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ORIGINAL ARTICLE

Comparative study of everting sutures versus everting sutures and lateral tarsal strip for correcting primary lower lid involutional entropion

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Objective

Everting sutures are a surgical technique used to bring the edges of a wound or incision together, ensuring proper healing and minimizing scarring. The goal of this study is to investigate whether there exists a significant disparity in the surgical results between using everting sutures (ES) alone or combining them with a lateral tarsal strip (ES+LTS) when treating primary involutional entropion. By comparing the outcomes of both methods, we aim to gain a deeper understanding of which one is more effective in addressing this condition.

Methods

In this prospective randomized comparative study. A total of 52 patients were given the chance to have surgery to fix this issue. After obtaining informed consent, these brave individuals were randomly assigned to two groups: one group received ES alone, while the other group received ES+LTS. Each patient was evaluated multiple times post-surgery to ensure everything was healing properly. These evaluations took place one week, three months, six months, twelve months, and fifteen months after the surgery.

Results

After undergoing surgery, patients eagerly await a successful outcome. In the case of eyelid surgeries, success is determined by a normal eyelid position at rest, which should be achieved within 15 months of the procedure. Unfortunately, 8 patients were lost to follow-up, leaving us with data from 52 patients. Among these patients, there were 10 failed surgeries for those who underwent ES alone, while those who underwent ES+LTS only experienced 1 failed surgery. Despite the setbacks, the majority of patients experienced successful results and were able to enjoy the benefits of the surgery.

Conclusion

These data unequivocally shows that patients who underwent ES+LTS procedures had a significantly higher success rate after 15 months compared to those who received ES alone. In other words, the numbers don't lie, and the evidence is indisputable - ES+LTS procedures are the way to go for optimal results.

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Involutional (senile) entropion is a medical condition that can affect the eyes, particularly in older individuals. This condition is caused by a weakening of the muscles and tendons around the eyelids, which can lead to the eyelid turning inward and causing the eyelashes to irritate the cornea and conjunctiva, leading to discomfort, tearing, and blurred vision.[1] This condition can be caused by several factors, including weakening of the muscles and ligaments that support the eyelid, as well as changes in the skin, leading to sagging and drooping of the eyelid. While entropion can occur in both men and women, it is more commonly observed, with a prevalence rate of 2.4% in women compared to 1.9% in men.[2] This difference in prevalence rates between genders could be attributed to differences in the anatomical structure and composition of the eyelids, hormonal changes, or environmental factors.[3] One of the most effective ways to treat involutional entropion is through surgical intervention. This process involves tightening the muscles and ligaments that support the eyelid or even repositioning the eyelid margin.[4-11]

Eyelashes can rub against the delicate cornea and conjunctiva, leading to irritation and even impaired optical function of the eye.[4,6,8-12] This chronic irritation can cause serious conditions such as conjunctival scarring, corneal ulceration, and even blindness. That's why early intervention is crucial to prevent tear film instability, recurrent corneal abrasions, and other severe complications.[1,13,14] This issue is so important that a current study was conducted to shed light on the problem and find solutions.

The purpose of this study is to compare the efficacy and the success rate of both procedures in terms of stability and how long it lasts, with particular emphasis on the role of the horizontal lid laxity and its influence on surgical modality.

METHODS AND MATERIALS

This case series features 52 eyelid operations and offers a unique perspective on their effectiveness. By comparing different interventions, this study sheds light on the best approaches for improving eyelid function with symptomatic involutional entropion was performed. The ethical medical committee-Mosul College of Medicine was approved. In addition, consent forms for the evaluation of data and surgical intervention were obtained from all patients.

Patients with lid malposition were referred to our clinic by a local optometrist and family medicine physicians for evaluation and potential selection for primary lower lid entropion surgery. The study duration is three years (2017 to 2020), suitable candidate patients who attended our clinic were sub-classified into, group 1 treated with the ES (n=26) and group 2 treated with LTS+ES (n=26)

Inclusion criteria: primary Lower lid entropion, which is symptomatic and disturbing the patient causing watering and visual disturbance at rest.

Exclusion criteria: Excluding patients with postsurgical, cicatricial, congenital entropion, or previous entropion repair was a necessary step in the study. This ensured that the sample group was free from any pre-existing conditions that could potentially skew the results.

Surgical methods

All surgical procedures were performed under local anaesthesia, this included the use of tetracaine eye drops to numb the conjunctival sac and a subcutaneous injection of 2% xylocaine with epinephrine 1:100 000 to the lower eyelid. The result A virtually pain-free experience for our patients.

Everting suture techniques (ES)

After the lower eyelid is appropriately anaesthetized, as mentioned above, prepping and draping of the surgical field are done in a sterile manner. A three-set of double-armed 6-0 polyglactin sutures (Vicryl®, Aurolab, India) are passed through the conjunctiva deep within the inferior fornix. They are equally spaced medially, centrally, and laterally, avoiding the punctal area as it causes punctal ectropion and epiphora. First, an arm of the suture is passed through the conjunctiva deep within the fornix and then brought up through the retractors of the lower lid, passing through the orbicularis and exiting the skin at the lower eyelid crease (about 2-3 mm inferior to the lash line). The other arm of the double-armed suture is then passed with approximately 4 mm next to its fellow. Once this manoeuvre is repeated with all three sutures, the arm of each suture is then trimmed and tied on itself directly onto the skin, aiming to

Table 1 *Demographic parameters of the studied sample*

Parameters	ES. alone single procedure (n=26) No. (%)	ES-LTS combine procedure (n=26) No. (%)	Total (n-52) No. (%)	p-value*
Age (years)				
< 70	2 (7.7)	3 (11.5)	5 (9.6)	0.638
70 - 80	19 (73.1)	12 (46.2)	31 (59.6)	*0.048*
≥ 80	5 (19.2)	11 (42.3)	16 (30.8)	0.071
Mean age ± SD (min-max)	76.31 ± 5.09 (68 - 89)	78.23 ± 5.03 (68 - 87)	77.27 ± 5.10 (68 - 89)	
Sex				
Male	11 (42.3)	8 (30,8)	19 (36.5)	0.388
Female	15 (57.7)	18 (69.2)	33 (63.5)	

** Chi-square test*

induce slight overcorrection. The suture is left in situ to generate scarring as they disintegrate, glueing the inferior tarsal plate to the tightened inferior retractors.

Lateral tarsal strip (LTS) with everting sutures (ES)

The surgeon first numbs the area with local anaesthesia and performs a lateral canthotomy and inferior cantholysis to detach the lower eyelid from the orbital rim. Then, they create a tarsal strip using a linear incision and anchor it to the internal lateral orbital rim with a suture. The surgeon slightly overcorrects the lid height and then closes the lateral canthal orbicularis muscle and skin with sutures.

Postoperative care

After the surgical procedure for ectropion or secondary entropion, postoperative care involves instilling fusidic acid eye ointment and using a two-layer eye pad for 24 hours. Patients are instructed to use ofloxacin 0.3% eye drops four times a day for two weeks and not to pull on their lower lid. Follow-up visits are scheduled at various intervals up to 15 months post-surgery to ensure the surgical outcome is successful. Recurrence of ectropion or secondary entropion is defined as failure.

RESULTS

The study enrolled 58 patients with a mean age of 77 years. Six patients were excluded due to incomplete follow-up. Of the remaining 52 patients, they were divided into two equal groups ES and ES+LTS group and reviewed by an ophthalmologist. Both groups were similar in age, gender, and eye operation. After analyzing the data, we found that 52 of eligible for further investigation. These patients were then split into two groups - the ES group and the ES+LTS group - and were evaluated by an experienced ophthalmologist. Interestingly, we found that both groups were quite similar in terms of age, gender, and previous eye surgeries.(Table 1 and Table 2).

Concerning age (Table 3), three age categories were designed. The first age group was those below 70: two cases underwent ES alone, and 3 underwent the combined procedure, and, interestingly, none of

Table 2 *Distribution of involutional (senile) entropion between right and left eyes*

Parameters	ES. alone single procedure No. (%)	ES-LTS combine procedure No. (%)	Total No. (%)	p-value*
Eye				
Right	13 (50.0)	11 (42.3)	24 (46.2)	
Left	13 (50.0)	15 (57.7)	28 (53.8)	0.578
Total	26 (100.0)	26 (100.0)	52 (100.0)	

** Chi-square test*

Table 3 *Demographic parameters and types of procedure and failure rate of Involutional (senile) entropion*

Parameters	Successful (n=41) No. (%)	Failed (n=11) No. (%)	Total (n-52) No. (%)	p-value*
Age (years)				
< 70	5 (100.0)	0 (0.0)	5 (100.0)	*0.025*
70 - 80	22 (71.0)	9 (29.0)	31 (100.0)	*0.020*
≥ 80	14 (87.5)	2 (12.5)	16 (100.0)	*0.003*
Mean age ± SD (min-max)	77.00 ± 5.57 (68 - 89)	78.27 ± 2.72 (75 - 85)	77.27 ± 5.10 (68 - 89)	
Sex				
Male	28 (84.8)	5 (15.2)	33 (100.0)	*0.000*
Female	13 (68.4)	6 (31.6)	19 (100.0)	0.108

** Z test of one proportion.*

them failed the procedure regardless of the methodology used (P=0.025). Likewise, those above the 80s were five cases subjected to ES procedure, and 11 patients for a combined approach, 14 patients (87.5%) achieve success. Just two cases (12.5%) experienced a recurrence of entropion (failed procedure) (P=0.003). However, for those in the 70-80 age bracket: a total of 31 cases, with 19 patients in group one and 12 in group 2, their success rate was much lower at 71% (22 cases) with 29% (9 cases) failure rate. (Tables 3 and Table 4). There was a statistically significant difference in the success and failure rate between the two procedures the former was 39% and 61%, while the latter was 90.9% and 9.1%, respectively (P=0.002).

Although there was no statistically significant difference between the two groups regarding the horizontal lid laxity (Table 5), those in group 1 tend to have slightly higher HLL (8.0-10.8 mm) versus 7.5-10.6 mm) in the second group (P=0.88).

In terms of complications (Figure 1), it seems that suture-related granuloma occurred solely in the second visit (3 months postoperatively). On the other hand, failure of the procedure occurs mainly in the third visit (five cases), which was in the six months post-surgery; nevertheless, two cases of failure were noted one year (fourth visit and another case in the fifteenth month after surgery. Happily, no instances of ectropion happened in either category of intervention.

DISCUSSION

Different methods have been described for treating involutional entropion.[15-17] Therefore, this study compared ES with ES+LTS as a primary surgical methodology for repairing senile lower eyelid entropion.

Everting sutures alone with a long-term recurrence rate of 15% (mean follow-up 31 months).[18] The

Table 4 *Failure rate of ES and ES-LTS procedures*

Parameters	Successful No. (%)	Failed No. (%)	*p*-value
ES. alone single procedure	16 (39.0)	10 (90.9)	0.002
ES-LTS combine procedure	25 (61.0)	1 (9.1)	
Total	41 (100.0)	11 (100.0)	

Table 5 *FHLL preoperatively in ES and ES-LTS procedures*

Parameters (n=52)	No (%)	HLL pre-operatively in mm (min-max)	Mean ± SD	p-value
Procedure				
ES. alone single procedure	26 (50.0)	(8.0 - 10.8)	9.07 ± 0.71	0.887
ES-LTS combine procedure	26 (50.0)	(7.5 - 10.6)	9.10 ± 0.84	
Final Result				
Successful	41 (78.8)	(7.5 - 10.6)	9.00 ± 0.76	0.140
Failed procedure	11 (21.2)	(8.0 - 10.8)	9.39 ± 0.78	

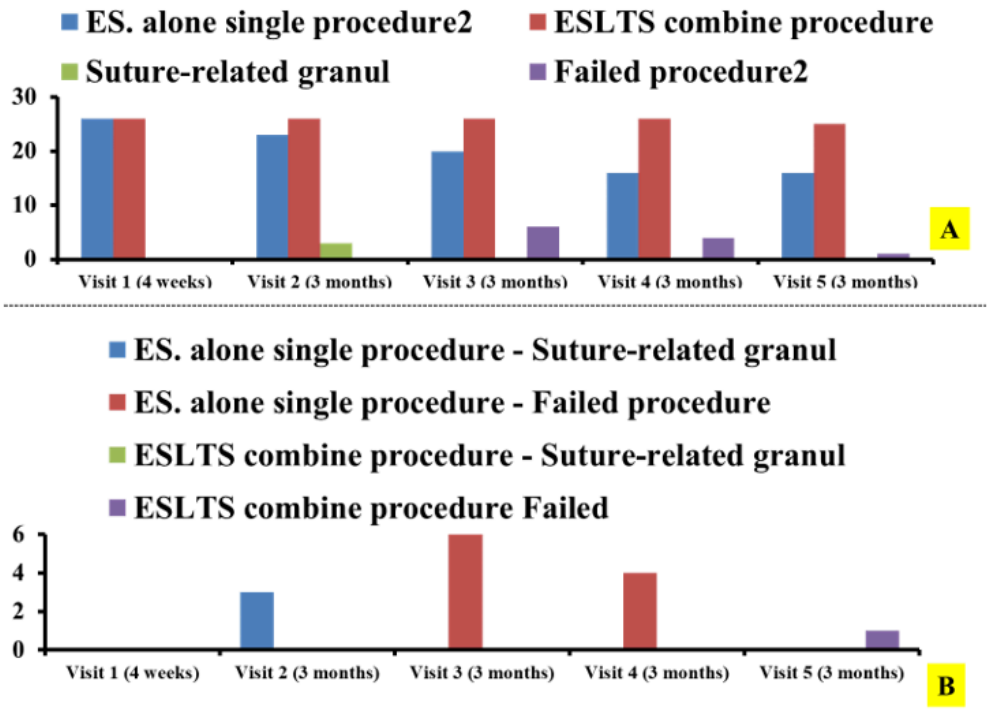

Figure 1 *Complications of procedures*

ES+LTS procedure has a variable success rate recorded in the literature. the success rate varies. In one study, conducted by Barnes et al, the recurrence rate was only 2% (based on a mean follow-up of 18 months).[19] However, another study by Ho et al, showed a recurrence rate of 9.4% when ES+LTS was performed as the primary procedure (at a mean follow-up of 2 years).[20] Hence, it is important to consider all factors when deciding on the best treatment option

Based on the results of a randomized comparative trial conducted under the guidance of a single surgeon, this study confirms the earlier findings of Barnes et al.[19] The trial compared the efficacy of two different plans of action and found that a combined approach of ES+LTS was significantly more successful in treating lower eyelid entropion. This study emphasizes the importance of addressing horizontal lid laxity in surgical procedures for lower eyelid entropion. By anchoring the tarsal strip to the orbital margin during the LTS procedure, the lower lid's lateral insertion is prevented from rotating, which may further hamper recurrent entropion. It suggests that the vertical component of involutional entropion is not as crucial as the horizontal component in achieving surgical success. In short, this research highlights the significance of using a combined approach and addressing horizontal lid laxity in lower eyelid entropion surgery to achieve better outcomes.

Despite both groups having similar levels of horizontal lid laxity, it was found that the average length of laxity was slightly longer in patients who experienced a recurrence of their entropion within group one (the ES group). However, these differences were not significant enough to be considered statistically significant. According to our research, it would be prudent to fix horizontal lid laxity when dealing with entropion surgically to lower the chance of recurrence of such senile laxity. To address the duty of the horizontal lid component, A more extensive investigation and follow-up would be prudent for determining the success or the failure of such reconstructive surgery. Moreover, it might be worthwhile inquiring whether group one recurrence is more frequent in those who are presenting with a greater extent of horizontal laxity. failure is more common in patients presenting with greater degrees of horizontal lid laxity.

In this study, the difference between gender in the two groups was statistically significant, indicating a higher incidence of involutional entropion in females than in their male counterparts. This study is in

agreement with many publications. For example, in a study by Boboridis et al, there were 41 male and 61 female patients,[21] and in a survey by Damasceno et al, the prevalence was 2.4% in female patients and 1.9% in male patients which may be due to the smaller tarsal plate in female than in male populations.[2] However, this is in disagreement with Abdel Fattah et al[22], in which the number of male patients was 20. In contrast, the number of female patients was six, and in the study by Tsang et al,[23] in which the number of male patients was 26 and the number of female patients was 25; however, they did not explain the cause.

In this study, recurrence rate occurred in 90.9% (10 cases) that underwent ES stand-alone procedure compared with only one patient (9.1%) recurrence in ES+LTS, indicating a higher recurrence rate with ES compared with ES+LTS (P=0.002), which is following many studies.

The first group, in which there is tightening of the lower lid retractor indirectly so that it deals with the vertical component of lower eyelid laxity, has a higher recurrence rate (90.9%), chiefly if applied for significant case eyelid laxity. Despite the above-mentioned fact, it is still an easy procedure to be performed, mandating simple and basic skills of surgery as well as being a repeatable procedure. The LTS method tightens the lid laterally, hence dealing with the horizontal component of lower eyelid laxity.

When it comes to fixing droopy eyelids, it's important to consider how much they sag horizontally. If there's a lot of sagging, then traditional stitching techniques won't be enough to fix the problem. Our research has shown that horizontal sagging is more important than vertical sagging when it comes to fixing age-related eyelid droop.[23] That is the reason we recommend a procedure called LTS, which involves tightening the lower lid horizontally. This technique is crucial for reconstructing the eyelid and reversing the effects of entropion, even if there is no obvious horizontal sagging. Other studies have also recommended this technique as the go-to option for fixing droopy eyelids.[24-26]

Our latest findings confirm what many published studies have suggested: tackling both the horizontal and vertical components of lower lid laxity using a combined procedure leads to the most successful anatomical correction, with very little chance of recurrence. This means that patients are more likely to be satisfied with the results in the long term.[27-29]

CONCLUSION

The information in this paper presents solid ground that the success rate at 15 months is higher in patients treated with combined technique than in ES stand-alone procedure. HLL is best dealt with using a lateral tarsal strip as a horizontal factor is far more important that the vertical one. We do recommend using both Lateral tarsal strip and everting sutures at the same time to optimize healing and minimize complications and recurrences.

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