



A STUDY ON THE OUTCOME OF SIMPLIFIED CANALICULO-DCR IN NORTH EAST INDIA

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ABSTRACT

Aims and objectives: To evaluate the surgical outcomes and its complications following modified canaliculo-DCR. **Materials and methods:** 100 patients with common canalicular obstruction were selected and were evaluated by history, syringing, diagnostic probing and dacryocystography in doubtful cases. The surgical technique included construction of bony ostium and anterior flaps, excision of canalicular block, bicanalicular intubation of silicon tube and suturing the anterior flaps followed by closure of the wound. Data were collected in a standard data collection format which included age, sex, type of block, observation of operative procedure, complications encountered and success rate of the technique. **Results:** Common canalicular obstruction was found more commonly in the age group of 41-50yrs, out of which 56% were females. Membranous block was more compared to proximal block. The success rate was 78%. The most common intraoperative complication is haemorrhage and post operative complication is infection. **Conclusion:** Modified canaliculo-DCR is a successful and most standard operative procedure to manage the cases of common canalicular block with >8 mm patent canaliculus, though it requires higher grades of technical skill.

KEYWORDS : Single flap, Canaliculo-DCR, North East India.

INTRODUCTION

Epiphora resulting from either obstruction or lacrimal pump failure is a common problem. The most common causes of lacrimal obstruction are nasolacrimal duct stenosis and common canalicular obstruction. External dacryocystorhinostomy is a standard procedure for the nasolacrimal duct stenosis with high success rate.¹

Conjunctivo-DCR and canaliculo-DCR is preferred for proximal and distal canalicular obstruction.²⁻⁴ The distal common canalicular block is caused by the membranous obstruction at its junction with the sac and accounts for two thirds of common canalicular obstructions.⁵ And the proximal common canalicular obstructions are caused by pericanalicular fibrosis at the lateral end.

The common canalicular obstruction can be treated by alternative technique of DCR with internal membranectomy and silicone tube intubation in cases where it is encountered intraoperatively.⁶

Membranectomy and silicone tube intubation are done commonly in common canalicular obstruction worldwide. However, no such study was carried out in North- East India for long term success rate of this procedure.

Our study will prospectively investigate this technique of canaliculo-DCR with membranectomy and silicone tube intubation for common canalicular obstruction and its outcome over a period of 1 year on a series of patients attending Regional Institute of Ophthalmology (RIO), Gauhati Medical College and Hospital (GMCH), Guwahati, Assam. Regional Institute of Ophthalmology, GMCH being a tertiary referral center of North-East India, this study will reflect a scenario of success rate of this procedure in North-East India.

MATERIALS AND METHODS

The study was a prospective clinical study of the surgical procedure canaliculo-DCR which was conducted during the period of November 2019 to November 2020.

It was carried out in the Regional Institute of Ophthalmology, Gauhati Medical College & Hospital, Guwahati and only patients attending that hospital were taken for the study.

Total number of 100 cases were selected for the study from all OPD patients with the diagnosis of common canalicular block who reported with symptoms of lacrimal drainage system during the study period and subsequently were admitted into the hospital for treatment, canaliculo-DCR. The selected cases were both male and female, excluding the extremes of ages.

The cases with the following features were included:

- Common canalicular obstruction and stenosis.
- Canalicular obstruction where the site of obstruction is more than 8 mm away from punctum.

The exclusion criteria were:

- Patients with medical problems such as unstable angina, severe respiratory diseases, uncontrolled diabetes, bleeding disorder etc.
- Patients with gross nasal pathology like grossly deviated nasal septum, nasal septal spur, adhesion between septum and turbinates, atrophic rhinitis, neoplastic condition of the nose.
- Patients with lacrimal passage tumor and other severe lesion on medial canthal region, extremes of age.

PREOPERATIVE WORKUP

The selected cases were evaluated by detailed history, examination and investigations. History of epiphora, discharge, any previous surgery in the nose, eyelids and lacrimal system, any allergy were noted.

Routine local examination with special emphasis on lacrimal system was carried out which included-

- Examination of the punctum, skin over the sac area, local tenderness, presence of any congenital abnormalities of medial canthus or nose, any evidence of fungal dacryocystitis or canaliculitis.
- Syringing.
- Diagnostic probing.
- Jones dye test.
- Lignocaine sensitivity test.
- Dacryocystography in doubtful cases.

Investigation included (1) investigations of blood: complete blood count, blood sugar, serum creatinine, viral marker (2) BT, CT (3) ECG

OPERATIVE PROCEDURE

All selected cases were operated with the same procedure by single experienced surgeon. All patients were operated under local anaesthesia.

Operative steps:

1) Initial steps:

Skin incision was made about 3 mm medial from the medial canthus and was extended approximately 2 mm above and 10 mm below the horizontal intercanthal line where skin and subcutaneous tissue were cut. Blunt Dissection was done to separate the orbicularis fibres to expose MPL, lacrimal fascia, and anterior lacrimal crest and the lacrimal sac. Four retraction sutures were given by 4-0 silk suture to expose the dissected area. The sac was opened by a longitudinal incision on its medial wall and interior of the sac was explored and any fibrous tissue and adhesions were removed. Two horizontal cut was given through the ends of previous vertical cut of medial wall of lacrimal sac and anterior and posterior flap was made following which posterior flap was excised.

2) Blocked canaliculus management:

Introducing the lacrimal probe through the dilated punctum up to the block. The blocked part of the common canaliculus was tent up towards inside the lacrimal sac. Then it was meticulously excises under a surgical microscope to clear the passage of the remaining part of the canaliculus which is more than 8 mm long from the concerned punctum.

3) Bony ostium and nasal flap preparation:

The bony ostium was made with the help of Citelli's bone punch such that it covered an area extending from posterior lacrimal crest beyond the anterior lacrimal crest; and from the superior opening of bony nasolacrimal duct to the level of medial palpebral ligament which measured about 12x14 mm in size. The edge of the bony window was smoothed out and it exposed the portion of mucosa of the middle meatus. To make nasal mucosal flap, two vertical incisions were made by the side of superior and inferior wall a bony ostium. Then a horizontal incision was made towards posterior part of exposed nasal mucosa by Bard parker knife. There by anterior nasal flap was made and remaining portion of mucosa was excised out.

4) Intubation:

At first both the canaliculi were cleared introducing Bowman's probe till it comes out to the inner side of the sac. Then metallic introducer of the silicon tube was introduced through the lower punctum till it reaches the level of the bony ostium or middle meatus. A curved artery forceps was introduced through the nostril to the bony ostium. The metallic introducer of the silicon tube was hold by the forceps and it was pulled out by the forceps gently through the nostril. The other end of the silicon tube was also introduced same way via the upper punctum and then via the the nostril. Both the ends of the silicon tube were braided at the nostril and then ligated by non-absorbable silk suture. Then remaining portion of the tube with metallic introducer was excised.

5) Suturing of the flaps:

Both the anterior sac flap and nasal mucosal flaps were examined properly for its size, mobility and then both the flaps were sutured together with 6-0 vicryl suture by three interrupted sutures without sagging of the flap and taking care that the canaliculi do not kink.

6) Closure of the wound:

Splitted orbicularis muscle were closed using interrupted sutures of 6-0 vicryl suture. In cases where medial palpebral ligament was bisected, it was sutured with 6-0 vicryl suture. The skin incision was carefully sutured by bringing the skin edges together by non-absorbable 6-0 prolene suture.

After closure of wound on table syringing was done.

POST OPERATIVE MANAGEMENT:

Antibiotic ointment (Moxifloxacin) was applied over the sutured wound and pad and patch was applied over it. The same systemic antibiotic which was started one day earlier was continued for another 6 days post-operatively. Nasal decongestant drops were instilled into the nose thrice daily for 10 days.

On the next day the patch was removed. Local antibiotic Moxifloxacin eye drops were applied to the conjunctival sac 6 times daily for 10 days

and Moxifloxacin ointment applied to the operative wound thrice daily for 10 days. NSAID and serratiopeptidase were given for 5-7 days. Symptomatic treatments were given as and when required. Skin sutures were removed on 7-10days of post-operative day.

POST OPERATIVE FOLLOWUP:

Patients were followed up for a period of 12 months. Each patient was evaluated on the 2nd, 7th and 15th post operative day; on 6th post operative week and then 2 monthly until 12 month. Silicon tube was removed after 6 months. In the cases who presented with prolapsed of tube or other complications it was removed earlier. Then syringing was done. The final outcome of the operation was assessed after 12 months.

Criteria for complete success:

- i) Subjective disappearance of epiphora.
- ii) Freely patent tear draining passage on syringing.

Criteria for partial success:

- i) Subjective incomplete disappearance of epiphora which occurred on exposure to wind, cold or dusty atmosphere.
- ii) Partially patent tear draining passage on syringe with or without force.

Criteria for failure:

- i) Recurrence of epiphora following operation.
- ii) Regurgitation through the puncta on pressure over the sac.
- iii) Blocked lacrimal passage on syringing even with application of forceful syringing or pressure syringing.

RESULTS AND OBSERVATION

In this prospective clinical study of 100 eyes of 100 cases with common canalicular block were operated. Then the outcome was analyzed. Prior to surgery the cases were diagnosed by syringing, diagnostic probing, dye test and dacryo cysto graphy (DCG) in doubtful or undiagnosed cases. Single surgical procedure was applied to all patients to assess the outcome of the procedure. Results and data obtained from this study are detailed below.

1. Age:

In this study the age varied considerably. The lowest age at which this procedure was done was 21 years and highest was 60 years.

Table -1: Distribtuion of the age with percentage.

Age in years	No of patients	Percentage
21-30	11	11
31-40	17	17
41-50	39	39
51-60	33	33

2. Sex Distribution:

Out of 100 cases, 56 cases were female and 44 cases were male.

Table -2: Distribtuion of the Sex with percentage

Age group	Male	Female	Total number	Percentage	
				Male	Female
21-30	5	5	10	50	50
31-40	13	6	19	68.4	31.5
41-50	10	29	39	25.6	74.35
51-60	16	16	32	50	50

3. Types of block

In our study group, we got 56 cases of membranous block and 44 cases of proximal canalicular block.

Table 3. Showing distribution of types of block

Block	No cases	Percentage
Membranous block	56	56
Proximal block	44	44

4. Distance of block from the punctum :

This distance was measured with the help of a Bowman's probe and measuring scale. It varied from 9-12 mm and average was 11 mm. The distance was measured from lower punctum via lower canaliculus. We did not include any case having less than or equal to (\leq) 8 mm from the lower punctum.

5. Observation of operative technique:

All surgeries were done with curved incision and the concavity was laterally. The incision was made at around 3 mm medial to medial canthus and it was found to be adequate for exposure of the deeper structures. It was a safe distance to prevent from injury to the angular vessel.

Canalicular dissection: Canalicular dissection procedure was difficult. But, it was adequate to manage the situation. It requires a skillful surgical experience.

Preparation of bony ostium: The bony ostium was made punching the bone of the fossa for lacrimal sac in a c-pattern direction ultimately to almost a round ostium of size 12-14 mm. These techniques found to be effective and comfortable. The size of the ostium was also surgically adequate that exposed required area of nasal mucosa for a mucosal flap. Yet there was mild to moderate nasal mucosal injury in 12 cases during the preparation of the bony ostium. After the period of 12 months when endoscopically study bony ostium was evaluated, it was found to be about 2-3mm in diameter in successful cases.

Intubation: The assisted introduction of silicon tube, with the help of metallic introducer and curved artery forceps was found to be surgically competent, though it requires better skill.

Anastomosis of the flap: All the cases were operated by simplified procedure where only the anterior flaps were anastomosed after intubation by 6-0 vicryl suture. It was surgically effective, relatively easy and less time consuming. It was also manageable on the cases of scanty nasal mucosa, where two nasal flaps were difficult to manage. Moreover, it was comparable with that of double flap suture.

Wound closure: The wound was closed in layers of skin and muscle. It gave better anatomic configuration post operatively. The medial palpebral ligament was sutured with 6-0 vicryl where it was bisected.

Skin was sutured with interrupted suture using 6-0 prolene which was observed to be acceptable cosmetically in later period. But, five cases showed some amount scar on the line of incision.

6. Complications encountered:

(a) Intraoperative complications:

Thirty three percent cases showed manageable intraoperative complications which were haemorrhage, nasal mucosal injury and sac wall injury.

Table 4. Showing intraoperative complications

Complications	No of cases	Percentage
Haemorrhage	17	17
Nasal mucosal injury	11	11
Sac wall injury	5	5
Total	33	33

(b) Post operative complications:

A few post operative complications were encountered which were treated with systemic and topical antibiotics, anti-inflammatory medicines and irrigation of anastomosis with antibiotic solution. Prolapse of the tube was managed by repositioning the tubes.

Table- 5. Showing post operative complications

Complications	No of cases	Percentage
Infection	22	22
Nasal irritation	11	11
Prolapse of tube	11	11

7. Success of technique:

Our study shows complete success in 56 patients who became symptom free and there was a patent anastomosis. There was partial success in 22 patients

Table- 6: Showing levels of operative success

Grades of success	No of cases	Percentage
Complete success	56	56
Partial success	22	22
Failure	22	22

showed improvement of symptoms and partially patent anastomosis. However, 22 cases showed no improvement of symptoms and block anastomotic tract. The overall acceptable success rate in this study was 78%.

DISCUSSION

Common canalicular block is a important cause of troublesome epiphora and it accounts for a lot many cases in any lacrimal clinic.

Its management has been quite unsatisfactory till present situation. Medical management including tear reducing topical medication may ultimately lead to dry eye. Therapeutic probing and dilatation for obstructive common canalicular diseases are of no value. It often creates complete obstruction from an incomplete strictures.⁸ Surgical management, conjunctivo-dacryocystorhinostomy with Jones tube intubation^{2,14}, is relatively unphysiological and associated with lifelong follow up and other complication.

Reconstructive surgery, canaliculo-dacryocystorhinostomy, is more of a physiological in nature where canaliculus is reconstructed by removing blocked portion and intubation of silicon tube.^{7,15,16,17,18} However, it requires a high surgical skill and more time. But the result is quite inspiring.

Female cases were more in our study which was 56%. It has been found in other studies of common canalicular block as well.⁷ This is probably due to difference in anatomical structure and canalicular diameter between male and female. Common age group was 5th decade (post menopausal). It is probably due to estrogenic hormonal imbalance. But in case of younger cases the difference of male and female is less in our study.

Canaliculo-dacryocystorhinostomy for common canalicular block is a satisfactory surgical procedure. Therefore, one should not hesitate to go for this surgery. Nevertheless, it is important to choose the appropriate cases for such surgery by establishing the site of obstruction.

According to Doucet and Hartwitz (1982) and Grover, Gupta and Rastogi (1991) more than 8 mm of patent lower canaliculus is required realistically to undertake the canaliculo-dacryocystorhinostomy. Thus in our series we excluded those cases of common canalicular block which had less than or equal to 8 mm patent canaliculus.

Till date, different stent materials for intubation have been used by different authors for common canalicular surgeries like polyethylene tube by Bonaccolto G, 12. 100 metric blue monofilament nylon by Barrie Jones, silastic tube with a probe cemented to each end by Jones Guibb, silicon tubes by Keith¹⁵, Crawford probes by Katowitz, Quickert and Dryden^{19,20}. Of all these intubation materials, polyethylene and silicon tubes have been most widely used. In our study we opted for silicon tube for intubating common canaliculus which was tolerated quite well by patients. Capillary action of the tube was quite good in 56% cases showing relief of epiphora and moderate in 22% cases showing improvement of epiphora during the follow up period. Katowitz²⁰ in his series of silicon tube intubation in canalicular obstruction reported a success rate of 85% in extubated cases but 94% if all extubated and intubated cases were combined. Prognosis is good in such cases where epiphora is relieved with the tube in situ. Cases where epiphora persists while tube is in position indicates stricture gripping the tube firmly, with no space available for tears to drain by capillarity indicating that prognosis is less better. Silicon tube intubation helps epithelization along the tract and prevents closure of the bony ostium and canalicular punctum by granulation tissue.

There is different opinion regarding anastomotic flaps of the surgical procedure. Many surgeons like Prasad and Katara (1967), Avasty P, Agarwal IP (1962) etc preferred anastomosis of anterior flaps of lacrimal sac and nasal mucosa only. But others surgeon like Grover, Gupta and Rastogi (1991)⁷, Doucet and Hurwitz (1982)⁸, Struck and Frank (1999)²¹ did the procedure with anastomosis of both anterior and posterior flaps of lacrimal sac and nasal mucosa along with recanalization procedure. In our study we anastomosed only anterior flaps along with recanalization of block canal and bicanalicular silicone tube intubation that passes to the nostril via bony ostium. Its seems to be easier by eliminating the difficulty of suturing the posterior flaps and took less time but has a good success rate, that was around 78% in our study. It is quite satisfactory and which is comparable to

other modern canaliculo-DCR with double flap anastomosis. With this experience we would like to recommend for further study of canaliculo-DCR with single anterior flap procedure.

The proper time for removal of the tube has not been clearly established by the existing reports. Barrie Jones kept nylon stent in canaliculo cryocystorhinostomy for two weeks, while Doucet and Hurwitz extubated the silicon tubes after 4-6 months postoperatively with 75% success rate. Katowitzlos in his series of canalicular obstruction removed silicon tube arbitrarily from 6 to 15 months after surgery with 85% success rate and no major complication. In our study, we extubated the silicon tube 6 months after the surgery. We followed up the operated patients for a period of 12 months.

In our surgical procedure, we had to face some amounts of complication during operation and during the follow-up period. During the operative procedure there was moderate type of hemorrhage (17%), injury to nasal mucosa (5%) and sac wall injury (5%) which was manageable quite effectively. In follow up period there was infection to the anastomotic track (22%) and nasal irritation (11%) during 2-3 months post operatively. All these were managed properly. Moreover, there was prolaps of tube in 11 cases after two months of post operative period which were repositioned.

In this study, 78% cases showed satisfactory improvement of symptom which can be correlated with other studies. Our follow up period was 12 months and extubation of tube was done at six months.

Table-7. Comparison of success as shown by different studies

Author	Success
Doucet Hurwitz(1982)	75%
Grover et al(1991)	695
Boridices et al(2005)	92%
Hans gert struck and frank torty(1999)	50%
Our study	78%

We tried to correlate some more parameters like types of incision, modes of intubation, types of flap etc. Some parameters of our study could not be correlated with other established studies due to lack of comparable similar study. Therefore, it is justifiable to do more study in this subject with more number of study cases.

CONCLUSION

The modification of operative procedure of canaliculo-DCR in our study involves the excision of blocked canal and anastomosis of patent canal with silicon tube intubation. Anastomosis of only anterior flaps of lacrimal sac nasal mucosa in our study shows that it is an easier and less time consuming technique with success rate being quite encouraging.

Canaliculo- DCR is a successful and most standard operative procedure to manage the case of common canalicular block with more than eight millimeter patent canaliculus though it requires higher grades of technical skills in micro dissection.

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