Mini-incisional Buried Everting Suture and Transcanthal Canthopexy for Involutional Lower Eyelid Entropion: A Retrospective Study.

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Abstract

Background: Everting suture is a simple technique for correcting involutional lower eyelid entropion but is limited by high recurrence, ectropion from unaddressed lid laxity, and granuloma risk from exposed sutures. Combining it with transcanthal canthopexy and buried sutures may reduce these complications.

Purpose: This study aims to evaluate the clinical efficacy of the everting sutures with transcanthal canthopexy (ESTC) technique, utilizing a buried suture method, for the treatment of lower eyelid involutional entropion in Thai patients.

Methods: A retrospective, non-comparative, interventional case series was conducted by reviewing medical records at Samutprakarn Hospital, Thailand. Data were collected from patients diagnosed with involutional entropion who underwent the ESTC technique between January 2021 and December 2023. The primary outcome was the recurrence rate and complications. Secondary outcomes included demographic data, medical history, medication use, severity of eyelid laxity and meibomian gland dysfunction, operative duration, and follow-up time.

Results: Fifty-nine eyelids from 50 patients were included, with an average age of 75.69 ± 7.6 years and a male-to-female ratio of 0.92:1. Among the treated eyelids, 20 (33.9%) underwent ESTC while patients were on aspirin or warfarin. The mean postoperative follow-up period was 15.59 ± 8.13 months, with a recurrence rate of 18.64% observed at a mean follow-up of 11.91 ± 8.46 months. No perioperative or postoperative complications were reported.

Conclusion: The everting suture with transcanthal canthopexy technique demonstrates a promising lower recurrence rate compared to conventional methods for correcting involutional lower eyelid entropion in Thai patients, even in those receiving anticoagulant therapy in over 30% of cases.

Conflicts of Interest: none

Keywords: Buried suture knot, Everting suture, Involutional entropion, Quickert suture, Transcanthal canthopexy

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Introduction

Involutional entropion is a common eyelid malposition in the elderly, characterized by the inward turning of the eyelid. This condition results in the lashes rubbing against the eye, leading to discomfort and the potential for corneal damage. Various surgical procedures have been described to correct this disorder.

One of the simplest methods is the application of everting sutures(ES), which can be performed in an outpatient clinic and does not require cessation of anticoagulant therapy prior to surgery.[1-3] However, a significant limitation of this procedure is its high recurrence rate, which has been reported to range from 22% to 58.8%.[1-5] Studies indicate that recurrent malposition of

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the eyelid is significantly more likely when horizontal eyelid shortening is not included in the surgical approach.[5,6] Additionally, the use of resorbable sutures that pass through the skin and remain in place may increase the risk of infection and the formation of granulomas.[2,7]

To overcome these limitations, adjunctive procedures have been explored. Combining ES with a lateral tarsal strip (LTS) has demonstrated improved long-term outcomes by simultaneously correcting vertical and horizontal laxity.[7-9] However, reported complications include postoperative canthal deformity and cellulitis.[7,10]

Transcanthal canthopexy is a promising alternative, offering eyelid-tightening without the need for lateral canthal tendon detachment or canthotomy.[11] Compared to LTS, transcanthal canthopexy involves a smaller incision, reduced operative time, and faster recovery. This technique effectively addresses horizontal eyelid laxity during entropion repair.[10]

In this study, we investigate the efficacy of performing everting sutures combined with transcanthal canthopexy (ESTC) using a buried suture technique. This less invasive approach aims to achieve eyelid suspension, thereby improving surgical success rates and reducing the risk of granuloma complications.

Methods

This retrospective interventional case series was conducted with the approval of the Institutional Review Board and Human Research Ethics Committee of Samutprakarn Hospital. All associated data were anonymized prior to analysis, with all patient identifiers removed to ensure confidentiality and compliance with data protection standards. Although the study design qualified for a waiver of informed consent for retrospective data, informed consent was explicitly obtained from follow-up patients for the use of clinical photographs. These consents were documented during routine postoperative visits.

Clinical data from patients who were diagnosed involutional entropion and treated with the everting sutures with transcanthal canthopexy (ESTC) technique from January 2021 to December 2023 were collected by reviewing medical charts. Preoperative clinical characteristics and surgical outcomes were recorded. Exclusion criteria included concurrent eyelid pathologies such as malignant tumors, infections, cicatricial entropion, blepharospasm, age under 60 years, a postoperative follow-up period of less than 6 months, and previous surgical corrections. The primary outcome measure was the recurrence rate and complications, while secondary outcome measures included patient demographic data (age, gender, duration of symptoms, laterality of entropion), patient medical history and medication, severity of eyelid laxity and meibomian gland dysfunction, duration of operation and duration of follow-up.

As part of routine postoperative care, patients were evaluated by the operating surgeon at 1 week and 3 months following surgery. Thereafter, follow-up assessments were conducted by ophthalmologists at Samutprakarn Hospital every 6 months to 1 year. Recurrence of entropion was defined as inversion of the eyelid margin with lash-to-corneal contact.

The Kaplan-Meier survival curve was used to analyze the success rate after operations. Successful outcomes were compared to treatment failure cases using the Univariate and Multivariate Cox regression analysis. A P value of < 0.05 was considered statistically significant.

Surgical Technique

Anesthesia

Local anesthesia was administered using 2-3 mL of a solution containing 2% lidocaine (Xylocaine, AstraZeneca) with epinephrine 1:200,000. Both topical and infiltrative techniques were employed to ensure adequate anesthesia.

Skin Incisions

Four small skin incisions were made using a No. 11 blade, each positioned 2 mm inferior to the lash line at the following landmarks: 1 mm medial to the medial limbus, at the center of the pupil, 1 mm lateral to the lateral limbus, and 10 mm lateral to the lateral canthal angle. An additional conjunctival incision was created at the lateral canthal angle (Figure 1:a).

Placement of Everting Sutures

Double-armed 5-0 absorbable sutures (Vicryl, Ethicon) were inserted through the skin incisions and passed through the conjunctival fornix, 2-3 mm inferior to the lower border of the tarsal plate, ensuring engagement of the

lower eyelid retractors. The suture ends were then redirected through the original skin incisions and tied with sufficient tension to induce mild ectropion (Figure 1:b).

Transcanthal Canthopexy

A 5-0 Vicryl suture was passed through the longitudinal axis of the lateral canthal tendon and anchored to the lateral orbital periosteum. The suture knot was buried within the lateral skin incision, located 10 mm lateral to the lateral canthal angle, to minimize external visibility (Figure 1:c).

Wound Management

All small skin incisions were left unsutured to heal by secondary intention. The canthopexy incision was optionally closed with the same 5-0 Vicryl suture. Postoperatively, antibiotic ointment was applied to all wounds twice daily for one week (Figure 2).

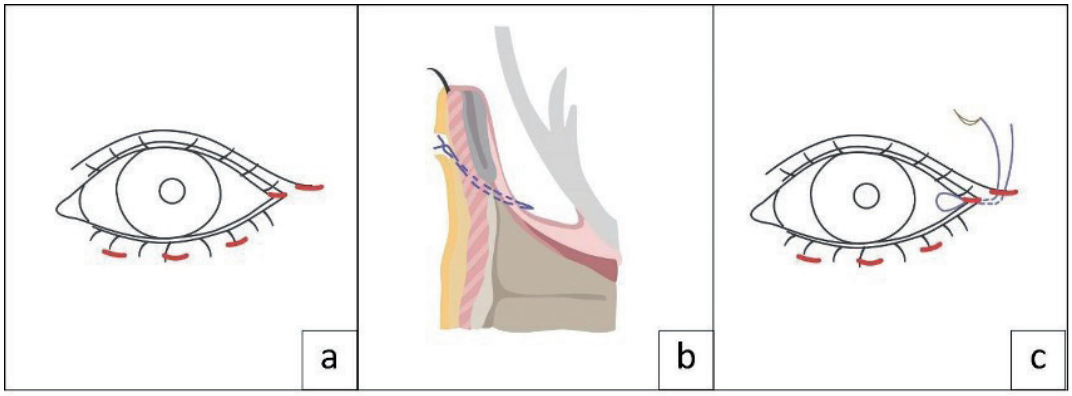

Figure 1: (a) Demonstration of the planned incision sites. (b) Placement of the everting suture knot within the skin incision. (c) Completion of the transcanthal canthopexy.

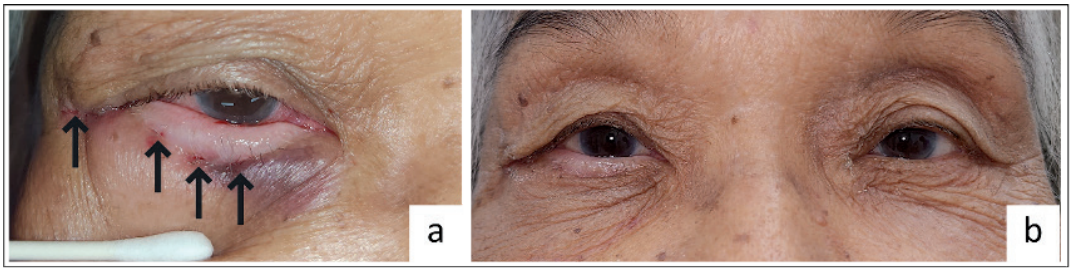

Figure 2: A 71-year-old female who underwent right lower eyelid entropion correction using everting sutures combined with transcanthal canthopexy (ESTC). (a) Immediate post-operative appearance. Arrows indicate the incision sites. (b) One week postoperatively. The left eye remains unoperated for comparison.

Result

A total of 59 eyelids from 50 subjects underwent everting suture with transcanthal canthopexy for lower lid involutional entropion, performed by a single surgeon at Samutprakarn hospital, Thailand, between January 2021 and December 2023. The mean age of participants was 75.69 ± 7.6 years, with a male-to-female ratio of 0.92:1. The mean duration of surgery was 14.82 ± 3.67 min. The mean duration of follow-up was 15.59 ± 8.13 months. Recurrence occurred in 11 eyelids (18.6%), with a mean time to recurrence of 11.91 ± 8.46 months (Table 1).

Table 1: Demographic characteristics (n = 50 patients, 59 eyelids)

	Statistics data
Age	
Mean ± SD.	75.69 ± 7.6
Min - Max	58 - 92
Sex	
Female	26 (52%)
Male	24 (48%)
symptom duration (months)	
Mean ± SD.	9.14 ± 10.97
Min – Max	1 - 48
distraction test (mm.)	
Mean ± SD.	6.28 ± 1.34
Min - Max	4 - 10
ON anticoagulant	20 (33.9%)
Laterality	
RE	28 (47.5%)
LE	31 (52.5%)
MGD grade 1-3	17 (34%)
MGD grade 4	12 (24%)
Baggy eyelid	3 (6%)
Diabetes mellitus	12 (24%)
Follow up time (months)	
Mean ± SD.	15.59 ± 8.13
Min - Max	1 - 41

From the Kaplan-Meier survival curve (Figure 3) following entropion correction, success rates were 89.2% at 12 months, 83.4% at 18 months, and 72.6% at 24 months post-operatively (Table 2).

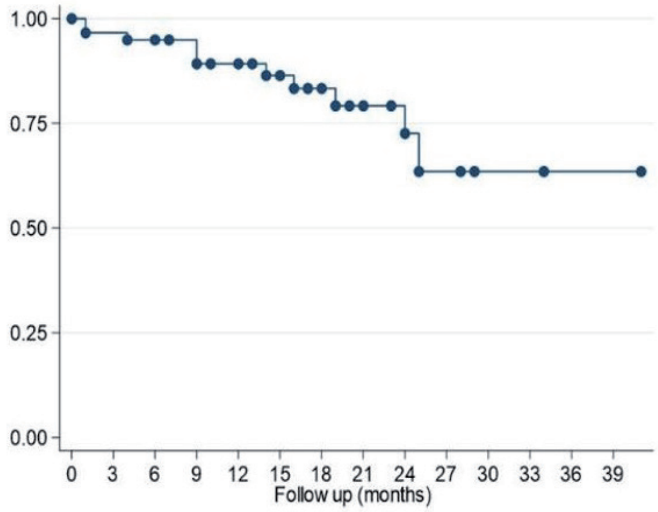

Figure 3: Kaplan-Meier survival curve following entropion correction.

Table 2: Success probability.

Months	Success	95%CI	
3	96.6%	87.1%	99.1%
6	94.9%	85.1%	98.3%
9	89.2%	77.5%	95.0%
12	89.2%	77.5%	95.0%
15	86.4%	73.2%	93.4%
18	83.4%	68.7%	91.5%
21	79.2%	62.2%	89.2%
24	72.6%	51.0%	85.9%
27	63.5%	37.2%	81.2%
30	63.5%	37.2%	81.2%
33	63.5%	37.2%	81.2%
36	63.5%	37.2%	81.2%

Univariate Cox regression analysis for recurrence identified several factors significantly associated with the recurrence group: male gender (P = 0.045), meibomian gland dysfunction (MGD) grade 4 (P = 0.037), and the use of anticoagulation therapy (P = 0.036). There were no significant differences observed in terms of age, symptom duration, distraction test results, MGD grades 1-3, presence of baggy eyelids, or underlying diabetes mellitus (Table 3).

Table 3: Univariate Cox regression for recurrence of entropion

	Recurrent (n eye = 11)	Success (n eye = 47)	HR	95%CI	P value
age	75.73 ± 3.85	75.55 ± 8.29	0.97	0.89 - 1.05	0.448
Sex					
Female	3 (27.3%)	30 (63.8%)	Reference	-	-
Male	8 (72.7%)	17 (36.2%)	3.89	1.03 - 14.72	0.045*
symptom duration (mo)	3 (2, 24)	6 (2, 12)	1.02	0.97 - 1.07	0.410
distraction test	6 (5, 7)	6 (6, 7)	0.83	0.49 - 1.42	0.503
ON anticoagulant	8 (72.7%)	12 (25.5%)	4.21	1.1 - 16.09	0.036*
Laterality					
RE	4 (36.4%)	23 (48.9%)	Reference	-	-
LE	7 (63.6%)	23 (48.9%)	1.54	0.45 - 5.28	0.490
MGD grade 1-3	3 (27.3%)	16 (34%)	0.97	0.25 - 3.75	0.970
MGD grade 4	6 (54.5%)	9 (19.6%)	3.57	1.08 - 11.75	0.037*
Baggy eyelid	2 (18.2%)	2 (4.3%)	3.87	0.81 - 18.39	0.089
Diabetes mellitus	5 (45.5%)	10 (21.3%)	2.33	0.71 - 7.65	0.163

Multivariate Cox regression analysis further indicated that patients on anticoagulants were more likely to experience recurrence, with a hazard ratio of 4.68 (95% CI: 1.01–21.6) (Table 4).

Table 4: Multivariate Cox regression for recurrent

	Adjusted HR	95%CI	P value
Male	2.86	0.71-11.57	0.140
On anticoagulant	4.68	1.01-21.6	0.048*
MGD grade 4	1.88	0.5-7.02	0.347
Baggy eyelid	3.31	0.44-24.55	0.243

Postoperative complications were generally mild. No cases of ectropion were observed. One patient developed a localized infection at the canthopexy wound site, which was effectively managed with oral antibiotics. Two patients exhibited exposed absorbable sutures, requiring no additional intervention. Additionally, ecchymosis was noted in one case and resolved spontaneously without treatment.

Discussion

The pathogenesis of involutional entropion involves four major factors: disinsertion or laxity of the lower eyelid retractors, horizontal lower eyelid laxity, the upward migration of the preseptal orbicularis muscle over the pretarsal orbicularis muscle, and relative enophthalmos.[12-14] Recurrence remains the most common complication in the surgical repair of involutional lower eyelid entropion. To minimize recurrence, it is crucial for surgeons to address at least two of the underlying pathophysiological mechanisms.[7,14,15]

Standard procedures, such as retractor reattachment combined with LTS, are associated with a low recurrence rate.[16,17] However, these procedures may be challenging for general ophthalmologists due to the technical complexity and the longer operative time required. Everting sutures, on the other hand, offer a simpler and more accessible approach. They correct vertical laxity by applying the attenuated lower eyelid retractors to the anterior surface of the tarsal plate and induce a fibrotic scar along the suture tracks, which prevents the upward migration of the preseptal orbicularis muscle.[1,2,18] This technique can be combined with other surgical methods to correct lower eyelid laxity and improve surgical outcomes.[7-9]

Combining everting sutures with lateral tarsal strip procedures (LTSES) has demonstrated very low recurrence rates, with Scheepers et al. reporting 0% and Barnes et al. reporting 2%, both with a minimum follow-up of 18 months.[8,9] However, managing patients on anticoagulant therapy remains a challenge. Kent and Custer highlighted that 40% of patients undergoing oculoplastic surgery are on anticoagulants, and discontinuation of these medications increases the risk of cerebrovascular and cardiovascular events.[19]

The transcanthal canthopexy technique provides a safer alternative for patients on anticoagulant therapy. This eyelid-tightening procedure allows surgery to be performed without discontinuing thrombolytic medications and may reduce the risk of postoperative lateral canthal deformity compared to the lateral tarsal strip technique.[10] In our study, combining everting sutures with transcanthal canthopexy achieved an 83.4% success rate at 18 months, outperforming everting sutures alone. Notably, despite over 30% of patients being on anticoagulants, such as aspirin and warfarin, no intraoperative or postoperative bleeding-related complications were observed.

Multivariate Cox regression analysis suggested that patients on anticoagulants may have a higher risk of recurrence. This risk may be linked to the absence of electrical cautery for controlling bleeding in some cases performed in outpatient clinic settings, which can lead to blood clot formation along the suture track and tissue edema which can disrupt the correction of entropion's underlying pathophysiological mechanisms. Additionally, electrical cautery is beneficial for shrinking portions of the preseptal orbicularis oculi muscle and promoting

anterior lamellar scarring. We recommend the use of electrical cautery to control bleeding in this procedure, rather than relying solely on compression.

Univariate Cox regression analysis showed that severe blepharitis with grade 4 meibomian gland dysfunction is associated with a significantly higher risk of recurrent entropion. Chronic inflammation from severe MGD leads to tissue remodeling and weakening of the tarsal plate, disrupting the balance of the eyelid lamellae and causing eyelid instability with inward rotation.[20] Without adequate treatment, persistent inflammation may trigger recurrence and compromise surgical outcomes. Therefore, effective management of lid margin disease is essential for durable entropion correction.

A key limitation of this study is its retrospective design. Minor complications that did not require additional treatment, such as exposed absorbable sutures or minor ecchymosis, may have been underreported. A randomized prospective study is needed to compare LTSES and ESTC techniques.

Conclusion

The combination of everting sutures and transcanthal canthopexy with a buried suture technique is a simple and effective method for correcting involutional entropion. This approach reduces recurrence rates and minimizes complications, such as skin granuloma formation, while permitting continuous anticoagulation therapy. This is especially advantageous for elderly patients with comorbid systemic disease.

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