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Bicanalicular Intubation for Traumatic Unicanalicular Laceration

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ABSTRACT

The patency of the lacrimal excretory apparatus is essential for the proper drainage of the tears without causing spillover of the tears onto the cheeks. Any breech in the continuity of the drainage system results in epiphora leading to stasis and infection. The present case study describes the effectiveness of 4-0 prolene suture material in intubating and recanlaizing the lacerated lower canaliculus. A 2-year old female child presented with full thickness left lower lid canalicular laceration caused by bull gore injury. Retracted lacerated torn nasal canalicular part identified by passing the pigtail probe through the upper punctum. The pigtail probe withdrawn from the upper punctum after the eyelet threaded by the prolene 4-0 suture. The probe introduced through the retracted lower punctum and the free end of the intubated prolene suture engaged, and withdrawn from the lower punctum thus completing bicanalicular intubation under general anesthesia. The anterior and posterior lacerated lid lamellae repaired with 6.0 vicryl suture. The Prolene suture removed after 6 weeks and the child followed up for 7 months for suture related complications. Positive Flurescein dye disappearance test indicated patency of canaliculo-lacrimal drainage apparatus. Prolene suture material maintained the patency of the upper lacrimal drainage apparatus without any suture extrusion and infection during 7 months follow up. Anatomical and physiological drainage properties with acceptable cosmetic appearance achieved.

Key words: Bicanalicular Intubation, Canalicular laceration, Epiphora, Pigtail probe, Prolene

1. INTRODUCTION

Canalicular laceration perturbs the anatomical and physiological architecture of the lacrimal excretory passages causing lid mal apposition and epiphora. Canalicular and lacrimal sac/lacrimonasal duct laceration constituted 70% and 30% of the traumatic cases respectively (Struck, 2009). There seems to be lack of consensus regarding accurate material for canalicular reconstruction; however, various antegrade/retrograde techniques described with or without canalicular intubation achieving successful results.

Prolene 4-0 suture: The prolene 4-0 material maintained the patency of the canalicular system without any suture related complication

Billson and Hansel-mayer first reported direct canalicular anastomosis with sutures. Silk sutures, silver wires, silicone rod, silastic tube, Crawford's probe demonstrated varied successful patency rates. The advantage of employing the pigtail probe is successful identification and tracking of the canaliculi without false passage formation (Liang et al., 2009). With retrograde approach through the nasolacrimal canal in 98 canalicular laceration patients achieved 78.6% anatomic success and 84.7% functional success rate with retention of the silicon tube more than 90 days (Wu et al., 1010). The present case report investigated the effectiveness of antegrade bicanalicular intubation by prolene 4-0 suture in achieving recanalisation and patency of the lower canalicular system.

2. SCOPE OF THE STUDY

Prolene augmented intubation: Prolene 4-0 suture material used to intubate the torn lower canaliculus and helped in maintaining the integrity of the lacerated canaliculus and lower lid (medial portion)

While various methods available to manage patients with traumatic canalicular lacerations this study focus on the use of prolene suture augmented intubation that served as stent material. Stabilization of the monocanalicular laceration achieved by bicanalicular intubation and stent insertion without suture related complication such as extrusion, infection or cheez wiring of the prolene suture material.

2.1. Materials

Two-year-old female baby with history of bull gore injury to the left eye presented on 17 September 2013. A lacerated vertically cut wound running 3 mm medial to the separated lower punctum and further advancing 8 mm to 10 mm downwards involving the tarso-conjunctiva (Figure 1). The wound was perfused with 5% surgical (povidone Iodine) betadine solution and exploration with reconstruction performed under general anaesthesia.

2.2. Methodology

Double curved pigtail probe: Pigtail probe served as an efficient canalicular tracking in identifying the retracted nasal cut end of the lower canaliculus

The Bowman's lacrimal probe and single curved pigtail probe failed to locate the torn nasal canalicular portion. The double curved round tipped pigtail probe successfully tracked the canaliculus after passing through the upper punctum. Prolene 4-0 suture threaded through the probe's eyelet and the probe withdrawn from the upper punctum. Then the probe inserted through the torn lower punctum and the free end of the intubated suture again threaded into its eyelet and withdrawn (Figure 2). The free ends of the intubated prolene suture fastened with multiple knots and affixed over glabella with an adhesive tape.

The split lower lid margins approximated with 6-0 Vicryl suture by passing the needle tip anterior to the white line. The apex of the lacerated wound identified and repaired up to the eyelid margin with intermittent sutures meticulously burying the knots in the subconjunctival tissue thus reconstructing the lower medial inferior fornix. The anterior lamella approximated in layers with interrupted sutures (Figure 3). The repaired wound area dressed with moxifloxacin eye ointment. Topical tobramycin and paediatric nasal saline drops instilled. The intubated prolene suture removed at 6 weeks after the surgery (Figure 4).

3. RESULTS/OBSERVATION

PATHOGENESIS OF CANALICULAR LACERATIONS

Comparison: Jordan et al., (2008) described the coexisting morbidities in the retrospective study that included 236 patients with canalicular laceration from 1998 to 2007. Mechanism of the injury classified in terms of force as direct penetrating, indirect/diffuse avulsive. Direct penetrating force (54.2%) caused canalicular lacerations compared to avulsive (45.7%) injuries. Other more serious associated injuries were orbital fractures, globe rupture, bodily injuries, and head trauma.

Content: In the present case study, the direct penetrating force attributed as the mechanism for the canalicular laceration by bull gore. The current case study describes the role of prolene suture material used to anatomize and promote recanalisation of the torn lower canaliculus.

Placement: Introduction part

The prolene suture removed at 6 weeks and the child followed for 7 months to observe for any complications. Patency of the canalicular system confirmed on positive Flurescein dye disappearance test and normal lower meniscus height observed on slit lamp microscope signifying free drainage of the lacrimal fluid.

4. DISCUSSION

The present case study highlights the importance of using the double curved

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Figure 1

Intra operative picture showing lower canalicular laceration

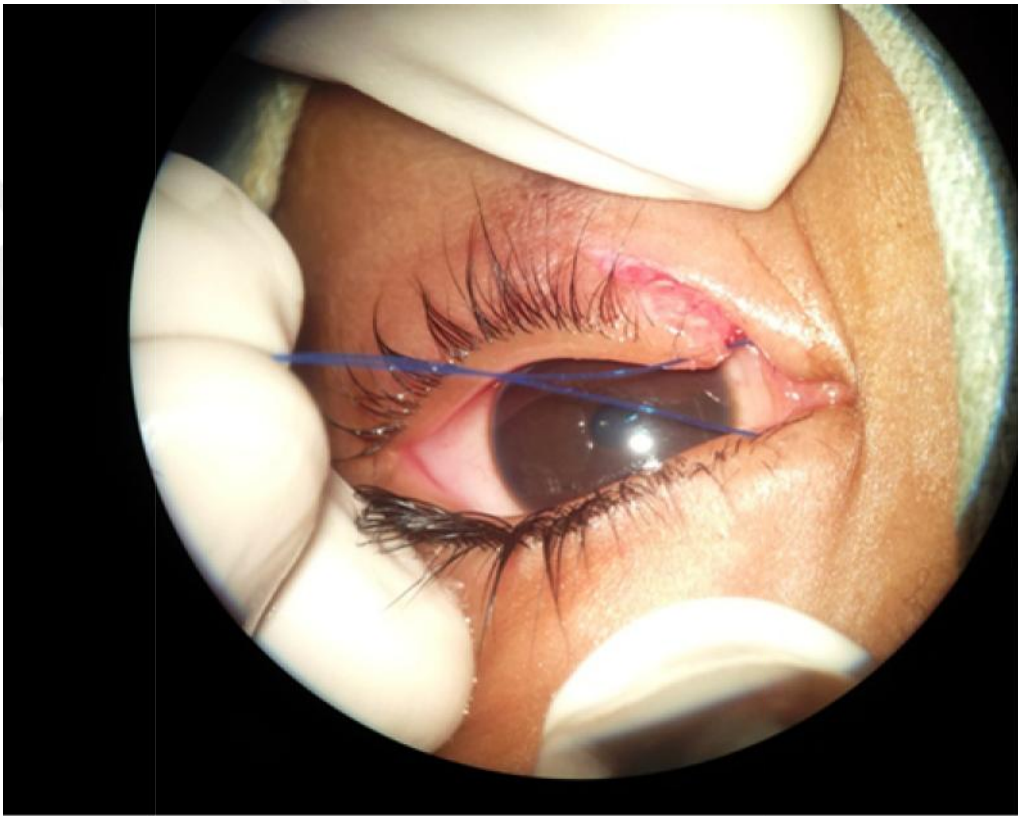

Figure 2

Intra operative image of bicanalicular intubation with 4-0 prolene

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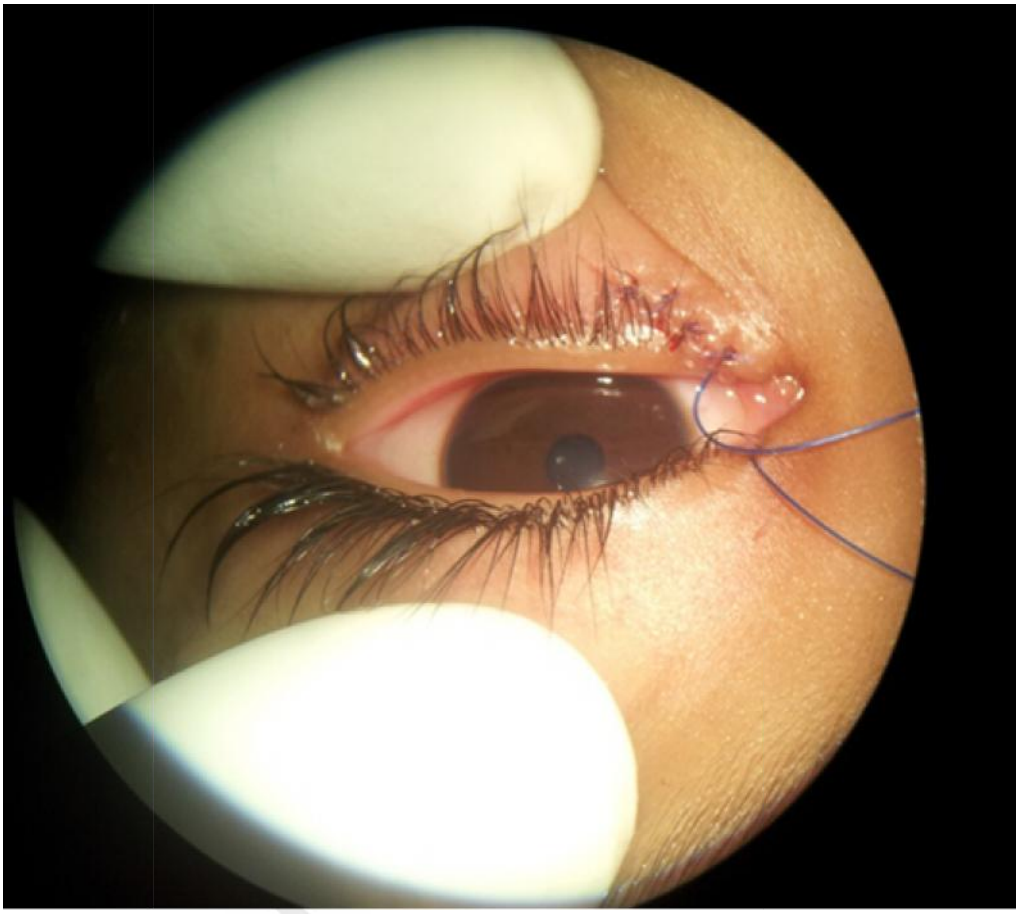

Figure 3

Completed reconstruction of lower lid-canalicular laceration

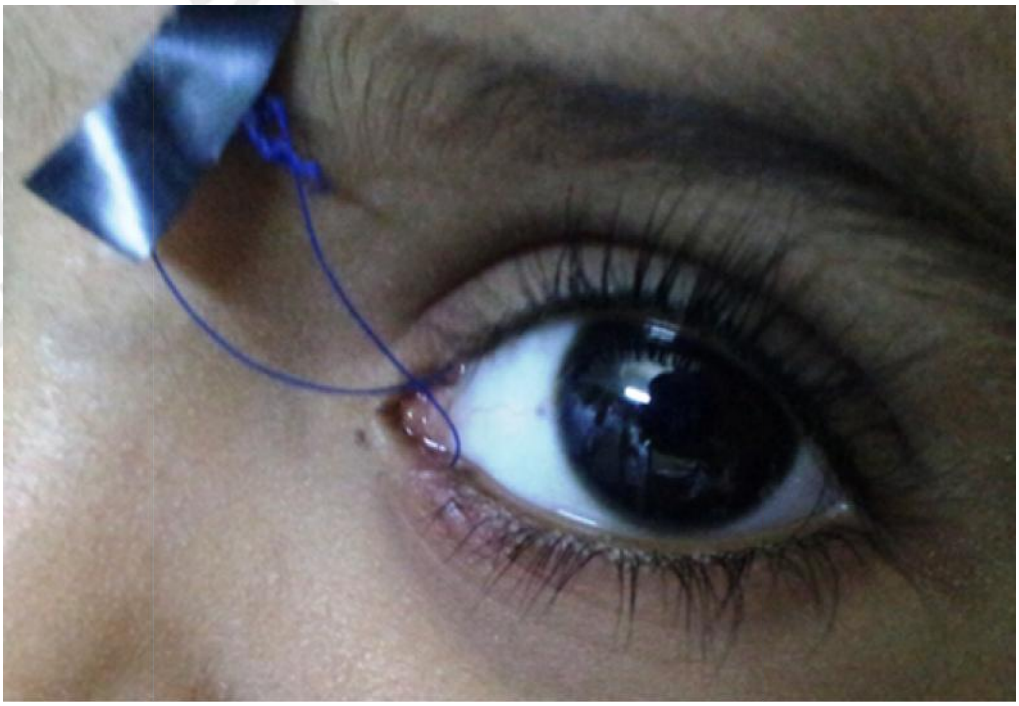

Figure 4

Bicanalicular intubation with 4-0 prolene secured with adhesive tape six weeks post op

Exteriorization of the prolene knots: After the bicanalicular intubation completed the prolene material fastened with multiple knots and exteriorized with adhesive on the glabella

pigtail probe that is easily helpful in canalicular intubation than a single curved probe. The pigtail probe threaded by the prolene suture realigns the angle anatomy to maintain the relation of the canalicular system to the lacrimal sac. Then the Crawford stent fixated with the prolene suture and the knot rotated into the intact segment of the lacrimal system (Louise, 2009). The prolene knots exteriorized and fixed on the glabella by adhesive plaster without the use of stents is the purpose of the presentation.

The lacerated horizontal lower canaliculus discerned and canalized without difficulty as the wound was recent. The canalicular localization might be difficult in lately presented cases due to tissue edema. The pigtail probing has the disadvantage in cases where the canaliculi open independently with the lacrimal sac (Jeffery, 2010). Tissue differentiation and stereopticon magnification provided by the operating microscope was splendid. In all cases of canalicular lacerations, the identification and the localization of the retracted canalicular end diagnosed accurately facilitating canalicular intubation (Jordan, 2008).

It is very important to approximate initially, the separated lid margins and apex of the laceration with stay sutures for further ease and comfortable closure of the defects. The inferior fornix reconstruction began by approximating the apex of the lacerated tarsoconjunctival tissue using 6-0 Vicryl suture. The knots concealed in the subconjunctival tissue to prevent postoperative ocular irritation and lastly the anterior lamella reconstructed in layers. The child was free from epiphora and ocular irritation during the follow up of 5 months with satisfactory anatomical and physiological success, cosmetically acceptable inferior fornix and lower eyelid reconstruction.

The thicker 3-0 or 2-0 prolene suture that could produce better canalization not used for the fear of canalicular cheese wiring due to the stronger tensile strength. The use of thinner 5-0 or 6-0 prolene might lead to insufficient canalicular recanalization due to the high elastic property. Anatomical continuity restored in 90% cases with prolene 8-0 suture used for suturing only or suturing with intubation as reported previously compared to the present study that used 4-0 prolene without going for direct canalicular apposition by sutures (Struck, 2009). The silicone tube removed after 3-10 months and lower punctum splitting occurred in 2.86% compared to present study in that no stent used and the prolene suture removed after 48 days without any complications (Liang et al., 2012).

Peripunctal tissue fixated monocanalicular silicone stent with good success rates reported with complication of lid margin erosion and premature tube extrusion not noticed in the current study (Mauriello Jr, 1996). Mini-Monoka monocanalicular stent although achieved 90% anatomical success reported 11.1% of extrusion rate (Naik et al., 2008). Similar results obtained by the previous study of 'one stitch' canalicular repair that reported 100% success with bicanalicular intubation eliminating the need for direct canalicular closure (Kersten, 1996). Liang et al. (2009) study of modified pigtail probe technique showed higher cure rates of 95.65% than the traditional pigtail probe, however, the success rates were similar with no statistical significance. The silicone tubes (0.95 mm) used as stents for canalicular intubation left for 4-6 months, prolene 4-0 suture removed after 48 days in the current study.

5. CONCLUSION

In conclusion, a simple and effective management of monocanalicular laceration by using prolene 4-0 suture material threaded to double curved pigtail probe, eliminating the need for silicone tubes and retrograde approach described in the present study. The new message is the use of prolene 4-0 suture material alone which acted as a stent in recanalisation of canalicular laceration successfully.

SUMMARY OF RESEARCH

1. Two-year-old female baby with left lower canalicular laceration induced by bull gore efficiently managed by prolene suture augmented intubation.
2. Double curved pigtail probe easily identified the torn nasal cut end of the canaliculus and provided excellent canalicular tracking tool.
3. The patency confirmed by positive flurescein dye disappearance test and normal lower tear meniscus height.
4. No complications observed during follow up of 7 months.
5. The anatomical and physiological success achieved with excellent cosmetic acceptance after the removal of the prolene material.

FUTURE ISSUES

1. Randomized clinical trials conducted to investigate the patency maintaining efficiency of the prolene material in large sample.
2. Various materials such as silicone and wires compared with the prolene material for intubation
3. Dacryoendoscope assisted canalicular laceration repair may be considered without use of pig tail probe to prevent false passage formation

DISCLOSURE STATEMENT

Nil

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Liang et al. (2012):

Purpose:

To explore a modified technique for silicone intubation for the repair of canalicular lacerations.

Methods:

The surgery was performed on 35 eyes in 35 adult patients from October 2007 to September 2009. Using a modified soft probe, silicone tubes were inserted through the lacrimal punctum and left in the bicanaliculi for 3-10 months.

Results:

The surgery was performed successfully in all cases. The tubes were removed after 3-10 months (mean 5.3±1.8 months). The mean follow-up time after tube removal was 13.8 months (range, 6-22 months). Lower punctum splitting occurred in one case (2.86%) after the surgery. No other complications associated with the silicone tubes occurred. All the tubes were removed successfully without any difficulty. No iatrogenic injuries occurred during tube removal.

Conclusions:

The modified bicanalicular intubation procedure described here is an effective and atraumatic procedure for the management of canalicular lacerations in adults, and it is associated with fewer complications than the traditional sutures of canalicular lacerations.

RELATED RESOURCES

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