Results of A New ‘Mirror Tuck Technique’ for Fixation of Lacrimal Bypass Tube in Conjunctivo Dacryo Cysto Rhinostomy (CDCR)

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Epiphora secondary to proximal canalicular obstruction or absence is treated by Conjunctivo Dacryo Cysto Rhinostomy (CDCR) with the insertion of bypass tube. The technique of CDCR has undergone numerous modifications since its initial description by Von Hoffman in 1904. The original tube was described in 1962 by Jones. The most common complication with Jones tube is extrusion with published rates varying from 28 to 51%.

Various types of bypass tubes have been subsequently tried based on the material, design, length and shape. Fixation of soft tubes (polyethylene, polypropylene, silicone, Teflon) is easily performed by passing a suture through the flange directly or through the holes in Pyrex tube. In glass tubes without holes the suture is looped around the collar that can slip postoperatively leading to tube extrusion. In this article we describe and evaluate the results of `the mirror tuck technique` of fixing the bypass tube without holes using 6-0 polypropylene following laser CDCR over a period of one year.

MATERIALS AND METHODS

A prospective interventional case series was conducted at Gurunanak Eye Centre, New Delhi from May 2012 to April 2013 after obtaining the institutional ethical committee clearance. Forty consecutive adult patients suffering from epiphora due to proximal canalicular block (<8mm patent passage) were treated with 980nm diode laser CDCR with glass tube fixation by mirror tuck technique. Exclusion criteria included nasal cavity abnormalities precluding endoscopy like high deviated nasal septum, polyps, tumors, Wegner’s granulomatosis, sarcoidosis, uncontrolled systemic diseases (diabetes, hypertension, coronary artery disease, bleeding
All patients were operated by single surgeon (RG) and were evaluated preoperatively by lacrimal irrigation and probing and nasal examination. Blood investigations included haemogram, sugar, bleeding and clotting time. The main outcome measure was absence of extrusion or tube migration with patent tract at one year of follow-up.

The surgeries were conducted under local anaesthesia. The patients received nasal decongestant drops (xylometazoline) thrice a day for a week and antibiotic eye drops ofloxacin 0.3% four times a day for a week. Injection diclofenac 75mg i.m. and injection promethazine 25 mg i.m were given immediately before the surgery. Ipsilateral nasal cavity was packed with ribbon gauze soaked in 15 ml of 4% lignocaine with 1 ml of 1:1000 adrenaline. Topical anaesthetic drops were instilled in the affected eye and local infiltration of the operative site, skin around the medial canthus and at the nasal mucosa overlying the base of the lacrimal sac was performed with 2% lignocaine with 1:80,000 adrenaline, 0.75% bupivacaine and 25IU/ml hyaluronidase. The nasal pack was then removed and nasal cavity was visualized with zero degree 4mm nasal endoscope.

The caruncle was partially excised and a tract was created using Von Grafe’s knife from caruncular area to nasal cavity at the root of the middle turbinate. The fibre optic cable of the 980nm diode laser was inserted through this tract and laser energy was delivered at 8W in continuous mode to create an opening of 6mm x 6mm. Any loose overhanging tissue of charred pieces were removed with 45 degrees Weil-Blakesley’s forceps.

A Bowman’s probe was then passed through the caruncle into the tract created till it hit the nasal septum. The distal end of the probe was grasped with a forceps and the probe was withdrawn. The length of this segment was measured against a scale. A glass tube with 4mm flange and length 2mm less than the measured segment length was introduced into the tract under endoscopic visualization.

The flange was then secured to the surrounding conjunctiva using 6-0 prolene suture by ‘mirror tuck technique’. A loop was first tied around the tube and then a net was created on top of the flange taking bites from adjacent conjunctiva. Interlocking suturing was then

Figure 1: The 6-0 prolene is used to create interlocking pattern of suturing around the flange of the bypass tube.
performed all around the flange which pulled the net to the periphery holding the tube in place (Figure 1).

Postoperatively, nasal packing was done. The patients received oral ciprofloxacin 500mg B.D. for 5 days, ibuprofen 400mg tds for 3 days, Xylometazoline nasal drops for 2 weeks and ofloxacin 0.3% eye drops 6 hourly for 2 weeks.

On 1st postoperative day, nasal pack was removed and syringing was done. The patients were told to avoid forceful blowing of the nose for 2 weeks and to keep a finger over the canthal end while sneezing. Also detailed instructions were given regarding cleaning of tube and regular sniffing to maintain patency.

The patients were followed up on day 1, day 7, every two weeks for first 2 months and every month for the next 10 months. The patients were evaluated to note patency, position and complications related to the tube.

**RESULTS**

A total of 40 eyes of 40 patients were treated with CDCR using glass tube secured by `mirror tuck technique`. The mean age was 34 years. There were 26 males and 14 females with presenting complaint of epiphora. The various etiologies of obstruction were idiopathic in 10 eyes, trauma in 15 eyes, congenital agenesis of punctum in 7 eyes and infections in 8 eyes. The length of the bypass tube ranged from 21 mm to 24 mm.

Success was achieved in 39(97.5%) cases both subjectively, with relief of epiphora and objectively, with patency on syringing on the final visit, one year after surgery. One patient suffering from allergic conjunctivitis, had medial migration of tube while rubbing vigorously. The tube was removed and patient refused any further intervention. Heaviness was reported by 5(12.5%) patients till about 2 weeks. Conjunctival overgrowth over the tube occurred in 1(2.5%) case at 5 months which was excised and treated with application of 0.02% Mitomycin C for 3 minutes and there were no further recurrences.

There were no cases of suture abscess or suture intolerance warranting tube removal. There was no case of tube malposition, nasal mucosal granuloma or conjunctival granuloma.

**DISCUSSION**

CDCR with bypass tube is the procedure practiced for management of proximal canalicular obstruction with less than 8 mm healthy canaliculus. Canalicular blocks provide a challenge to ophthalmologists as unlike external DCR which has replicable high success rates in treatment of
nasolacrimal duct obstruction there is no surgery providing complete success. Various methods have different success rates depending on surgeon factors and the method used.

Our study had a patient population with a mean age of 34 years. This is in accordance with the study done by Zilelioglu and Gunduz\textsuperscript{8} with a mean age of patients being 30.1 years and Enany \textit{et. al.}\textsuperscript{9} who had a mean age of 37 years. The tube length was slightly longer, 21 to 24 mm in our study in comparison to Pushker \textit{et. al.} where the length used was 14 to 20mm.\textsuperscript{10} This could be attributed to the endoscopic approach used in our study.

The principal demerit of bypass tubes is extrusion. This is related to tube itself that acts as a foreign body. Several attempts have been made to minimize tube extrusion by altering the shape and material of the bypass tube or the way it is fixed.

The tube can be fixed to the medial canthus, caruncle, conjunctiva or lid margin.\textsuperscript{11,14} Lamping \textit{et. al.} used a 6-0 nylon double armed suture that was tied around the collar of the Pyrex tube, the arms then traversed the orbicularis to exit at the skin in the medial canthal region.\textsuperscript{15} Putterman secured the Jones tube to the medial canthal angle by 6-0 black silk. He passed the suture through the lumen of the Jones tube and the ends of this suture were tied in triplicate on the outside of the tube and then the taut suture was slid to make the knot near the collar.\textsuperscript{16} Ma’luf \textit{et. al.} employed double armed 6-0 vicryl suture. They passed one arm through the lumen of the tube and the ends were then tied in triplicate on the outside of the tube, placing the knot near the collar. The two arms were then tied around the collar, placing the second knot on the opposite side of the tube, following which the two arms were externalized to the skin at the medial canthal area and tied. Schwarcz and co-workers used 6-0 prolene suture placed in the purse string manner.\textsuperscript{13} Chang \textit{et. al.} proposed encircling fixation method similar to the purse string technique using 6-0 prolene. They buried the suture material under the conjunctiva and caruncle and did not externalize it to the skin. In their follow-up of 15.4 ±2.4 months they had no extrusions in the 52 cases. There were 4 tube malpositions, 4 conjunctival granulomas and 3 tube obstructions.\textsuperscript{18}

We also used 6-0 prolene suture but instead of purse string we created continuous interlocking pattern

\textbf{Figure 2:} The prolene suture gets buried under the conjunctiva over the time
which held the tube firmly in position. Over the time, the suture material got buried under the conjunctiva and there was no irritation due to the suture material (Figure 2).

However, we did have a case of conjunctival overgrowth which was effectively treated by application of Mitomycin C. Another patient with allergic conjunctivitis could not tolerate the prolene suture. There were no cases of suture abscess as the suture was not externalized to the skin. There were no cases with nasal irritation as appropriately sized tubes had been placed under direct endoscopic visualization.

Therefore, Mirror tuck technique using 6-0 prolene suture is an effective method for tube fixation (for tube without holes) in conjunctivo dacryocystorhinostomy (CDCR). It helps to hold the tube firmly preventing its displacement, however, it may be avoided in patients with allergic conjunctivitis.

REFERENCES


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