simple LTS surgical procedure and 1 required additional skin and muscle excision (20 lids).

Group B: 10 patients with unilateral acquired 7th nerve palsy , 9 were corrected with a simple LTS surgical procedure and 1 required additional lateral tarsorrhaphy (10 lids). All patients had marked facial palsy present for more than 1 year with lagophthalmos and keratitis.

Group C: 10 patients with cicatricial ectropion ,9 unilateral and 1 bilateral (11 lids).

From these 8 patients with postoperative mild cicatricial ectropion after blepharoplasty, complaining of unacceptable look, tearing, redness and photophobia due to mild lower eyelid ectropion , were managed by simple LTS. While 2 patients (3 lids) with severe traumatic cicatricial ectropion, were managed by total reconstruction of lower eyelid with scar revision in addition to LTS . (Table 1)

Methods

The preoperative assessment of each patient was recorded on a standard Performa. Details of any previous surgery was taken, lateral tarsal strip technique efficacy was assessed by abolition of lower eyelid with thumb which compresses the orbital fat, shortens and elevates the lid laterally giving a good idea about the outcome of the surgical technique. (Fig.1) The following tests and measurements were also included:

- 1- Lid Distraction Test: The lower eyelid is grasped centrally and pulled away from the globe as far as possible without causing discomfort and the maximum separation of the lower lid margin from the lower limbus is measured in the primary position.
- 2- Snap-Back Test: The lower eyelid is pulled down away from the globe, and then suddenly released; normally the lid return into normal position due to elasticity a second after release, if any delay

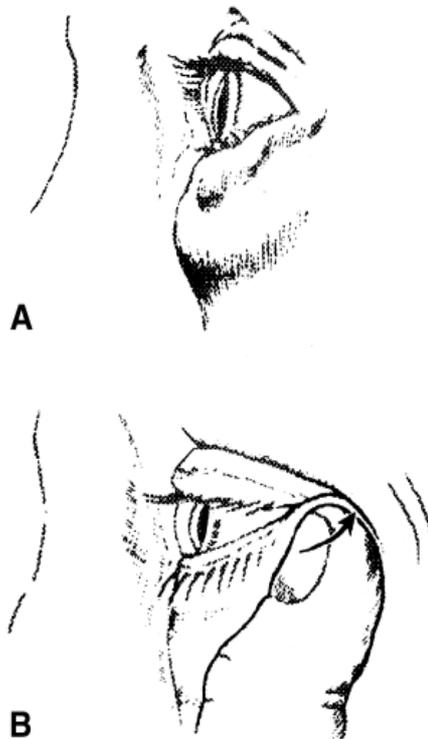
found it is calculated and the test is considered positive indicating horizontal lower eyelid laxity, stop watch was used to calculate the time.

- 3- Margin-reflex distance: Distance between lower eyelid margin and corneal reflex in the primary position.
- 4- Capsulopalpebral Fascia Disinsertion signs:

- Higher resting position of lower eyelid.
 - Incomplete lower eyelid movement with down gaze.
 - Pink horizontal band along lower fornix.
 - Deep lower fornix.
 - Absent lower eyelid crease
- 5- Rose Bengal staining Test: Kerato-conjunctival staining due to exposure.

Table 1: Base Line Characteristic

No. of patients		30	
Gender	Male:	17 Patients	56.6 %
	Female:	13 Patients	43.3 %
Age (Years)			
Mean		59.15+/-6.2 Ys	
Range		4 – 65 Ys	
Eyes	Right:	21 lids	
	Left:	20 lids	
Lid Malposition			
• Involitional ectropion:		20 Lids (10 Bilateral)	
• Paralytic ectropion (7th N palsy):		10 Lids (10 Unilateral)	
• Post operative Cicatricial Ectropion :		8 Lids (8 Unilateral)	
• Traumatic Cicatricial Ectropion:		3 Lids (1 Unilateral and 1 Bilateral)	



**Figure (1): A. Diagram showing left lower eyelid malposition
B. Abolition by thumb compression shortening and elevating lower lid laterally, with compressing of the orbital fat. (36)**

Table 2: Surgical Procedures.

Clinical Diagnosis	No. Patient.	Surgical procedure
<ul style="list-style-type: none"> Involitional Ectropion: 	9 patients 18lids 1 patients 2 lids	LTS LTS + Skin Muscle Excision
<ul style="list-style-type: none"> Paralytic Ectropion (7th N palsy): 	9 patients 9 lids 1 patients 1 lid	LTS LTS + LT
<ul style="list-style-type: none"> Post.oper. Cicatricial Ectropion: 	8 patients 8 lids	LTS
<ul style="list-style-type: none"> Traumatic Cicatricial Ectropion: 	2 patients 3 lids	LTS+ Scar revision

LTS: Lateral Tarsal Strip **LT:** Lateral Tarsorrhaphy. **Scar Revision:** Scar Excision + Rotational flaps.
Skin Muscle Excision: Removal of a horizontal skin and muscle strip along the whole width of the lower lids 3 – 4 mm from the lower lid margin.

Nine patients with involitional ectropion (18 lids) where operated with lateral tarsal strip as the only procedure to treat the lid pathology, one patients with bilateral involitional ectropion (2 lids) needed removal of a horizontal skin and muscle strip along the whole width of the lower eyelid , 3 – 4 mm from the lower lid margin to prevent over riding of the preseptal part of the orbicularis muscle over the pretarsal part, in this patient the lower lid was taught and puffy, the wound was closed by 6-0 prolene and the residual scar was cosmetically acceptable and augmented the lateral tarsal strip effect. (Fig. 2 a, b)

Ten patients with 7th nerve palsy were operated with LTS, (Fig. 3 a, b) in one case we performed lateral tarsorrhaphy (LT) to decrease the

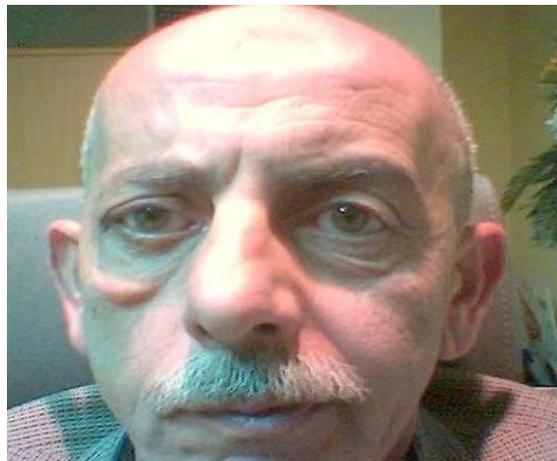
vertical inter-palpebral distance. (Fig. 4 a, b) The LTS perfectly aligned the lower lid malposition. In two patients with severe traumatic cicatricial ectropion, scar revision and rotational flaps were done, though the main surgical procedure to reattach the lower lid in its normal position was LTS, revision of the scar and flaps were done to eliminate traction and for cosmetic reasons, but still not enough alone to reconstruct lower lid malposition. (Fig. 5, 6)

In eight patients with mild post operative lower lid ectropion, LTS was perfectly the only surgical procedure. (Fig.7). All the operations in this study were performed by one senior surgeon, Marzouk MA. (Table 2)

**(Fig. 2a): Patient with involitional lower lid ectropion.****(Fig. 2b): Same patient after lateral tarsal strip with skin and muscle excision.**



(Fig. 3 a): Patient with lower lid ectropion due to right facial palsy.



(Fig. 3 b): Same patient with lower lid ectropion due to right facial palsy after simple lateral tarsal strip.



(Fig. 4 a): Patient with lower lid ectropion due to right facial palsy.



(Fig. 4 b): Same Patient after lower lid lateral tarsal strip & lateral tarsorrhaphy.



(Fig. 5 a): Patient with lower lid malposition due to car accident.



(Fig. 5 b): Same patient in operation room after lower lid reconstruction with lateral tarsal strip as a main surgical step for reconstructing LL position.



(Fig. 5 c): Same patient 2nd post operative day after lower lid reconstruction with lateral tarsal strip as a main surgical step for reconstructing LL position.



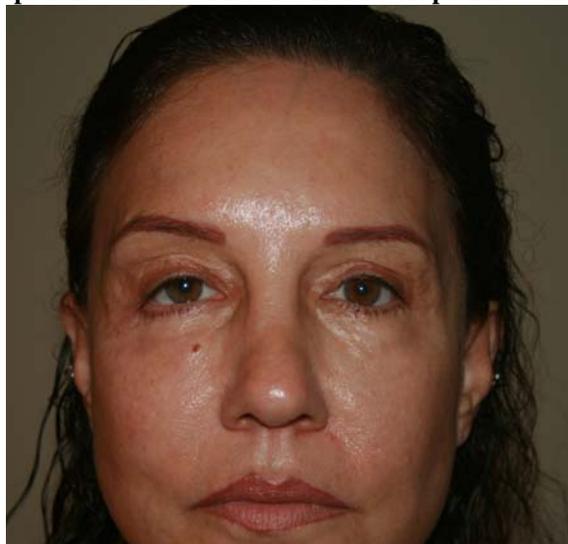
(Fig. 6 a): Patient with lower lid cicatricial ectropion.



(Fig. 6 b): Same patient with lower lid cicatricial ectropion at the operation room after scar revision and lateral tarsal strip to relocate the lower lid in its normal position.



(Fig. 6 c): Same patient with lower lid cicatricial ectropion 1 week postoperatively.



(Fig. 7 a): Patient with right lower lid ectropion due to lower lid blepharoplasty.



(Fig. 7 b): Same patient after simple lateral tarsal strip.

Surgical Methods

Surgery was performed under local anesthesia in 28 patients and under general anesthesia in 2 patients, one 4 years old kid not fit for local anesthesia and one patient with severe lid deformity which needs extended surgical procedures. Local anesthesia included tetracaine eye drops in the conjunctival sac and subcutaneous infiltration of the lower eyelid with 1:1 volume of lidocaine 2% with 1:200,000 epinephrine and bupivacaine 0.5%. The lateral canthus was also infiltrated down to the periosteum along with the lateral third of the upper eyelid.

A lateral canthotomy and inferior cantholysis were initially performed. A "tarsal strip" is fashioned from the lateral lower eyelid by stripping the superior mucocutaneous junction tissue, debriding conjunctival epithelium posteriorly, excising the anterior lamella, and making a linear incision inferiorly to create a "tendon" of tarsal plate. The length of the fashioned tendon is determined by assessing the desired tension required to tighten the lower eyelid. The tarsal strip is attached to the internal lateral orbital rim with a double-armed 5-0 polyglactin suture by creating a slip knot at the tendon and passing the 2 suture ends through the internal orbital portion of the lateral orbital rim periosteum. (49) The aim is to slightly overcorrect the height of the eyelid by placing the suture slightly more superiorly than the lateral canthal angle while maintaining a posterior vector of tension. Just before tying this suture, lateral canthal reformation is achieved with a single buried 6-0 polyglactin suture. Deep buried 6-0 polyglactin suture is used to close the lateral canthal orbicularis muscle followed by skin closure with interrupted 7-0 polyglactin suture. (50)

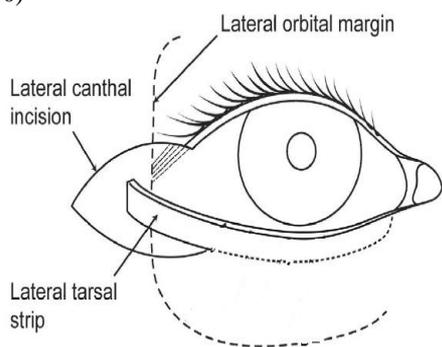


Figure (8): Diagram showing lateral tarsal strip procedure .(51)_

Antibiotic ointment was instilled in the inferior conjunctival fornix and suture sites, and a double eye pad was used for a firm dressing for 24 hours. Patients were asked to instill tobramycin eye drops 4 times per day for 3 weeks. Patients were asked to take care not to pull on their lower lid when instilling the drops because it could increase the risk of dehiscence. The first postoperative review in the outpatient clinic was 1 week after surgery. Patients were then reviewed again at 4, 8, 12, and 24 weeks postoperatively.

All patients were followed up for a minimum of 6 months to ensure that the late failures can be detected. Successful surgery was defined as resolution of lid malposition.

3. Results:

A total of 30 patients, 17 males and 13 females, made up the study groups. The mean age of the cohort was 59.15 \pm 6.2 yrs (range 4- 65 years). The average follow up was 24 weeks. The patients were divided into 3 groups :

Group A: 10 patients with bilateral involutional ectropion (20 lids).

Group B: 10 patients with unilateral paralytic ectropion (10 lids).

Group C: 10 patients with cicatricial ectropion 9 unilateral and 1 bilateral (11 lids).

Most common presenting feature was persistent tearing, which was seen in all patients, others included lid laxity, lagophthalmos and unacceptable cosmesis. Thirty-five lids obtained satisfactory correction of eyelid ectropion with a simple LTS surgical procedure, while six lids required an additional intraoperative ancillary procedures to correct the remaining skin laxity, scleral show and residual ectropion. Common ancillary procedures were excision of skin and muscle strip, lateral tarsorrhaphy and scar revision in severe cicatricial ectropion.

N.B: We excluded the 2 patients with severe cicatricial ectropion (3lids) from the statistical calculations as they gave us abnormal measurements due to fibrosis.

The preoperative tests and measurements were taken and statistically analyzed as follow:

-Lid Distraction test ranged from 14 to 15 mm with a mean of 14.4 \pm 0.48 mm in group A, and from 14 to 16 mm with a mean of 14.8 \pm 0.49 mm in group B and from 11 to 13 mm with a mean of 12.2 \pm 0.39 mm in group C.

-Snap-Back test was positive in all patients as the lids did not snap back except ,after blinking in group A , after forced eye closure in group B, and after multiple blinking in group C.

-Margin reflex distance ranged from 4.0 to 4.5 mm with a mean of 4.25 ± 0.25 mm in all groups.

-Capsulopalpebral fascia dehiscence signs: A higher resting position of the lower eyelid, inability of the lower lid to follow movement of the globe in down gaze and a deep lower fornix were noticed in all groups.

-Rose Bengal staining test was positive in all groups.

-Six months after surgical correction:

a- Lid Distraction test ranged from 9 to 10 mm with a mean of 9.4 ± 0.49 mm. The test results were highly significant $p < 0.05$ compared to preoperative calculation in all groups.

b- Snap-Back test ranged from 3 to 5 sec. with a mean of 3.8 ± 0.94 sec. The test results were significant compared to preoperative calculation in all groups.

c- Margin reflex distance ranged from 4.5 to 5.5 mm with a mean of 4.95 ± 0.36 mm. The test results were significant compared to preoperative calculation in all groups.

d- Rose Bengal staining decreased in all groups, indicating good functional results.

Functional and cosmetic success was achieved in 28 patients. No major complications were noted except for pain and tenderness over lateral canthal region, which was short lasting (1 week).

4. Discussion

Disorders that alter the delicate anatomy of eyelid margin can have serious effect on comfort and vision. The lower eyelid is analogous to tennis net. The net remains erect and straight because of its horizontal support at the net poles. If the horizontal support slackens, the net sags and is free to flop in to one court or the other depending on the wind. Management of such relaxation aims at restoration of the near-normal horizontal eyelid tone by horizontal lid tightening. Anderson and Gordy originally described the lateral tarsal procedure in 1979. The lateral tarsal strip procedure was found to be particularly useful for lower lid paralytic ectropion, involutional entropion or ectropion, lateral canthal tendon laxity or malposition, iatrogenic phimosis associated with recurrent entropion or ectropion after traditional lid shortening procedures and in elevating the lateral canthus and effectively deepening the fornix while tightening lax eyelids in surgically anophthalmic socket. (1)

In this study we divided 30 patients in to 3 groups according to the etiology of the lower eyelid ectropion, group A: involutional, group B: paralytic and group C: cicatricial.

We used a battery of simple clinical tests to evaluate lower eyelid ectropion in all cases.

The Lid Distraction test changed from 12-14mm before LTS, to 9-10mm, 6 months after LTS, this was highly significant. The Snap-Back test is difficult to quantitate (4). However by using a stop watch we found the test to be reliable and easy to perform. Snap-Back test before LTS in group A was on blinking, and in group B was on forced eye closure, and in group C was on multiple blinking, 6 months after LTS Snap-Back test changed to 3-5 sec. which was significant. Margin reflex distance changed from 4.0-4.5 mm before LTS, to 4.5-5.5 mm, 6 months after LTS, which was also significant. All our cases had extensive Rose-Bengal conjunctival and corneal staining which showed marked improvement in the degree of staining after LTS procedure.

The Snap-Back test reflects the lid elasticity, the Lid Distraction test reflects the overall relaxation and the Rose-Bengal staining reflects the objective ocular surface morbidity. This makes Rose-Bengal testing an important step in the preoperative evaluation of patients with border line lower eyelid laxity which when correlated with subjective complaints could be useful in decision making for surgery and in the evaluation of postoperative results. In our study one patient with involutional ectropion (2 lids) underwent excision of muscle and skin strip along with lateral tarsal strip as an ancillary procedure; one patient with facial palsy (1 lid) needed lateral tarsorrhaphy. Tarsal strips are an excellent adjunct to skin grafts in cases of cicatricial ectropion. Two patients (3 lids) in our series underwent full thickness rotational skin graft along with lateral tarsal strip. Lateral tarsal strip is relatively simple procedure and complications are rare. The most common complaint of patient is tenderness and mucus discharge at lateral canthal region, which were noted in all our patients during postoperative period. Other rare complications like pyogenic granuloma formation, suture abscess and wound dehiscence were not seen in our series. The patient undergoing lateral tarsal strip should be cautioned not to excessively rub or stretch the tight eyelid in immediate postoperative period and we routinely advise our patients for the same. LTS is a simple technique, which can be used in correcting various eyelid disorders, and renders excellent cosmetic and functional results. The multiple ancillary procedures used in our study are suggestive of a very specific role for lateral tarsal strip as a sole treatment in correcting various types of eyelid ectropion. (1)

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