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A comparative study between external Dacryocystorhinostomy (DCR) and external DCR combined with bicanalicular intubation of the lacrimal drainage apparatus - an experience at a tertiary hospital in Eastern India

Authors
Dr Arkendu Chatterjee[1], Dr Madhurima Chaudhury[2]
[1]MS (Oph); DO; MBBS, Assistant Professor, Dept. of Ophthalmology, NRS Medical College and Hospital, 138 AJC Bose Road Kolkata 700014
[2]MBBS; MS (PGT) (Oph), Dept of Ophthalmology, NRS Medical College and Hospital, 138. AJC Bose Road Kolkata 700014, India

Abstract
Aim: *This study was undertaken to compare the success rates of external DCR with external DCR combined with bicanalicular intubation of the lacrimal drainage apparatus.*
Material and Methods: *A total of 28 eyes of 28 patients were selected for this study, 15 patients were selected for conventional external DCR the rest 13 patients were selected for conventional DCR combined with bicanalicular silicone tube intubation. Silicone tubes were between 20 - 22 G. Patients ranged from 26 years to 71 years in age. Factors such as recurrent chronic dacryocystitis, fistula formation and mucocoele were taken into account. None of the eyes had any history of nasolacrimal surgical intervention. Eyes were randomly included in both the subgroups. The group with intubation were left with the silicone tubes in situ for 2 months. These eyes were followed up for a period of 18 months, initially weekly for one month after intervention, then monthly for two more months and then three monthly till end of study period.*
Results: *18 females and 10 males in a total of 28 patients were operated. External dacryorhinocystostomy combined with bicanalicular intubation could not be performed in 1 patient. One patient had a spontaneous expulsion of the silicone tube at 2 weeks post intervention. At three months post intervention 13 out of 15 eyes having conventional DCR had remained patent, a success rate of 86.67% where as 11 out of 12 eyes in the group having external DCR combined with intubation had remained patent, this gives a success rate of 91.67%. However at 6 months post intervention the conventional external DCR group presented 12 patent eyes ie, a success rate of 80.0% and the other group, ie, external DCR with combined intubation still had 10 patent eyes, ie, a success rate of 83.33%, further at 12 months post intervention the conventional external DCR group had a success rate of 73.33%, the combined intubation with external DCR (ex-DCR) group had a success rate of 83.33%. At the end of the study period of 18 months conventional DCR recipients had a success rate of 68% (10/15 eyes). The second group on the other hand had a success rate of 75.0 % (9/12 eyes). It was found that the age of the patient and the laterality of the eye did not influence outcome, male sex had higher rates of failure.*
Conclusions: *It was found out that success rates in the conventional external DCR group was lower than that of ex-DCR with intubation group moreover the presence of complications such has recurrent dacryocystitis, and presence of bony deformities like mild deviated nasal septum (DNS) further lowered the success rates. In conclusion it can be said that although external DCR is the gold standard in chronic dacryocystitis, the success rates are significantly increased when it is combined with silicone tube intubation, especially in complicated cases. Furthermore this neither significantly increases the cost of surgery nor require any expensive instruments or special training.*
Keywords: *External Dacryocystorhinostomy, Intubation-DCR, failed DCR, Deviated Nasal Septum.*

Introduction

The definitive treatment of dacryocystitis is surgical, The continuity of the nasolacrimal apparatus is reestablished by bypassing the obstruction and patency is ensured by connecting the lacrimal sac with the nasal mucosa through a bony ostium. This is the principal of dacryocystorhinostomy surgery and has remained largely unchanged since it was introduced by Toti in 1904[1]. The success rate of external DCR (ex-DCR) ranges from 69% to 100%[2] depending on various factors. It is often seen that though external DCR is thought to be a gold standard[3] in Lacrimal apparatus drainage obstruction, incorrect identification of the tear sac, inadequate osteotomy, fibrosis of the osteotomy, flap drop[4-6] shelving and tear sac recess are some of the common causes of failure of primary ex-DCR. Coupled to these established causes certain complicating factors such as recurrent dacryocystitis, bony deformities like deviated nasal septa (DNS), or those that cause scarred or thinned out lacrimal sac walls[5] cause even further high rates of failure.

Intubation entails placement of a silicon tube in the lacrimal pathway. The principle[6] behind this is presence of a surgically inert material in the pathway helps maintain the patency of the bony ostium as well as the anastomosis between the lacrimal sac and nasal mucosa, till epithelialisation is complete. Silicone tubes were left insitu for 2 months. The most widely available material in our setting is silicon tube. This also happens to be the material of choice.[6]

Conventional teachings[7] show that silicon intubation is associated with complications such as corneal irritation, granuloma formation, erosions, adhesions and punctual deformities and trauma to nasal septum. And as such is thought to be best reserved for complicated cases such as failed DCR dacryocystorhinostomy, those associated with bony deformities or with trauma.

This study was undertaken to compare the success rate of conventional ex-DCR with that of ex-DCR combined with intubation, whether intubation was indeed associated with increased rates of complications and that if it was used in all cases of external DCR it could serve as a means to increase the success rate of ex-DCR further without introducing any needless complications and significantly increasing the costs.

Material and Methods

Adult patients were screened for epiphora or chronic ocular discharge and sent to the surgeon, A single surgeon carried out all the examinations as well as surgeries.

All the patients underwent the following examinations, Slit lamp biomicroscopy, lacrimal sac expression, lacrimal sac syringing and the dye disappearance test. Slit lamp Biomicroscopy was used to study the adnexa and rule out trichiasis, distichiasis, lid entropion or any other cause of excessive tearing. The dye disappearance test was done by instilling a drop of 2% fluorescein in the conjunctival sac of both the eyes. The tear menisci of both eyes were evaluated by the cobalt blue light of the slit lamp after 5 minutes of installation. Lacrimal sac expression was performed by pressing upon the skin over the lacrimal sac region just below the medial palpebral ligament. Regurgitation of fluid or purulent material from the puncta was observed carefully. Last and most importantly the syringing test was done, 4% lignocaine was instilled in the conjunction sac and punta were dilated using a Nettleship punctual dilator, after dilating the puncta, a 24 G lacrimal cannula was introduced in the canaliculus and the sac irrigated with normal saline. Reflux of purulent fluid or clear fluid from the opposite puncta was looked for, after satisfying that the patient had a probable block at the nasolacrimal duct level the patient was selected for surgery. Patients were randomly selected for either conventional ex-DCR or ex-DCR combined with silicone tube intubation.

Surgical techniques: All patients underwent a conventional external DCR while those in the second group underwent an additional intubation procedure. All surgeries were conducted under local infiltration block using 2% lignocaine. All

patients were given nasal pack with roller gauze soaked in adrenalin (1;1000 dilution) and 2% lignocaine before commencement of surgery, to help anaesthetise and blanch out nasal mucosa. A slightly curved incision was given 3 mm lateral to the medial canthus of the eye extending from just above the medial palpebral ligament extending upto 1.5 cm below the Medial palpebral ligament. The superficial and deep slips of the medial palpebral ligament is cut, the incision is deepened through the fibres of the orbiculares oculi, till the periosteum is reached. With help of a rougine, the periosteum was elevated, blunt dissection is carried on to dissect off the medial wall of the sac. Bowman's probe is used to tent up the medial wall of the sac, carefully an incision is made over this medial wall of the sac to fashion out the lacrimal sac flaps. The posterior lacrimal crest is identified, the lacrimal bone just below that is selected for the bony esteem construction, Citelli's bone punch is used to make a bony ostium, and it is progressively enlarged to about 8mm x 8mm ostium revealing the nasal mucosa below. A H shaped incision is given over the mucosa, fashioning out an anterior flap and a posterior flap, The nasal flaps and the sac flaps are sutured using 6-0 polyglactin (vicryl) sutures. The nasal pack is removed at this stage and those who were selected for only conventional ex-DCR had the surgical area irrigated thoroughly, The anterior limb of the medial canthal tendon and overlying periosteum were then reattached. The remaining suture knot ends were then pulled anteriorly and tied with the suture closing the periosteum to obtain a taut anterior flap and to make the rhinostomy lumen as large as possible. Muscle, subcutaneous tissue and skin, respectively, were then closed. While those who had a combined intubation planned had their puncta once again dilated using the Nettleship dilator. The silicon tube (Modern Surgicals, 20- 22 G) was intubated using the malleable stylettes first through the upper puncta, to emerge through the anastomosis into the nasal cavity and out through the nostrils. The other puncta was similarly intubated the ends of the tube were pulled down and the two ends knotted, and released so that the knot retracted about 5 mm into the internal nares. The rest of the surgery being similar to the conventional DCR group. Both group of patients were administered steroid antibiotic eye drops and systemic antibiotics. Patients were instructed not to blow their noses, and touch the corner of their eyes.

Patients were followed up weekly for the first month, monthly for two months and there after 3 months. those that underwent only conventional ex-DCR were subjected to syringing using antibiotic solution, success meant a patent anastamosis (revealed by patient as a bitter taste) and disappearance of symptoms. Those that underwent ex-DCR with combined intubation were followed up for their symptoms, success meant disappearance of watering and discharge in the initial 2 months during which time they remained intubated. Thereafter this group too was subjected to syringing.

Results

28 eyes in all were selected for surgery. Conventional ex-DCR, surgery was offered to 15 patients and could be completed without any complications in all the 15 eyes in this group. In the other group viz, ex-DCR with intubation surgery could be performed on 12 of the 13 patients offered this surgery. The one patient who could not be intubated was excluded from the study. In this study there were 18 females and 10 males. The age ranged from 26 to 71 years. The average age of the patients was 60.01yrs, the average age of males being 66.3 years and the average age of females being 53.72 yrs. 53.5% of the eyes operated were Right eyes and the rest 46.5% left eye. Initially it was noted that all eyes in the ex-DCR group, ie, till one month post operative all (15/15) eyes had a patent anastomosis and resolution of symptoms. One patient in the ex-DCR with combined intubation had a spontaneous removal of the silicon tube at two weeks post operative, followed by return of symptoms and possible closing of the anastomosis by one month post intervention, thus

this group had a initial success rate of 91.67% (11/12 eyes).

Follow up	External DCR group		External DCR with combined Intubation group	
	Eyes Patent	Success rate in %	Eyes Patent	Success rate in %
3 months	13/15	86.67	11/12	91.67
6 months	12/15	80	10/12	83.33
12 months	11/15	73.33	10/12	83.33
18 months	10/15	68	9/12	75

Table showing a comparison of success rates between convention ex-DCR and ex-DCR with Intubation

At 3 months after intervention the conventional ex-DCR group had a success rate of 86.67% (13/15) eyes, the intubation group continued to have a success rate of 91.67% (11/12 eyes).

At 6 months after intervention the conventional ex-DCR group had a success rate of 80.0% (12/15 eyes) where as the combined intubation group had a success rate of 83.33% (10/12 eyes).

At 1 year post intervention the conventional ex-DCR group had a further decline in success rate to 73.33% (11/15 eyes) where as the other group continued to maintain its success rate at 83.33%(10/12 eyes).

At 18 months post intervention there was a further drop in the success rate in the ex-DCR group (10/15 eyes) or 68% where as the group with intubation had a better success rate at 75% (9/12 eyes)

Complications noted during the post operative period were higher in the convention ex-DCR, the commonest being watering from the eye 33%, chronic dacryocystitis 6%, Acute dacryocystitis with orbital cellulitis 6%.

Complications noted in the post operative period were similar in the intubation group too, but the rates were lower, watering was noted in 24%, 1 patient had punctual granuloma, and 1 patient had acute dacryocystitis. Those patients who had failed conventional DCR or failed intubation DCR were scheduled for a revision surgery.

The passage of antibiotic solution into the nostril or oropharynx during syringing and improvement of the patients symptoms of watering, was defined as a success, No improvement or possible worsening of watering and discharge and no passage of antibiotic in the nostril or oropharynx was defined as a failure.

Discussion

It is well accepted that the rate of success in conventional ex-DCR varies from 69% to 100% and it depends on various factors. Rates in our study matches this, it has been shown that there is an inverse relationship between success rate and duration of follow up, this too has been borne out in our study, the success rate in ex-DCR falling from 100% at one month follow up to about 68% at end of 18 months. It is this wide variation in success rates and its unpredictability which prompted this study, this study tries to find out if augmenting the conventional ex-DCR with bicanalicular silicone intubation provides for a better and more consistent success rates. In our study we found that cases which had combined intubation with ex-DCR had a higher and more consistent success rate throughout study duration. It is well known that primary causes of failure in a DCR are inadequate osteotomy, fibrosis of the osteotomy, shelving and sac recess formation, all these can be prevented from causing a failure if an inert material is left long enough in the anastomosis created so that epithelialisation across the anastomosis is complete, This principle was used by Gibbs[6] in 1967, he used Silicone tube and this has since been the material of choice. The reasons for the higher success rates of bicanalicular silicone intubation in comparison to the other techniques are the greater dilation of the lacrimal system achieved by this method and prevention of restenosis after stent removal. It is true that studies have shown that silicon tube intubation when combined with conventional DCR have increased complication rates[9-10](Anderson and Edwards 1979, Allen & Berlin 1989). But other studies[11] have also shown that success rates[12] with intuba-

tion DCR has been consistently better than with DCR alone. In our studies we find that complications rate in intubation combined with ex-DCR are comparatively lower and at the same time success rates being higher.

It is found that augumenting conventional external DCR with intubation neither significantly increase surgical time, nor significantly escalate costs and requires no additional skill on the part of the surgeon. While at the same time it does offer the benefit of better success rates and in our set up lesser complications. Though conventional teaching suggests intubation DCR to be reserved for difficult cases or cases with high risk of surgical failure, (Choung & Khwarg 2007; Yazici & Akova 2007)[12-13] our studies have revealed its superiority in terms of better and consistent success rates,

This study suffers from the drawback of small number patients, and a small follow up period of just 18 months,

It cannot be said that intubation alone will increase the percentage of surgical success. To better evaluate this percentage it is necessary to analyze the surgical factors, easy or difficult, tear sac volume, bleeding during the surgery or in postoperative period, techniques for performing sutures and making the flaps etc.

Further studies are needed to conclusively establish superiority of intubation DCR over conventional external DCR in terms of success rates.

Conclusions

Bicanalicular intubation for lacrimal drainage system is a simple, inexpensive and straight forward adjunct to conventional external dacryocystorhinostomy. The procedure is strongly indicated for patients with chronic dacryocystitis who are at high risk of surgical failure. Carefully performed, it gives a 76% success rate and is not influenced by the different variables examined. Though further studies and longer follow up is required to recommend its use routinely in every case.

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