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Main Article

Endonasal dacryocystorhinostomy: a prospective study

A. S. Harugop · R. S. Mudhol · B. K. Rekha · M. Maheswaran

Abstract

Objective The objectives of this study are to report the results of Endonasal Dacryocystorhinostomy (EnDCR) and the role of silicon intubation in EnDCR in Indian population.

Study design The authors conducted a prospective case series.

Methods 290 patients underwent EnDCR between January 2002 and July 2007 – 240 cases without silicon intubation and 50 cases with silicon intubation. Patients were followed up for an average of 18.6 months in first group and 5.2 months in second group. Outcome was evaluated subjectively and objectively.

Results In EnDCR without silicon intubation, the procedure was successful in 93.3% of cases. In EnDCR with silicon intubation, the procedure was successful in 96% of cases.

Conclusion EnDCR is a safe procedure with good success rate and has potential advantages in chronic dacryocystitis cases. The use of silicon intubation in nasolacrimal pathway helps in maintaining the patency of rhinostomy.

Keywords Endoscopic dacryocystorhinostomy · Silicon intubation.

A. S. Harugop · R. S. Mudhol · B. K. Rekha · M. Maheswaran
Deptartment of ENT & Head and Neck Surgery,
K.L.E.'S University, Jawaharlal Nehru Medical College,
Belgaum, India

A. S. Harugop (✉)
E mail: anilharugop@yahoo.co.in

Introduction

Dacryocystorhinostomy (DCR) is an operation that has been in use for more than 100 years [1]. Toti originally described the traditional external approach in 1904 [2]. The original intranasal approach was described by Caldwell [1] in 1883 and was modified later in 1914 by West & Halle [3] using microscope for visualization. In last two decades, with the introduction of high-resolution endoscopes for paranasal surgery, EnDCR has begun to gain popularity [4]. McDonogh & Meiring [5] described the first modern endonasal DCR procedure in 1989. Since this description, a number of modifications using laser have also been described as a useful tool in EnDCR [6].

In addition to avoiding a skin incision and without disrupting the medial canthal anatomy and function [7], EnDCR enables the surgeon to identify and correct common intranasal causes of DCR failures such as adhesions, an enlarged middle turbinate, or an infected ethmoid sinus. EnDCR has definitive role in failed External DCR cases and revision cases.

Most of the studies have shown good result and excellent patient acceptability. In this study we report the results of EnDCR & role of silicon intubation in Indian population.

Materials and methods

Patients selection

A prospective study was conducted on 290 patients diagnosed to have chronic dacryocystitis between January 2002 to July 2007 in KLE'S Hospital & Medical Research Centre and District Hospital, Belgaum. Age of the patients ranged from 2 years (Fig. 1) to 73 years (Fig. 2). The cases with presaccal block, previous lacrimal trauma, were excluded from the study. Patients who required other nasal procedures like septoplasty, release of adhesion, and clearance of agger nasi

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were included in the study. Revision surgery was done in 13 patients – 8 patients were subjected to revision surgery after external DCR, and 5 after endonasal DCR. Silicon stenting was performed in randomly chosen 50 cases. The data regarding the patient's age, sex, additional procedures, type of surgery (with or without silicon intubations), side of operation and follow up are depicted in Table 1.

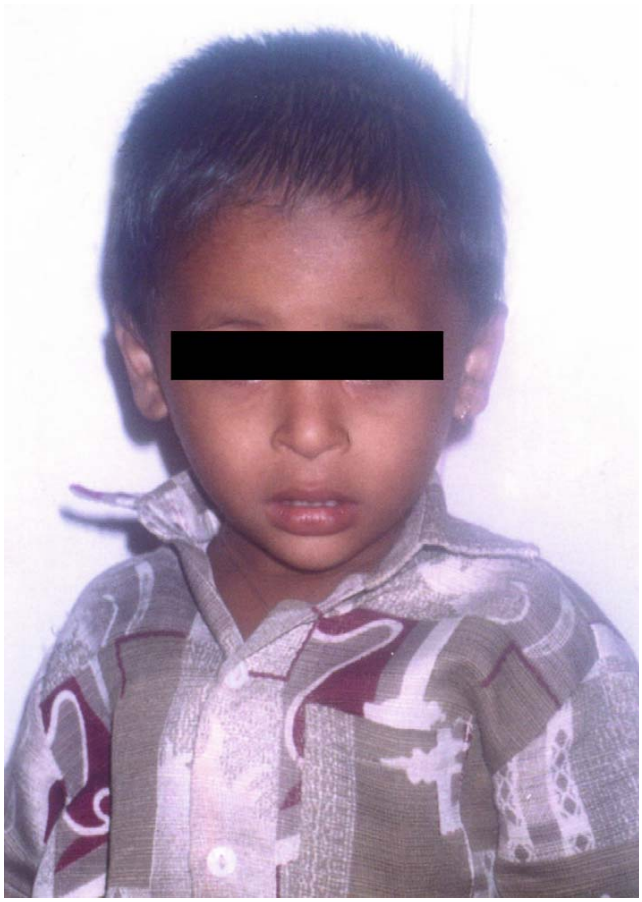

Fig. 1 Child of 2yrs with bilateral dacryocystitis

Diagnosis

The diagnosis was made by the patient's history- recurrent infections of the lacrimal sac and intermittent or permanent epiphora were the most frequent symptoms. Diagnostic procedures included catheterization and irrigation of the lacrimal duct. In selected cases, Jone's dye test and dacryocystogram were done for confirmation of nasolacrimal duct obstruction. The preoperative examination consisted of inspection and palpation of the medial canthus and examination of the nasal cavity.

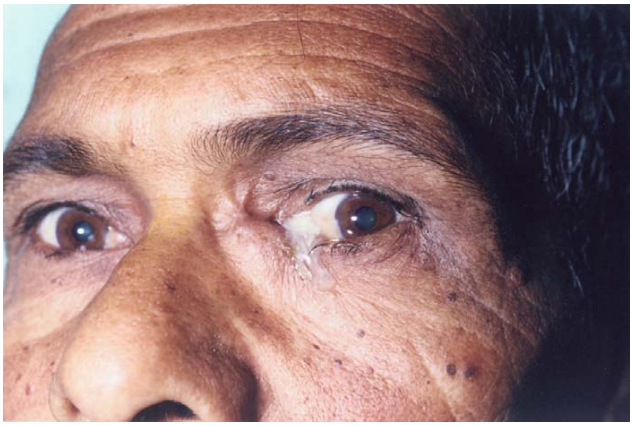

Fig. 2 A 73-year-old patient case of failed external DCR

Table 1 Patients details

	Without Silicon Stent	With Silicon Stent	p-value
Sex			
• Male	66(22.8%)	18(6.2%)	0.3011*
• Female	174(60%)	32(11%)	
Age (in years)			
• Mean	40.5	45.46	0.0819**
• Range	2-72	19-73	
Laterality			
• Bilateral	42(17.5%)	8(16%)	0.9493*
• Right	107(44.6%)	22(44%)	
• Left	91(37.9%)	20(40%)	
Additional procedure			
• Septoplasty	17	3	
• Release of adhesion	-	2	
Follow up (months) average	18.6	5.2	

* Pearson's χ^2 test

** Student's t-test

Methods

Out of 290 cases, 287 cases were operated under local anesthesia with premedication (Pentazocine, Atropine, Promethazine). Nasal cavity was packed with cotton pledgets soaked in 4% lignocaine with 1:30,000 adrenaline half an hour before the start of the procedure. General anesthesia was used in 3 pediatric patients of the age 2yrs, 5yrs and 11yrs.

Surgical technique

The 4 mm 30 degree endoscope with camera and monitor was used for the procedure, except when a septoplasty was required. The average time required for surgery was 40 minutes.

The mucosa of the lateral nasal wall in the region of the maxillary line was infiltrated with 2% lignocaine with adrenaline (1:1,00,000). A 1cm square incision was made in lateral wall of nose with help of sickle knife or 12 blade, starting just anterior to the axilla of middle turbinate. Mucosa was resected. Under endoscopic control, the entire medial bony covering of the sac was removed using 2mm Kerrisons punch. A sickle knife was used to open the sac. Kerrisons punch was used to remove the lateral half of the sac. Stenting was performed in randomly chosen 50 cases. A silicon tube was inserted through upper and lower puncta and both ends were taken out from the nasal cavity and tied with several knots (4–6 knots) (Fig. 3 & Fig. 4). Nose was packed with medicated ribbon gauge for 24 hrs. The patients were discharged the following day. Antibiotic, anti-inflammatory, local decongestant, antibiotic steroid eye drop, saline nasal douching and gentle digital massaging of sac region were advised. The tubes were left in place for 3 months. Endoscopic suction clearance was done weekly for one month, then monthly for 6 months to prevent crusting / adhesions.

Statistical analysis

Except the age other parameters in this study are of qualitative nature. Hence student's unpaired t-test is used to compare the ages of 2 groups and constructing suitable contingency table. Pearson's χ^2 test is used to find the association between 2 qualitative variables. Medcalc 8.2 statistical software is used in the analysis.

Results

EnDCR without intubation: 240 EnDCR procedures were performed without lacrimal intubation. Of these, 174 were female and 66 were male, with a ratio of M:F = 1:2.6 (Table 1). The age ranged was from 2 yrs to 72 yrs, with a mean age of 40.5 ± 18.63 years. 42(17.5%) patients presented with bilateral disease among them 26 patients underwent bilateral surgery. 107(44.6%) patients presented with right sided disease and 91(37.9%) patients presented with left sided disease. 36 patients had a mucocele. 17(7.08%) patients required septoplasty to gain access to the area of the lacrimal sac and duct.

EnDCR with intubation: 50 EnDCR procedures were performed with lacrimal intubation. Of these, 32 were female and 18 were male, with a ratio of M:F = 1:1:78. The age ranged was from 19 to 73 years, with a mean age of 45.46 ± 16.44 years. 8 patients (16%) presented with bilateral disease among them 3 patients underwent bilateral surgery. 22(44%) patients presented with right sided disease and 20(40%) patients presented with left sided disease. 5

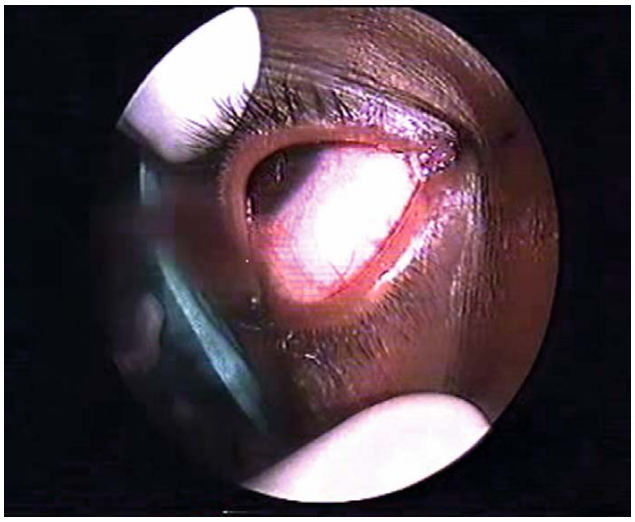

Fig. 3 Stent in situ- externally

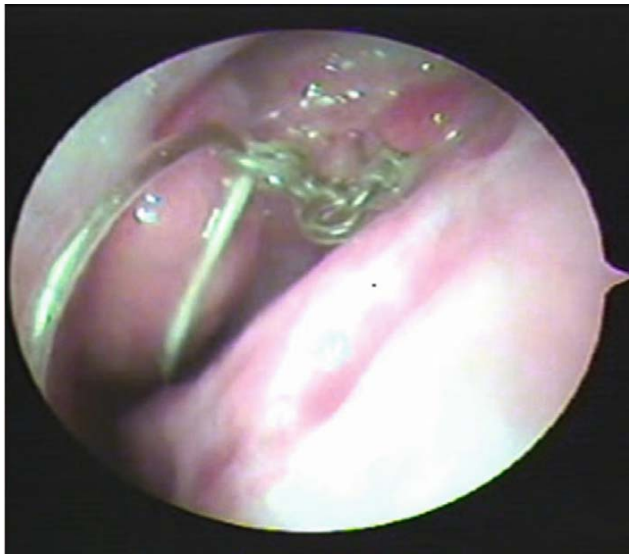

Fig. 4 Stent in situ-internally (After 3weeks) shows the knot

patients had a mucocele. 3 patients required septoplasty and in 2 cases adhesion bands were released.

The surgical outcome was evaluated both subjectively and objectively [8]. In the subjective assessment a 5-point scale was used to grade the degree of epiphora relief (Table 2). Grade1 to Grade 3 was considered as success. In without stent group, 144(60%) patients became symptom free, 68(28.3%) patients reported significant improvement and 12(5%) had slight improvement. 12(5%) patients reported no improvement and in 4(1.7%) patients condition became worse. In stent group, 38(76%) patients became symptom free, 10(20%) patients reported significant improvement and 2(4%) patients had no improvement. 2 patients developed pain and swelling near medial canthal region after 1 week of stent insertion which was overcome by medications.

In objective assessment, the rhinostomy opening was visible in 192(80%) patients without stent and in 43(86%) patients with stent (Table 3). There was no statistically significant difference between the 2 groups (p= 0.4317). There was granulation tissue at the rhinostomy opening in 48(20%) patients without stent and 5(10%) patients with stent. 50(25%) patients without stenting and 5(10%) patients with stenting had formation of synechiae between nasal septum and the lateral wall and also between middle turbinate and lateral wall. Spontaneous methylene blue flow was noticed in 188(78.3%) cases without stenting and in 45(90%) cases with stenting. On pressing the sac flow was observed in 36(15%) patients without stenting and 3(4%) patients with stenting. There was no flow in 6(6.7%) patients without stenting and 2(4%) patients with stenting. We found an opened knot in 2 cases with stenting after 2

Table 2 Results of subjective evaluation

	Without stent (n=240)	With stent (n=50)	p-value
Subjective evaluation			0.1864*
• Symptom free (grade 1)	144(60%)	38(76%)	
• Significant improvement (grade 2)	68(28.3%)	10(20%)	
• Slight improvement (grade 3)	12(5%)	0	
• Same (grade 4)	12(5%)	2(4%)	
• Worse (grade 5)	4(1.7%)	0	
Outcome			0.6974*
• Success	224(93.3%)	48(96%)	
• Failure	16(6.7%)	2(4%)	
Discomfort from stent			
• Yes	-	12(24%)	
• No	-	38(76%)	
Pain and swelling	-	2(4%)	

* Pearson's χ^2 test

Table 3 Endoscopic findings of objective evaluation

	Without stent (n=240)	With stent (n=50)	p-value
Rhinostomy			
• Visible	192(80%)	43(86%)	0.4317*
• Invisible	48(20%)	7(14%)	
Granulation			
• Present	48(20%)	5(10%)	0.1434*
• Absent	192(80%)	45(90%)	
Synechiae			
• Present	50(25%)	5(10%)	0.0897*
• Absent	180(75%)	45(90%)	
Methylene blue flow			
• Spontaneous	188(78.3%)	45(90%)	0.1598*
• With pressure	36(15%)	3(6%)	
• No flow	16(6.7%)	2(4%)	
Knot opened	-	2(4%)	

* Pearson's χ^2 test

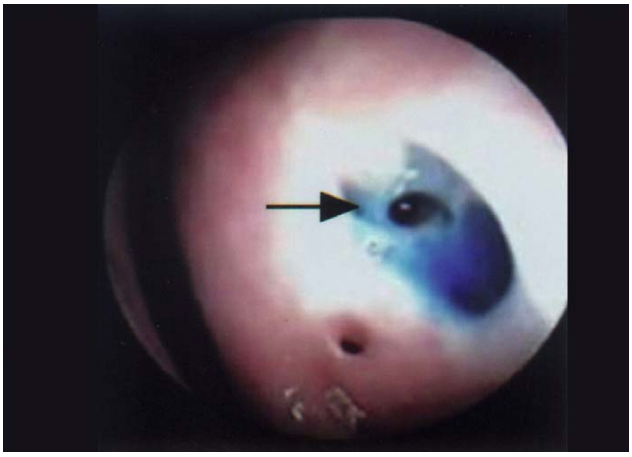

Fig. 5 Rhinostomy after 2 months of stent removal

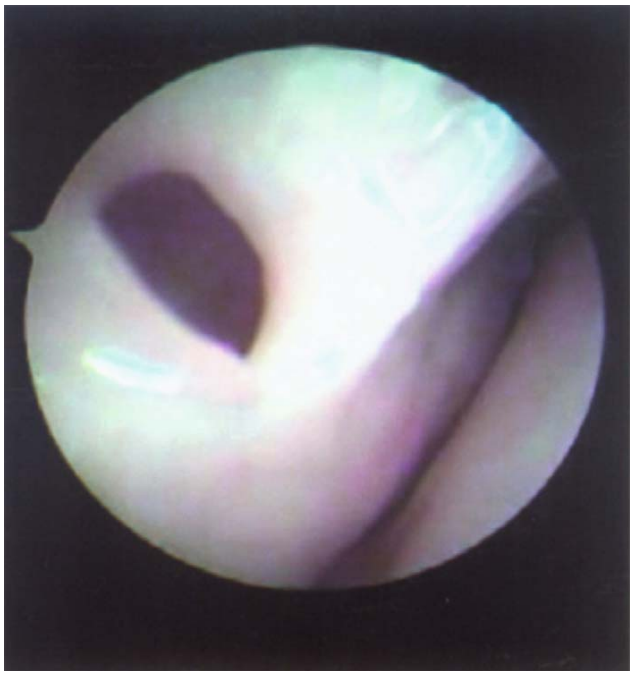

Fig. 6 Rhinostomy after 6 months of stent removal

months of intubation. We were able to analyze all patients 3 months postoperatively with an average follow up of 18.6 months in-group without stent and 5.2 months in-group with stent (Fig. 5 & Fig. 6).

At 3 months follow up, 224 (93.3%) patients had a successful outcome in without stent group (Table 2), all of whom reported a dry, comfortable eye and in the stent group 48(96%) patients had a successful outcome. But there was no statistically significant difference between the surgical outcomes of these 2 groups ($p = 0.6974$).

Problems due to stent in place: Premature stent extrusion was noted in 2 patients and the procedure was unsuccessful in these 2 patients. Minimal granulation tissue was observed in 5 cases but resolved with local steroids and antibiotics. 3 patients developed postoperative dacryocystitis and were successfully treated with IV antibiotics and showed symptomatic improvement without any premature stent removal.

Discussion

In the present study, majority of the patients were between 30 years to 50 years, the youngest patient was 2 years old (Fig. 1) and the eldest was 73 years (Fig. 2). In our study, M: F ratio was found to be 1:2.5 (84:206) and our data correlates well with studies of Heike [9] (1994), Yung & Hardman [10] (1998). In the present series patients were assessed both subjectively and objectively. We recorded a success rate of 93.3% in EnDCR without intubation and 96% in EnDCR with intubation when the patients were reviewed 3 months after the procedure. Review of literature showed 82 to 95% success rate with EnDCR [10–13]. The success rate depends upon providing a wide intranasal stoma with removal of adequate bone around the stomal area and there by reducing the chances of postoperative stenosis and adhesions. A septoplasty may sometimes be required to gain adequate access. Inadequate bony removal is the commonest cause of postoperative stomal stenosis.

Silicon stenting was used in 50 cases. Granulation tissue was observed in 5 cases and acute dacryocystitis observed in 3 cases. All of them were managed by application of local steroids and antibiotics. In 2 cases, there was premature stent extrusion and failure of surgery. Bousch [14] observed a strong relationship between stent extrusion and failure.

The advent of endoscope has made EnDCR a preferred method over external DCR. A good knowledge of the anatomy and variations in the lateral nasal wall is essential [15]. Good functional results of EnDCR can be explained by the fact that pumping action of orbicularis oculi muscle remains intact [16].

We observed that Silicon tubing maintains the patency of the fistula by preventing fibrous closure of the stoma during the postoperative healing period. We also noticed that patients who adequately retained silicon tubes performed better than patients who extruded the silicon tube after EnDCR.

Conclusion

EnDCR has a definite role in chronic dacryocystitis. EnDCR has many advantages over the standard external DCR. With a good success rate, EnDCR avoids an external scar, produces minimal postoperative discomfort, maintains the pumping action of orbicularis oculi and is easy to revise. In addition, the use of silicon stenting in nasolacrimal pathway helps in maintaining the patency of the rhinostomy. Regular follow up is important.

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