

Everting suture correction of lower lid involutional entropion

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Abstract

Aims—To assess the long term efficacy of everting sutures in the correction of lower lid involutional entropion and to quantify the effect upon lower lid retractor function.

Methods—A prospective single armed clinical trial of 62 eyelids in 57 patients undergoing everting suture correction of involutional entropion. Patients were assessed preoperatively and at 6, 12, 24, and 48 months postoperatively. The main outcome variables were lower lid position and the change in lower lid retractor function.

Results—When compared with the non-entropic side, the entropic lid had a greater degree of horizontal laxity and poorer lower lid retractor function. These differences however, were not significant. At the conclusion of the study and after a mean follow up period of 31 months, the entropion had recurred in 15% of the patients. There were no treatment failures in the group of five patients with recurrent entropion. The improvement in lower lid retractor function after the insertion of lower lid everting sutures did not reach statistical significance. There was no significant difference between the treatment failure group and the group with a successful outcome with regard to: the degree of horizontal lid laxity or lower lid retractor function present preoperatively; patient age or sex; an earlier history of surgery for entropion. There was neither a demonstrable learning effect nor a significant intersurgeon difference in outcome. The overall 4 year mortality rate was 30%. **Conclusions**—The use of everting sutures in the correction of primary or recurrent lower lid involutional entropion is a simple, successful, long lasting, and cost effective procedure.

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Involutional entropion is one of the most commonly encountered eyelid malpositions. Several aetiological factors are thought to be important in the development of involutional entropion and these include: (a) horizontal lid laxity, caused by stretching of the canthal tendons and/or the tarsal plate¹⁻⁵; (b) vertical lid laxity, caused by attenuation, dehiscence, or disinsertion of the lower lid retractors and/or the orbital septum^{1 4-13}; (c) migration of the preseptal orbicularis muscle to override the pretarsal orbicularis muscle^{6 7 9 12 13}; and (d) appositional pressure of the lids during eyelid closure.^{1 14}

Every structure of the eyelid has been the object of surgery. Various medical treatments including skin patches,¹⁵ botulinum toxin,¹⁶ and tissue glue¹⁷ have been advocated. Everting sutures have been used for the correction of lower lid entropion since the time of Hippocrates¹⁸ and remain the most simple form of surgical treatment.¹⁹⁻²⁴ Without exception, everting sutures have been considered to offer only a temporary cure for patients with entropion.^{1 3 5 9 17 25-27}

Despite a plethora of publications describing various surgical techniques, none has attempted to quantify the effects of surgery upon the eyelid variables thought to be important in the aetiology of involutional entropion. We attempted to measure the lower lid retractor function and the degree of horizontal lid laxity present, firstly, in order to quantify the effects of our intervention and, secondly, to attempt to identify those patients in whom everting sutures are more likely to fail.

Patients and methods

After informed consent was obtained, 62 eyelids from 57 subjects were entered into a prospective single armed clinical trial of patients undergoing everting suture correction of lower lid involutional entropion (Fig 1). Follow up was complete in 38 of 57 patients (17 patients died during the study, one patient was enucleated, and one patient was lost to follow up between the 24 and 48 month visits). The mean duration of follow up was 31 months (range 1-49).

After the conjunctiva was anaesthetised using topical 0.4% benoxinate, approximately 1 ml of 2% lignocaine containing 1 in 200 000 units of adrenaline was injected subcutaneously into the lower lid. The surgical technique is essentially the same as that described by Feldstein.²⁴ The distance between the punctum and the lateral canthus is divided into quarters with the junction between the most medial and adjacent quarters being the entry point for the first suture. The other two pairs of sutures are inserted at the junction of the remaining quarters. The double armed 4/0 plain catgut sutures (W 813, Ethicon, UK) are prepacked in alcohol which was not rinsed off before use. The sutures are passed in a horizontal mattress fashion, the first needle engages the lower lid retractors which are seen as a subconjunctival, infratarsal white band at the lowest point of the inferior conjunctival fornix. The skin of the lower lid is pulled downwards everting the anterior lamella and the needle is advanced upwards to pierce the skin 3 mm below the lid margin. The other arm of the suture is passed



Figure 1 Preoperative appearance.



Figure 2 Immediate postoperative appearance.

2 mm lateral to the first arm in an identical fashion. The sutures are tied tightly to produce 1 mm of postoperative ectropion (Fig 2). No topical antibiotics are used and the sutures are allowed to fall out spontaneously.

Patients were assessed preoperatively and at 6, 12, 24, and 48 months postoperatively. Preoperative and postoperative data collection included an estimation of the lower lid retractor function and the horizontal lid laxity (HLL) for both eyelids. The lower lid retractor function was indirectly estimated by measuring the vertical excursion in millimetres of the centre of the lower lid margin between extreme upgaze and downgaze. This measurement was termed the lower lid excursion (LLE). The HLL was estimated by measuring with Castroviejo calipers the distance in millimetres the centre of the posterior margin of the lower lid could be distracted forwards from the limbus. All intraoperative and postoperative complications were noted. The 48 month postoperative visit was conducted by CMS who was masked to the treatment side. We included in our definition of success those patients who died during the study period who were noted to have a normal lid position at the preceding visit. Similarly, in calculating the cumulative failure rates we included these patients in order to simplify the reporting of the results.

The differences between the entropic and non-entropic lids in terms of the LLE and HLL and also the postoperative change in the LLE and HLL were analysed using the paired Student's *t* test. The group of patients with a successful outcome were compared with those in the treatment failure group using the χ^2 test. For all statistical tests *p* values of <0.05 were considered to be statistically significant.

Results

The mean age of the study group was 78 years (range 53–95), 32/57 (56%) of the patients were female, 5/57 (9%) had bilateral entropion, and 5/57 (9%) had recurrent entropion. The five patients with recurrent entropion had undergone a variety of surgical corrections, all of which had included a horizontal lid shortening procedure. All surgery was performed by MW or RWDB.

INTERLID COMPARISON IN UNILATERAL ENTROPION

The mean preoperative LLE of the entropic lid was 4.2 mm (SD 0.9, range 2–7), the mean preoperative LLE of the contralateral non-entropic lid was 4.6 mm (1.1, 2–7). There was no significant difference in the LLE when the entropic and non-entropic sides were compared *p*=0.097 (*n*=52).

The mean preoperative HLL of the entropic lid was 7.8 mm (2.2, 4–13), the mean preoperative HLL of the contralateral non-entropic lid was 7.6 mm (1.7, 5–12). There was no significant difference in the HLL when the entropic and non-entropic sides were compared *p*=0.649 (*n*=52).

POSTOPERATIVE CHANGE IN THE LLE AND HLL

The mean preoperative LLE of the entropic lid was 4.2 mm (1.0, 2–7), the mean (mean of 6,12, 24, and 48 month postoperative measurements) postoperative LLE was 4.3 mm (1.0, 2.7–7.0). There was no significant change in the LLE when the preoperative and postoperative values were compared *p*=0.405 (*n*=59; three deaths before the 6 month visit).

The mean preoperative HLL of the entropic lid was 7.8 mm (2.2, 4–13), the mean (mean of 6,12, 24, and 48 month postoperative measurements) postoperative HLL was 7.9 mm (1.6, 4.5–11.0). There was no significant change in the HLL when the preoperative and postoperative values were compared *p*=0.602 (*n*=59).

POSTOPERATIVE LID POSITION

At the conclusion of the study and after a mean follow up period of 31 months, the entropion had recurred in 9/61 (15%) eyelids. The cumulative failure rates were 4/62 (7%) at 6 months, 6/62 (10%) at 12 months, 7/62 (12%) at 24 months, and 9/61 (15%) at 48 months. There were no treatment failures in the group of five patients with recurrent entropion.

MORTALITY DATA

Cumulative mortality rates were 3/57 (5%) at 6 months, 8/57 (14%) at 12 months, 13/57 (23%) at 24 months, and 17/57 (30%) at 48 months.

For the comparison of the treatment success and failure groups see Table 1.

COMPLICATIONS

One patient developed an acute inflammatory reaction around each of the sutures which settled after a course of flucloxacillin. Two patients were noted to have a minimal degree of ectropion at the 6 month visit which was

Table 1 Comparison of the treatment success and failure groups

	Success (no (%))	Failure (no)	p Value*
Horizontal lid laxity (HLL)			
minimal (4–8 mm)	27 (82)	6	0.382
maximal (9–13 mm)	26 (90)	3	
Lower lid excursion (LLE)			
minimal (2–4 mm)	35 (90)	4	0.215
maximal (5–7 mm)	18 (78)	5	
Patient age (years)			
53–79	24 (83)	5	0.957
80–95	24 (86)	4	
Patient sex			
male	19 (76)	6	0.133
female	29 (91)	3	
Previous surgery			
recurrent entropion	5 (100)	0	0.337
primary entropion	48 (84)	9	
Timing of surgery			
1st half of study	27 (87)	4	0.688
2nd half of study	28 (90)	3	
Surgeon			
A	32 (89)	4	0.370
B	21 (81)	5	

* χ^2 test.

asymptomatic and which settled spontaneously. One patient was enucleated (for endophthalmitis which was unrelated to the everting sutures). Thirty per cent of the patients died during the study period from causes unrelated to the surgery.

Discussion

INTERLID COMPARISON IN UNILATERAL ENTROPION

This study did not demonstrate a significant difference in the function of the lower lid retractors or in the degree of horizontal laxity when the entropic and non-entropic lids were compared. Jones *et al*⁸ described a loss of lower lid retraction movement accompanying down-gaze in involuntal entropion and attributed this to an attenuation of the lower lid retractors. Both this study and that of Bengier and Musch¹ failed to demonstrate any such loss of retraction movement. The retention of normal vertical excursions by lower eyelids with involuntal entropion parallels the retention of normal excursions by upper eyelids with involuntal (aponeurogenic) ptosis. Bengier and Musch¹ demonstrated a significant increase in horizontal laxity in patients in whom the entropion was present for more than 6 weeks.

MECHANISM OF ACTION

Everting sutures plicate the attenuated lid retractors and transfer their pull to the anterior surface of the tarsal plate. They also create a horizontal barrier to the upward migration of the preseptal orbicularis. The permanence of the procedure depends on the creation of a fibrotic scar along the suture tracks. Seiff *et al*²⁵ demonstrated an aggressive fibrotic and inflammatory response in the tissues of the lower lid 2 weeks after the insertion of everting sutures. We chose to leave the sutures unrinsed in order to heighten the inflammatory response and enhance the developing cicatrix.

POSTOPERATIVE CHANGE IN THE LOWER LID RETRACTOR FUNCTION

Collin and Rathbun⁹ described a subjective increase in lower lid excursion after a Quick-



Figure 3 Three month postoperative appearance of the same patient as depicted in Figures 1 and 2.

ert's entropion repair and interpreted this as evidence of an improvement in lower lid retractor function. As our quantitative method of assessing retractor function failed to distinguish the entropic from the non-entropic side it is perhaps not surprising that we failed to demonstrate any significant change in lower lid retractor function after the insertion of everting sutures.

POSTOPERATIVE LID POSITION

At the conclusion of the study, the entropion had recurred in only nine of 61 (15%) lids with no treatment failures in the group of five patients with recurrent entropion. Recurrence of entropion following retractor tightening is almost exclusively associated with coexisting, uncorrected horizontal lid laxity.^{5 10 17 28} There was, however, no significant difference in the degree of horizontal lid laxity (or lower lid retractor function) present preoperatively when the treatment success and treatment failure groups were compared. Indeed, the treatment failure group demonstrated a smaller degree of horizontal lid laxity than the treatment success group (7.2 mm *v* 8.1 mm). Neither the age nor the sex of the patients influenced the outcome.

CONCLUSION

Everting sutures can be inserted quickly, simply, safely, cheaply (the cost of each suture pack is £2.13) and often at the patient's first appointment. As the overall mortality rate of 30% demonstrates, the vast majority of patients with entropion are elderly, often with many of the medical and social problems experienced by this group. In contrast with incisional lid surgery, anticoagulation therapy need not be omitted nor surgery delayed in the hypertensive patient.

There were no significant perioperative or postoperative complications. In the nine patients in whom the entropion recurred, no significant lid scarring was encountered during the repeat surgery (Quickert). The overall cosmesis was excellent, CMS was unable to detect which side had undergone the procedure in over 95% of cases examined (Fig 3). Our overall recurrence rate of 15% after 48 months of follow up is significantly higher than the frequently published recurrence rate of 0%^{4 26 29 30} following incisional surgery. These impressive results in part reflect the various authors' oculoplastic interest and expertise. In

contrast, everting sutures can be quickly and correctly inserted by a practitioner with minimal surgical experience. There was no evidence of the presence of a learning curve nor a significant intersurgeon difference in outcome.

It is generally accepted that the long term likelihood of success of any entropion surgery (including everting sutures) is dependent upon the correction of the underlying impairment in lower lid retractor function. Bengier and Musch¹ demonstrated a significant increase in the "vertical distraction distance" in entropic eyelids which was thought to reflect an attenuation or disinsertion of the lower lid retractors. Perhaps if we had chosen this method of measurement rather than the LLE we may have detected a quantifiable improvement in retractor function after the insertion of everting sutures.

Based upon the results of this clinical trial, everting sutures can be recommended in the management of lower lid involutional entropion, particularly for the group of patients mentioned above.

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