HHS Public Access
Author manuscript
Ophthalmic Plast Reconstr Surg. Author manuscript; available in PMC 2023 March 23.

Lateral Tarsal Strip Complications With and Without Conjunctiva Stripping

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Abstract

Purpose: The lateral tarsal strip (LTS) procedure is commonly used to correct eyelid malposition. When performing LTS, some surgeons elect to remove conjunctiva from the tarsal strip, while others do not. It has been hypothesized that without conjunctival stripping, the buried conjunctival tissue can cause complications such as inclusion cysts and granulomas. However, there is limited data comparing LTS cases with and without conjunctiva removal. The authors sought to evaluate whether conjunctival stripping had any impact on complication rates with LTS.

Methods: LTS operations for ectropion correction were retrospectively reviewed and were separated into 2 cohorts, Con (conjunctiva not removed) or Coff (conjunctival removed). Charts were reviewed for outcomes and complications including inclusion cyst formation, granuloma formation, wound dehiscence, infection and focal rim tenderness.

Results: The complication rate was 10% vs 8% for Con vs Coff respectively ($p=0.54$). The common complications of LTS surgery were granuloma (4%), wound dehiscence (3%), focal rim tenderness (3%), and infection requiring antibiotics (<1%). There was no significant difference in these complications between the Con and Coff cohorts.

Conclusions: Complications in both groups were minimal, similar to prior studies, and there was no difference between the two cohorts. While it has been suggested that buried conjunctiva may result in increased complication rates, the author's findings suggest that removing the tarsal conjunctiva is a superfluous step in the LTS surgery and does not affect complication rates.

Precis:

Lateral Tarsal Strip (LTS) procedures with and without tarsal conjunctival removal have similar success and complication rates, including inclusion cyst, granuloma, wound dehiscence and infection.

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b- Financial Disclosures:
The authors have no relevant financial or conflicts of interest to disclose.

c- Conflict of Interest:
The authors have no conflict of interest to disclose.

Keywords

Lateral Tarsal Strip; Ectropion; Conjunctiva; Inclusion Cyst; Granuloma; Wound dehiscence; Infection; Complications; Conjunctival Stripping

Introduction

The lateral tarsal strip (LTS) procedure, first described by Anderson in 1979, is commonly used for the correction of lower eyelid malposition[1], such as involutional ectropion and entropion. Eyelid laxity results from stretching of the tarsal plate, stretching or dehiscence of the lateral or medial canthal tendon, or a combination of these[2,3,4,5,6]. Lower eyelid tightening is a central part in repairing lower eyelid malpositions[1,7,8,9,10,11] and can be achieved with various surgical techniques including LTS[1], eyelid wedge resection[12], and lateral canthal tendon plication[13]. While success rates with these techniques have been shown to be comparable, some authors propose that LTS surgeries may have higher complication rates compared to plication and wedge resection[12,14].

Complications of the LTS procedure include granuloma, inclusion cyst, persistent focal rim tenderness, infection, wound dehiscence, eyelid malposition and ocular surface irritation[2,7]. Several authors suggest that the conjunctival lining of the tarsal strip is a possible cause of post-operative inclusion cyst and granuloma formation[5]. In order to reduce the risk of these complications, many surgeons advocate removing the tarsal conjunctival surface by either scraping or cauterization prior to attaching the tarsal strip to the orbital rim periosteum[2,15].

However, the tarsal conjunctiva is not routinely removed in other surgeries in which the tarsus is sutured to surrounding tissues, such as “quick strip” or “mini-tarsal-strip” canthopexy[16], and various other canthopexy techniques[17,18], without an apparent increase in complication rates, particularly inclusion cysts. Additionally, some surgeons do not routinely remove the tarsal conjunctiva when performing LTS procedures, without apparent increased complication rates. The authors sought to retrospectively compare the complication rates for LTS procedures performed with and without tarsal conjunctiva removal.

Materials and Methods

This retrospective, comparative, consecutive case series reviewed patients who underwent lower eyelid ectropion repair with LTS (CPT codes 67917 and 67950) at Bascom Palmer Eye Institute between July 2016 to June 2021. The Institutional Review Board at the University of Miami School of Medicine approved the study (IRB #20190931). This study was Health Insurance Portability and Accountability Act-compliant with protection of individually identifiable information and adhered to the tenets of the Declaration of Helsinki as amended in 2013.

Cases of involutional and paralytic ectropion were included in the study. Exclusion criteria included cicatricial/mechanical/congenital etiologies, prior or concurrent tarsal or lateral canthal involving surgery, last clinical follow-up less than 12 weeks from date of surgery, and age <18 years old. In patients undergoing bilateral surgery, both sides were included in the analysis, as each represents a unique surgical site.

Data was collected from the patients' electronic records and included patient demographics, diagnosis, previous eyelid surgery, type of surgery performed, concurrent procedures, whether tarsal conjunctiva was removed or not, type of suture used for periosteal fixation, type of suture used for skin closure, residual or recurrent eyelid malposition, and need for further surgery. Charts were reviewed for complications during the follow up period including inclusion cyst, granuloma, wound dehiscence, infection and persistent (more than 2 months) focal rim tenderness. Anatomic success was defined as restoration of normal eyelid position. Residual or recurrence of laxity was documented, as well as any subsequent surgical correction.

Surgical technique for lateral tarsal strip was as follows: 1. Horizontal skin and orbicularis incision. 2. Lateral Canthotomy with or without inferior cantholysis. 3. Formation of the tarsal strip by splitting anterior and posterior lamellae at the grey line, followed by excision of the anterior lamella overlying the tarsal strip. 4. Debridement of the tarsal conjunctival epithelium with a #11 blade (only in the conjunctiva-off group). 5. Excision of the mucocutaneous junction at the lid margin. 6. Tarsal strip shortened as desired, then fixated to the periosteum using double armed suture (4–0 or 5–0 Vicryl or Mersilene). 7. Skin and orbicularis closure (most commonly 6–0 or 7–0 Vicryl or Plain gut). Lateral canthoplexy completed with LCT plication, wedge resection, or any other procedure that deviated from the above-mentioned steps were excluded from the study.

For analysis of the LTS procedure outcomes, the authors compared the two separate cohorts: surgeries in which the tarsal conjunctiva was removed (Conjunctiva-off, Coff) versus left intact (Conjunctiva-on, Con) prior to reattachment to the orbital rim. Surgical technique was dependent on surgeon preference. A total of 5 attending surgeons were included, with residents or oculoplastic fellows involved in all cases.

Statistical analysis was carried out using the Statistical Package for the Social Sciences 20.0 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY). Independent t-test was used for comparing patient population characteristics. Success and complication rates were compared using independent t-test, χ^2 and fisher's exact test.

Results

239 LTS operations from 168 patients (71 bilateral) met inclusion criteria and were separated into two cohorts, Conjunctiva on (Con, n=105, 44%) and Conjunctiva off (Coff, n=134, 56%). Mean age was 75.8 years old ± 0.87 (range 24 to 97), female gender made 48.2% of the cohort, and 50.2% were left sided procedures (Table 1). The mean follow-up was 53.8 weeks ± 2.5 weeks (median 41, range 12–194). Indications for ectropion repair included cranial nerve VII paralysis (21/239), lateral canthal tendon disinsertion (38/239), floppy eyelid syndrome (27/239), and involutional ectropion (208/239). In all cases of Coff LTS, the conjunctiva was removed by scraping with a #11 Bard-Parker blade. Besides the studied Con vs Coff variation of the LTS procedure, the surgical technique was identical

amongst the different surgeons with two small variations noted. First, in all Coff cases, the mucocutaneous border of the tarsal strip was removed with sharp Westcott scissors (100%), while in the Con cases it was typically (92%), but not always removed. Second, inferior cantholysis was performed in 89% of LTS cases.

The post-operative complications following LTS were minimal. Complications were reported in 9.2% (22/239) of cases, which included granuloma formation in 3.8% (*9/239),* wound dehiscence 2.5% *(6/239)*, persistent focal rim tenderness 2.5% *(6/239)*, and infection <1% *(1/239).* Notably, there were no inclusion cysts seen *(0/239)*. The complication rates were similar amongst the Con and Coff groups and there was no statistical differences (Table 2). Complications were mostly transient in nature and very few required interventions. Four granulomas were excised, one wound dehiscence had additional suture placed, one infection resolved with antibiotics (oral Augmentin 875–125 BID for 10 days). Of note, there was no use of routine perioperative antibiotics. There were no patients that had complications occur bilaterally.

Two suture types were used for anchoring the tarsal strip to the periosteum: 4–0 and 5–0 polyglactin 910 sutures (Vicryl, Ethicon, Summerville, NJ, USA) and 4–0 and 5–0 ethylene terephthalate (Mersilene, Ethicon, Summerville, NJ, US) were used in 70% (168/239) and in 25% (71/239) of cases, respectively. Rate of granuloma formation was greater with ethylene terephthalate use, occurring in 7% of cases compared to 2% with polyglactin 910 (p=0.09). The complication rates for infection, wound dehiscence, persistent focal rim tenderness, and inclusion cyst were similar and did not show a statistically significant difference (Table 3).

Anatomic success was common, with recurrence or residual ectropion present in only 14% (33/239) of cases. Subsequent surgery for incomplete anatomical correction occurred in 12% (28/239) of cases. There was no statistically significant difference in the rate of recurrence/ residual ectropion (13% and 16%, p=0.41) for Con LTS and Coff LTS respectively. Amongst all LTS surgeries, 22% (6/27) of patients with floppy eyelid syndrome had residual or recurrent ectropion after surgery, nearly 2 times greater than the rate seen in patients without floppy eyelid syndrome (12.6%), although this was not statistically significant (p-value = 0.13).

Discussion

Horizontal lid laxity, a major pathophysiologic contributor to ectropion formation, can be corrected with LTS, canthal plication, and wedge resection. LTS has the advantage of directly correcting anatomical defects (canthal malposition, lid shortening), preserving an almond-shaped canthal angle, and avoiding potential ocular surface complications from marginal lid sutures, lid notching, and misdirected lashes[6]. As well, performing an LTS gives the surgeon the ability to horizontally shorten a loose eyelid more than a canthal plication can, while avoiding a full thickness excision of the eyelid that a wedge resection requires. Some reports suggest that LTS procedures may have a higher complication rate than other eyelid tightening procedures. This is speculated to be caused in part due to the combination of residual and subsequently buried tarsal conjunctiva, disrupted tarsus, and buried Meibomian glands that theoretically increase potential for inclusion cyst, granuloma, and infection.

This study found no significant difference in complication rates of LTS procedures performed with and without conjunctiva excision. Of the 239 procedures, 22 (9.2%) presented with complications which were mostly transient in nature, resolved without intervention, or were asymptomatic. The exceptions were one case of wound dehiscence that had an additional suture placed in the early post-operative period, four granulomas that were excised, and one infection that resolved with antibiotics. The most commonly encountered complication was granuloma formation, followed by wound dehiscence, focal rim tenderness, and infection. Notably there were no inclusion cysts.

The results from this study in the Con LTS group are similar to those reported by Liu[23]. He described tightening the lower eyelid by attaching the tarsal plate to the periosteum with 6–0 nylon sutures via a lateral canthotomy followed by full thickness eyelid resection to expose the lateral end of the tarsal plate, without conjunctival scraping. He reported a similarly low complication rate of 7.4%, including 3/121 (2.4%) granulomas. The authors speculate that the tarsal conjunctival lining is not implicated in the pathophysiology of the observed post-operative complications including granuloma and cyst formation.

The LTS group as a whole achieved 86% success rate, with no difference between the Con and Coff groups. The success rate was nearly 90% excluding the cases of floppy eyelid syndrome, of which only 21/27 (78%) had complete ectropion correction. Floppy eyelid syndrome represents one of the more difficult ectropion etiologies to treat given the propensity for horizontal and vertical laxity to recur. In these patients careful pre-operative planning is necessary, and additional eyelid shortening procedures, such as wedge resection, may be necessary to achieve sufficient and sustainable lower lid tightening.

The anatomical success rate between the two cohorts was similar. This is not surprising, as alteration of the of the tarsal conjunctiva is not implicated as a potential mechanical failure point of the surgery. From a biomechanical standpoint, the stability of the surgery relies on the periosteum to serve as a tension bearing structure (could fail if a needle slices along, rather than passing underneath the periosteum), and the tarsus to remain firmly attached to periosteum (could fail if suture cheese-wires through tarsal plate or if cut tarsal end does not scar firmly to the periosteum if absorbable suture is used). Removal of the tarsal conjunctiva would not be expected to affect either of these processes, and therefor reasonable to assume has no effect on the longevity of the procedure.

Two suture types, Vicryl and Mersilene, on spatulated needles, were used to anchor the tarsal strip to the periosteum. The optimal type of suture material used, absorbable versus non-absorbable, has been questioned. In his original paper, Anderson describes anchoring the tarsal strip to periosteum using 4–0 Vicryl suture on a semi-circular needle[1]. The concern was that a triangular cutting needle poses greater risk of slicing through periosteum, rather than going under it, rendering it less mechanically capable of serving as a tension bearing structure. As a result, 5–0 Vicryl on a spatulated needle is now commonly used. As mentioned, a potential point of mechanical failure includes the failure of the tarsal plate to form a strong adhesion to the periosteum through scar formation. The tensile strength of absorbable Vicryl suture gradually diminishes over several weeks, and the question is whether this is sufficient time to establish the tarsus-periosteum union. Some surgeons elect to use a permanent suture such as Mersilene for this reason.

Although Mersilene may provide greater duration of tensile strength, there is concern for higher rates of suture granulomas. Previous studies have shown increased complication rates with non-absorbable suture (particularly Mersilene) in abdominal wall closure[24,25], however limited data exists in the oculofacial literature. In our study, there was a higher rate of granuloma formation when Mersilene was used compared to Vicryl (7% vs 2%). Although LTS surgeries that utilized Merseline had over three times the rate of granuloma formation compared to Vicryl, this difference was not statistically significant (p=0.09). Future studies are needed that focus specifically on the association between suture type and granuloma formation in oculofacial plastic surgery.

Hsuan and Selva[2] evaluated the use of an absorbable suture (6–0 Vicryl) in LTS surgeries for either entropion or ectropion and found 4/104 cases of wound infections, 3/104 cases of wound dehiscence and 1/104 cases of granuloma formation. They concluded that the LTS carries an increased risk of wound infection, although they did not attribute this to the absorbable suture used. Our results show similar complication rates in both Con LTS and Coff LTS groups when stratified by suture type.

In conclusion, these findings suggest that the pathophysiology of granuloma and cyst formation, infection, and wound dehiscence is most likely not attributable to buried, non-excised tarsal conjunctiva. An alternative possibility is that debridement of the tarsal conjunctiva does not adequately remove the tissue to alter the complications encountered. Suture type used was the only variable identified to change the complication rates, with higher rates of granuloma formation occurring with Mersilene suture compared with Vicryl. However, it should be noted as previously mentioned, that Mersilene is a permanent suture that some surgeons believe to be better for long-term anatomic success.

While removal of the tarsal conjunctiva on the tarsal strip is not particularly time-consuming, these maneuvers are not without risks. Excessive cautery can lead to tarsal strip break-down, requiring the surgeon to lengthen the tarsal strip to allow for adequate anchoring, and to shorten the lid more than initially intended[23].

Limitations to this study stem from its retrospective design and multiple surgeons. However, the relatively large data-set, and comparison of two distinct surgical methods help to increase the robustness of this study's findings. Given that no inclusion cysts were noted, it is a possibility that the study was underpowered, despite the relatively large data set.

Acknowledgments

a- Funding/Support:

The Bascom Palmer Eye Institute is supported by NIH Center Core Grant P30EY014801 and a Research to Prevent Blindness Unrestricted Grant (New York, NY, USA).

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Table 1.

Number of cases, age, sex, laterality.

	All LTS	Con	Coff
Number of operations	239	105	134
Age (years)	75.8	75.2	76.2
Female	48.2%	52.4%	44.8%
Left Side	50.2%	50.5%	50.0%

Abbreviations: Lateral Tarsal Strip (LTS), Conjunctiva-on (Con), Conjunctiva-off (Coff)

Table 2.

Comparison of post-operative complications between Con vs Coff LTS

Complication	Con	Coff	P value
Any complication	10% *(11/105)*	8% *(11/134)*	p=0.54 *
Granuloma	5% (*5/105)*	3% *(4/134)*	p=0.47 *
Wound Dehiscence	2% *(2/105)*	3% *(4/134)*	p=0.60 *
Focal Rim Tenderness	3% *(3/105)*	2% *(3/134)*	p=0.76 *
Infection	1% *(1/105)*	0% *(0/134)*	p=0.44 **
Inclusion Cyst	0% *(0/105)*	0% *(0/134)*	p=1.0 **

Abbreviations: Conjunctiva-on (Con), Conjunctiva-off (Coff);

* Chi square test,

** Fisher exact test

Table 3.

Post-operative complications by suture type used for tarsal strip periosteal anchoring

Complication	Vicryl	Mersilene	P value
Granuloma	2% *(4/168)*	7% (5/71)	P=0.09 *
Infection	<1% *(1/168)*	0% *(0/71)*	P=1.0 **
Dehiscence	3% (*5/168)*	0% *(0/71)*	P=0.33 **
Focal Rim Tenderness	3% (*5/168)*	0% *(1/71)*	P= 0.48 *
Inclusion Cyst	0% (0*/168)*	0% *(0/71)*	P= 1.0 **

* Chi square test,

** Fisher exact test