Original Article

Comparison of Dacryocystorhinostomy with Mitomycin C Against Dacryocystorhinostomy with Intubation

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Purpose: To compare the surgical outcome of Dacryocystorhinostomy (DCR) with Mitomycin C (MMC) against Dacryocystorhinostomy with Intubation in patients of Nasolacrimal duct block (NLDB).

Material and Methods: This randomized controlled trial was conducted on 130 patients with NLDB, equally and randomly enrolled in two groups. In Group A patients underwent DCR with intubation and in group B DCR with MMC from July 2009 to December 2009. Patients were followed for 06 months. The main outcome measures were assessment of regurgitation and the patency of lacrimal drainage system (LDS).

Results: 130 patients of NLDB included in this study. Out of 65 patients in group A, 62 (95.4%) patients remained symptom free whereas, 3 (4.6%) showed failed syringing at the end of 6 months. However, out of the 65 patients in group B, 59 (90.8%) patients remained symptom free and 6 (9.2%) showed failed syringing. The overall success rate was 93.1%. (Statistics were and are mentioned in the results).

Conclusion: Silicon tube and MMC, both yield equally successful results with DCR. However, use of MMC is more cost and time effective than silicon tube and also associated with lesser intra-operative and post-operative complications.

Obstructive epiphora due to blockage in the distal part of the nasolacrimal apparatus is the major indication of External DCR. First performed by Adei Toti, DCR is still the gold standard against which other methods are compared.[1,2] Its various modifications include, Dupuy Dutemps and Bourguet's idea of anastomosis of the flaps of the lacrimal sac and nasal mucosa[3], Ohm's idea of suturing of nasal mucosa with the lacrimal sac,[4] Iliff's suggestion of placing a rubber catheter into the sac[5] and Older's suggestion of using a silicon tube[6].

Success rate of DCR has been found to be 90%.[7] 10% of cases however, still fail with persistent excessive tearing and inability to irrigate[7]. The two commonest causes of DCR failure are obstruction of the common canaliculus and closure of the osteotomy site[7].

Antiproliferative agents like MMC are used to prevent fibrous tissue growth and scarring. This overall decreases the failure rate of DCR[7]. Success rates achieved with the adjunctive use of MMC in various studies are 95.5%, 95% and 97.7%[7-9] and those with silicon tube are 83% and 97.5%.[10,11]

The aim of this study is to compare the surgical results of both these adjuncts of DCR.

MATERIAL AND METHODS

The study was carried out at the Oculoplasty clinic, Al-Ibrahim Eye Hospital, Malir Karachi from July 2009 to December 2009. Patients were followed post-operatively from January 2010 to June 2010. The ethical committee permission was taken before study. 130 patients of both gender and belonging to any age group presenting to the OPD with complaints of

watering / epiphora and fulfilling the inclusion criteria were subjected to the planned ocular examination and investigation. Inclusion criteria was complete NLD obstruction and chronic Dacryocystitis. The patients were randomly divided into 2 groups, each group consisting of 65 patients. Exclusion criteria included acute on chronic dacyocystitis, punctal agenesis, common or individual canalicular obstruction, neoplasm of the lacrimal sac, tuberculosis of the lacrimal sac, osteomyelitis of the lacrimal bone, severe atrophic rhinitis, nasal polyp, granulomas, neoplasms of nasal cavity and patients who were unable to follow up for six months.

A specific proforma was maintained for all the registered patients to assess the post-operative results. The patients were evaluated pre-operatively via history and examination.

A detailed history regarding watering, swelling near the medial canthus, mucopurulent discharge was obtained. History of using eye drops such as adrenaline or phospholine iodide and anticoagulants, was also taken.

Ocular as well as nasal examination was done in all patients. Ocular examination was done to assess for Entropion, Ectropion, Trichiasis or Blepharitis, Punctal malposition, stenosis, agenesis or accessory puncta, canaliculitis, conjunctivitis, keratitis or any fistulae near medial canthus. Regurgitation test was performed and reflux of mucus or mucopurulent material through the canaliculus and puncta was noted. Schirmer test was perfomed in the elderly patients with suspected low tear secretion. Nasal cavity was examined in all patients to exclude any nasal disease and patients with nasal problem were referred to otolaryngologist for treatment before performing DCR surgery.

Preoperatively patients were investigated for any bleeding diatheses via blood complete picture, erythrocyte sedimentation rate, blood sugar levels, bleeding and clotting time, HBsAg and anti-HCV. Other relevant investigations, wherever needed.

Surgical technique

DCR was performed under general or local anesthesia as per patient need or request will. Informed consent was taken after thorough explanation of the procedure, its risks and benefits to the patient.

The nasal mucosa was anesthesized and vasoconstricted by packing the respective nasal cavity of all patients with ribbon gauze soaked in 4% Xylocaine and Adrenaline (1:100,000).

After anesthesia and draping, the puncta were dilated with Nettleship punctum dilator. The lacrimal sac was irrigated with normal saline. A vertical straight skin incision 6 mm away from the medial canthus was made to expose the anterior lacrimal crest. Four Traction sutures with 4/0 silk were made through the skin to expose the area of surgery. The periosteum over the anterior lacrimal crest was elevated towards the bridge of the nose for about 5 – 6 mm. The lacrimal fossa was exposed. The suture between the lacrimal bone and frontal process of maxilla lying in the posterior half of fossa was identified.

An oval osteotomy, approximately 12 x 10 mm in size, with smooth edges and round corners, was created. Small anterior and larger posterior flaps of sac were made. An H-shaped incision was made in the nasal mucosa forming a larger anterior and smaller posterior flap.

In the DCR with MMC group, a piece of neurosurgical cottonoid / gauze piece was attached with a long thread and saturated with 0.2 mg/ml MMC. It was then placed over the anastomosed posterior flaps and osteotomy site for 5 minutes, with the long thread passing out through the nostril. Meanwhile the anterior nasal and lacrimal sac flaps were anastomosed with 3 or 4 interrupted 6/0 Prolene sutures on short ½ circle needles. At least 2 and upto 4 sutures were placed. Traction sutures were then removed and the bridge of flaps sutured to the muscle layer with 2-3 suture of 6/0 vicryl to avoid collapse of bridge.

The periosteum, orbicularis oculi and skin wounds were closed in separate layers with interrupted 6 / 0 sutures. The MMC saturated cottonoid / gauze piece was removed trans-nasally by pulling out the long thread from the nostril.

Steps for DCR with intubation were identical to the DCR with MMC upto the point of fashioning of the mucosal flaps. A fine silicon tube attached to malleable metal bodkins was then introduced through both upper and lower canaliculi and brought out through DCR skin incision. After suturing the posterior flaps, the tube ends were passed into the nose and out through the nostril by means of a curved artery forceps. The tube loops were then tied together with a 5/0 prolene suture and left in the nasal cavity near the external nostril without fixing it to the nasal wall.

Pressure bandage and nasal packing with ribbon

gauze soaked in antibiotic ointment was done in all patients to control bleeding post-operatively.

Post-operatively all patients were kept in ward for 24 hours. The nasal pack and bandage was removed the following day. Skin sutures were removed after one week. All patients were kept on oral broad-spectrum systemic antibiotics, non steroidal anti-inflammatory medicines for one week to prevent post-operative soft tissue infection. They were also kept on topical moxifloxacin eye drops, QID for one month and polymyxin B, Bacitracin eye ointment, OD for local application over the wound.

Follow-up Protocol:

Follow-up was maintained for 6 months for the evaluation of abnormal overflow of tears and the patency of the LDS by syringing. The first follow-up was done on day one after surgery then after one week, and then at 1st, 3rd and 6th month post-operatively. Skin sutures were removed on first postoperative week.

Outcome of the surgery was measured on the basis of these subjective and objective findings. The surgery was considered successful if the patient had no tearing or significant improvement in tearing in a patent with patent LDS at the last follow-up. Patients having persistent epiphora with non-patent LDS were classified as failed DCR. At the end of follow-up period of 06 months results of DCR with MMC and DCR with intubation were compiled and compared with national and international results.

RESULTS

A total of 130 patients of NLDB were included in this study. Patients were equally and randomly allocated into two groups. In group A, patients were treated with Mitomycin C and in group B, patients were treated with intubations. Age distribution of the patients is presented in Figure 1. The average age of the patients was 27.98 ± 5.6 Years (95% CI: 25.89 to 29.87). Similarly comparison of age between groups is presented in Table 1. Significant difference was not observed between groups in age at p = 0.72. (Fisher exact test).

Out of 130 cases, 55 (42.3%) were male and 75 (57.7%) were female as presented in Table 2. Proportion of gender difference was also not significant between groups (p = 0.214).

Success rate of DCR with MMC and intubations was 93.1% while 6.9% of cases still fail with persistent excessive tearing and inability to irrigate. Rate of surgical outcome was not statistically significant between the groups (Fisher exact test; p = 0.49) as presented in Table 3. Similarly surgical outcome was also presented with respect to gender and this is also not significant as shown in Table 4.

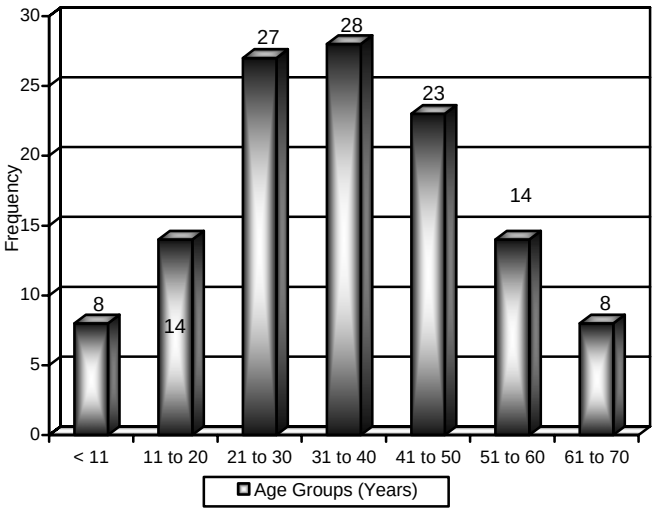

Fig. 1: Age distribution of the patients n=130
Mean± SD= 27.98 ± 5.6 Years (95%CI: 25.89 to 29.87)

DISCUSSION

External DCR is the gold standard procedure for relief of NLD obstruction by which other methods are measured and compared.[2] Success rate of DCR has been found to be 90%.[12-14] However, 10% of cases still fail with persistent excessive tearing and inability to irrigate the LDS.[7] The two commonest causes of DCR failure are obstruction of the common canaliculus and closure of the osteotomy site.[15-17] Fibrous tissue growth, scarring, and granulation tissue formation

Table 1: Age distribution with respect to treatment

Age Groups	Groups A n=65 n (%)	Groups B n=65 n (%)
<10 years	03 (4.6)	05 (7.7)
11-20 years	10 (15.4)	12 (18.5)
21-30 years	13 (20)	14 (21.5)
31-40 years	12 (18.5)	16 (24.6)
41-50 years	15 (23.1)	08 (12.3)
51-60 years	08 (12.3)	06 (9.2)
61-70 years	4 (6.2)	4 (6.2)

Table 2: Comparison of gender between groups

Gender	Group A n = 65 n (%)	Group B n = 65 n (%)	Total n=130 n (%)
Male	24 (36.9)	31 (47.7)	55 (42.3)
Female	41 (63.1)	34 (52.3)	75 (57.7)

Table 3: Comparison of Surgical outcome between groups

Outcomes	Group A n = 65 n (%)	Group B n = 65 n (%)	Total n (%)
Success	62 (95.4)	59 (90.8)	121 (93.1)
Failure	3 (4.6)	6 (9.2)	9 (6.9)

Table 4: Comparison of Surgical outcome between groups

Outcomes	Group A n = 65 n (%)	Group B n = 65 n (%)	P-Values
For Male	**24**	**31**	
Success	22 (91.7)	28 (90.3)	0.98
Failure	02 (8.3)	03 (9.7)	
For Female	41	34	
Success	40 (97.6)	31 (91.2)	0.32
Failure	01 (2.4)	03 (8.8)	

during the healing process decrease the created surface area of the osteotomy site, leading to surgical failure[7]. Thus, if we can reduce fibrous proliferation at the osteotomy site and at the anastomosed flaps, the success rate of DCRs may become much higher.[7]

In our study the overall success rate of DCR with MMC and intubations was 93.1% while 6.9% of cases still failed with persistent excessive tearing and inability to irrigate. The assessment criteria included symptomatic relief of epiphora and syringing at 1st day, 1st week and then at 1st, 3rd and 6th month.

In our study we attained a success rate of 90.8% and a failure rate of 9.2% in the DCR with intubation group. 59 patients were labeled as successful on the basis of absence of epiphora confirmed by positive syringing. Six patients however revealed persistent epiphora confirmed by failed syringing. Various other studies have previously been conducted to assess the surgical outcome of DCR with silicon tube. Zaman M et al showed a success rate of 97.5%[10] whereas, Ilff reported 90% 5 and Tarbat and Custer reported 95% success results[12]. In a comparative study Hussain et al[18] reported 94.7% success results in intubated series. Similarly Advani et al[19] reported a success rate of 95% in intubated cases. A study by Y M Delaney and R Khooshabeh showed that patent DCR system to irrigation and a positive dye test was achieved in 90% of procedures[20]. Nawaz et al were successful by 93.33%[11].

The DCR with MMC group showed a success rate of 95.4% and failure rate of 4.6%. 62 patients remained symptom free. This was confirmed on syringing. Three patients however revealed persistence of epiphora confirmed on failed syringing. From amongst the various studies previously conducted to assess the surgical outcome of DCR with MMC, Shu L Liao et al showed 95.5% success rate[7], Yildrim C et al gave a success rate of 95% and Rahman A et al achieved a success rate of 97.77%[8,9]. Kao et al showed 100% success with MMC in maintaining patency and a larger osteotomy site[7]. You in 2001, Roozitalab in 2004 and Akhund in 2005 applied Mitomycin-C over the anastomosed flaps and achieved a success rate of 100%, 90.5% and 99%; respectively[21, 22].

Mitomycin C, an anticancer agent isolated from Streptomyces caespitosus, has the ability to significantly suppress fibrosis and vascular in growth. Application of MMC over the osteotomy site and the flaps reduces the fibrous adhesion between the osteotomy site and the nasal septum as well as inhibits scarring around the opening of the common canaliculus[7]. In our study the most of the patients fell between 20-50 years of age. In the study by Zaman et al the majority of patients were between 41 and 60 years[10] whereas, that in the study by Rahman A et al were between 41 and 50 years of age[9]. This shows that the commonest age group to suffer from NLDB range between 30 and 60 years of age.

In our study there were 75 (57.7%) females and 55 (42.3%) males. It is known that chronic dacryocystitis most commonly affects the women of post-menopausal age[23]. This female predominance is possibly due to the narrow lumens of bony lacrimal canal and NLD in women, Osteoporosis, hormonal changes and a heightened immune response[24]. In the study by Zaman et al there were 62% females[10], by Rahman A et al there were 76% females[9], by Nawaz et al. there were 85% females[11], by Ali A et al. there were 79% females[25].

We found from our study that both silicon tube and MMC are equal in yielding successful results with DCR. The difference in the results achieved is not statistically significant for surgical outcome as well as for gender and thereby, both the adjuncts namely MMC and Silicon tube can be advised to patients undergoing DCR. However, the use of MMC is cost and time effective and the patient does not have to come for removal of the tube, neither does the patient have to suffer any irritation from the tube.

This study is the first of its type, to compare the surgical outcome of the two adjuncts used in DCR, namely, MMC and Silicon tube. We suggest that further studies be done to confirm these results.

CONCLUSION

From our study we find that there is no significant difference between the success results achieved with these two adjuncts. Thereby, both the adjuncts can be used with DCR. However, MMC is more cost and time effective.

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