ORIGINAL ARTICLE

Endonasal Dacryocystorhinostomy with Mucosal Flaps: Our Experience

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Abstract The endoscopic dacryocystorhinostomy (DCR) has distinct advantage over external DCR. There is no ugly scar on the face, less intraoperative bleeding, it is a daycare procedure and patient is discharged on the same day evening. Endoscopic DCR is considered to be a superior alternative technique to the conventional external DCR. Patients diagnosed with nasolacrimal duct obstruction between Jan 2009 and Jan 2011 were included in the study. One hundred and twenty endo DCR were performed with conventional 'cold steel' instruments. The technique involved complete exposure and marsupialization of the lacrimal sac. The surgical technique involved the creation of nasal mucosal and large posterior lacrimal flaps at the medial lacrimal sac wall and the two flaps were placed in close apposition. Success was defined as complete resolution of epiphora and a patent lacrimal system, evaluated by lacrimal irrigation and endoscopy, 1 year postoperatively.

Keywords Chronic dacryocystitis · Sac syringing · Mucosal preservation technique

Introduction

Endonasal dacryocystorhinostomy is not a new concept. First described in 1893 by Caldwell, the procedure did not gain popularity because of difficult visualization, complication associated with endo nasal surgery and difficulty in locating the Sac endoscopically. With the advent of new technology used in endoscopic sinus surgery, permitting better visualization of endonasal structure during operation. The introduction of the rigid endoscope provided the catalyst for endoscopic endonasal dacryocystorhinostomy. Three groups of procedures are currently practiced: external dacryocystorhinostomy (DCR), endoscopic DCR with laser, and endoscopic DCR without laser. Many factors influence the outcome of these different approaches. External DCR has remained the 'gold standard' surgical treatment for nasolacrimal duct obstruction, with success rate of 90–95 % [1]. Important factors for achieving this success rate are wide bone removal to expose the entire lacrimal sac, and anastomosing the lacrimal sac mucosa and nasal mucosa. This concept has been used by the authors during endoscopic transnasal DCR.

Material and Method

A prospective study was conducted from Jan 2009 to Jan 2011 in 120 patients in the ENT Department, NRSMC, Kolkata.

There were 30 male patient (25 %) and 90 female patient (75 %).

Patient ages ranged from 17 to 66 years. Patients were usually referred by an ophthalmologist with history of epiphora and nasolacrimal duct obstruction.

We included in the study all patient presenting with chronic dacryocystitis, mucocele, and acute on chronic dacryocystitis. We excluded all cases with presaccal obstruction and functional drainage failure cases.

In our series there were seven cases of acute dacryocystitis, for which surgery was planed after 2 weeks with antibiotic treatment. There were 25 cases of chronic dacryocystitis with purulent drainage at the medial canthus and

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a positive regurgitation test. Two cases of lacrimal fistula were also treated with endoscopic transnasal DCR.

Pre-operatively, a detailed clinical examination was carried out by an ophthalmic and ENT surgeon including regurgitation testing, lacrimal syringing, and probing. Syringing is very informative and helps localizing the site of block in the lacrimal passage (Fig. 1).

Prior to subjecting the cases for surgery, nasal endoscopy was done to see the accessibility of side operation and those having associated septal deviation.

In our series 30 patients need endoscopic septoplasty for better access to the operated side. General anesthesia was used in three cases in our series. In the remaining cases, were operated under local anesthesia.

In our series we have used 30 mg of fortwin and 25 mg of phenargan intramuscularly. Good analgesia and sedation is maintained by giving injection 45 min prior to surgery.

The nose was prepared using cotton strips soaked in 4 % xylocaine and adrenalin in a ratio of 4:1, 10–15 min prior to surgery. This ensured adequate decongestion, mucosal anesthesia, easy access, and a bloodless field. Two percent xylocaine with 1:200,000 adrenalin was submucosally injected into the lat nasal wall, superior and anterior to the attachment of the middle turbinate, and then along the maxillary line.

Surgical Technique

An incision was made in lateral wall of nose with the help of sickle knife, starting just anterior to the axilla of middle and proceeded in forward direction for 0.5–0.7 cm then vertically downward for 1.25 cm and thereafter it proceeded posteriorly, thus creating a posteriorly based mucoperiosteal flap.

An osteotomy was performed with straight, 2-mm Smith–Kerrison punch forceps. An angled punch was used to remove bone at upper limit of the Sac. Sometimes, removal of thick bone from the frontal process of the maxilla was required. In few cases, a chisel and harmer used for removal of thick bone. The complete anteroposterior extent of the medial wall of the sac was exposed. Lacrimal bone was removed with a free's elevator or with ball probe. At this point, it was important to meticulously locate and remove all small bone fragments. A small unit of 4 % xylocaine with adrenalin was infiltrated into the medial wall of the sac in order to obtain local anesthesia of the sac wall and to improve hemostasis during incision and fashioning of the mucosal flap. The lacrimal sac was incised vertically at the anterior margin of the exposed sac and incision extended horizontally at the posterior margin of sac. U shaped posterior based flap was created and folded posteriorly.

The nasal mucosal flap is cut to create superior and inferior mucosal flap. Superior flap is used to cover the raw bone left superior over the upper limit of the sac. The larger inferior flap is apposed with the large posterior flap at the medial sac wall. Stoma patency was checked by syringing with saline solution. The sac interior was visualized with a 30° endoscope. The surgical site was packed with a small piece of merocel to hold the flap in position and to ensure homeostasis.

Post Operative Care and Follow-up

Patients were discharged uneventfully the day after surgery with oral antibiotic for 2 weeks. The morocel was usually removed after 48 years, and saline nasal drops four to five times a day were advised to avoid crust formation. Patients were advised to avoid nose blowing for 4–7 days, as to

Fig. 1 Localization of block by diagnostic syringing
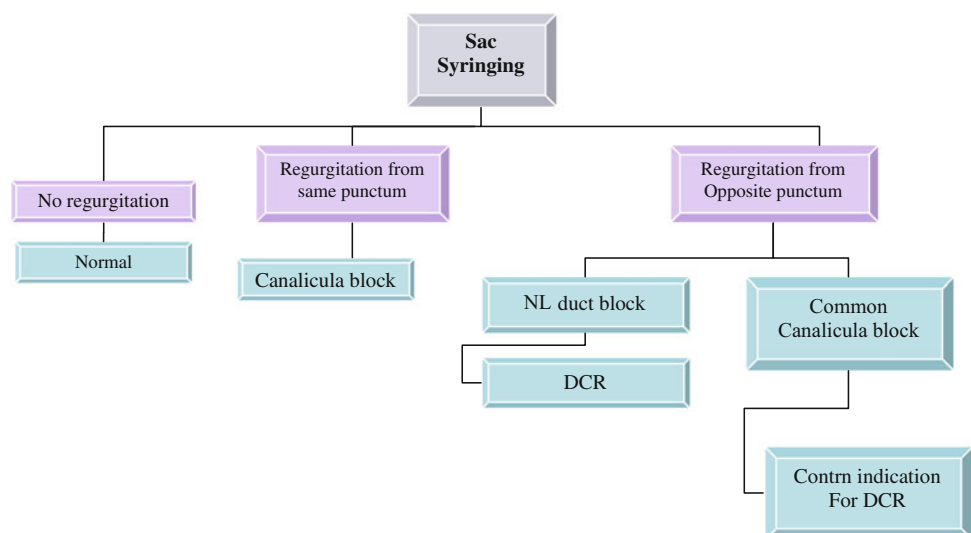
avoid nasal hemorrhage and orbital emphysema. Patients were followed-up weekly for a month. Endoscopic visualization of the nasal cavity was performed in order to remove crust and granulation and to check the patency of the newly created ostium using lacrimal irrigation.

Result and Observations

Of the 120 patients 30 patients were male (20 %) and 90 (75 %) female patients.

The youngest patient found in this study was a 15-year-old girl and eldest was 67-year-old woman. Age ranged from 15 to 67 years. The mean age of the patient in this study was 38.34 ± 13.59 years (SD 13.59) (Tables 1, 2, 3; Fig. 2).

Of these 120 procedures, 105 were primary DCR (87.43 %) and 15 were revision DCR (12.5 %).

Patient's duration of symptoms ranged from 1–5 years (Table 4). Endoscopic septoplasty was performed in 30 cases (25 %). A high deviated nasal septum (DNS) adjacent to the ant end of the middle turbinate was removed endoscopically. In 10 % of cases, conchoplasty and turbinoplasly were performed to improve access and to avoid post-operative synechiae formation.

Patients were followed up for 6–12 months after their operation. Overall primary success rate of the procedure was 93.3 % in terms of subjective improvement in eye watering and swelling at the medial canthus of eye. Patients were also evaluated endoscopically to visualize the patent stoma and also with periodic syringing.

In our series eight cases (6.66 %) had persistent epiphora. Of the eight failed cases DCR scarring, ostium fibrosis, and granulation were noted. These were cases in which the technique had been difficult to perform proper due to excessive bleeding, or to anatomical abnormally (such as excessively thick frontal process of maxilla).

Discussion

It is now known and accepted fact that DCR is the treatment of choice for chronic dacryocystitis. This procedure can be performed via external or the endoscopic endonasal approach [1]. Endonasal DCR has well known advantages

Table 1 DCR case review

DCR type	Operated (n)	Successful	Percentage (%)
Primary	105	100	95.23
Revision	15	12	80
Total	120	112	93.3

Table 2 Distribution of patients according to sex

Sex	No. of patients	Percentage (%)
Male	90	75
Female	30	25
Total	120	100

Table 3 Age distribution (Total No. 120)

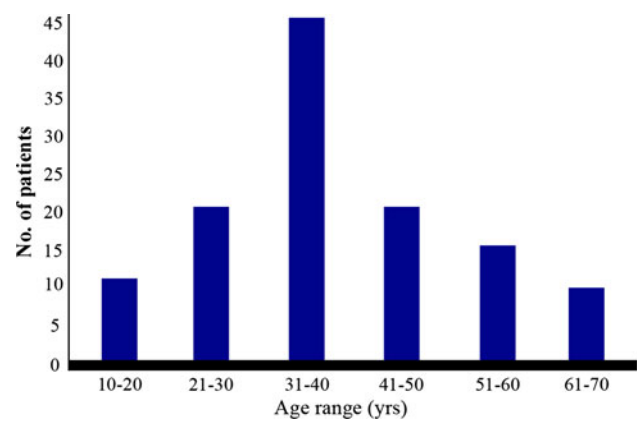| Age range (years)	No. of patients	Percentage (%)
10–20	11	9.16
21–30	20	16.66
31–40	45	37.5
41–50	20	16.60
51–60	15	12.5
61–70	9	7.5

Fig. 2 Distribution of cases according to age

Table 4 Distribution of cases according to clinical presentation

Total	Epiphora	Epithora and swelling at medial canthus	Epiphora with lacrimal fistula	Mucocele
120	95	17	3	5

over the standard external DCR like it avoids facial scarring, division of the medial canthal ligament and disruption of the pump action of the lacrimal sac. It has minimal morbidity and less risk of intraoperative bleeding. It also enables direct access to the rhinostoma site, reducing tissue injury [2]. It can also be performed during acute dacryocystitis as it has a shorter operating time and easy access route [3].

Most of the patients of the present study were in 31–40 years of age.(37.5 %), youngest was 15-year-old and eldest was 67-year-old. We did not see any patient of paediatric age group. Our data correlate well with studies
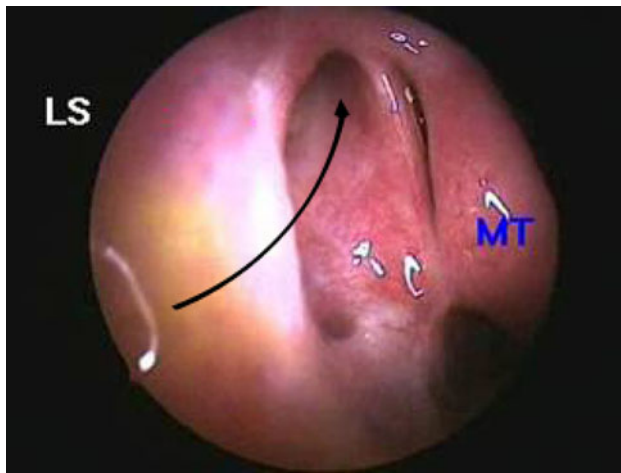
Fig. 3 Patent ostium after 1 year followup

Fig. 4 Granulation tissue blocking the ostium after 6 months followup

of Ibrahim et al. [4]. There was a declining trend towards both extreme of age. This may be due to the fact that amount of lacrimal secretion is less in extreme of age.

During our study male and female ratio was found 1:3 and our data correlate well with studies of Heikki et al. [5] and Ibrahim et al. [4]. Chronic dacryocystitis had been observed to be more common in women of low socio-economic group due to their bad personal habits, long duration of exposure to smoke in kitchen and dust in external environment. In addition to that use of kajal and other cosmetics increase chance of transmission of infection [6] (Fig. 3).

Tsirbar and Wormald [7] stated that the key to successful endoscopic DCR is to fully expose the lacrimal sac and marsupialise into the lateral nasal wall, with the nasal and lacrimal mucosa in apposition allowing healing by primary intention rather than formation of granulation tissue, reducing the risk of closure of the sac opening into the nose.

Our technique involves creation of a large bony ostium and a large posterior flap at the medial sac wall, reflecting it posteriorly and apposed with nasal mucosal flap. A superior nasal mucosal flap is also created to cover the exposed bone superiorly on the lateral nasal wall.

A greater success rate (89 %) has been reported for the lacrimal sac flap technique than for conventional endo nasal DCR in which entire medial sac wall is excised [8]. Endo nasal DCR has also been reported to be quicker than the traditional external approach, equivalently successful and preferred by patients [9]. It has been observed that creation of lacrimal and nasal mucosal flap results in primary intention healing with minimal risk of granulation tissue formation and therefore minimal shrinkage of the post operative DCR ostium [10]. Mann and Wormald [11] proposed that the DCR ostium shrinks a small but significant amount in the first 4 weeks after surgery and then stabilizes (Fig. 4).
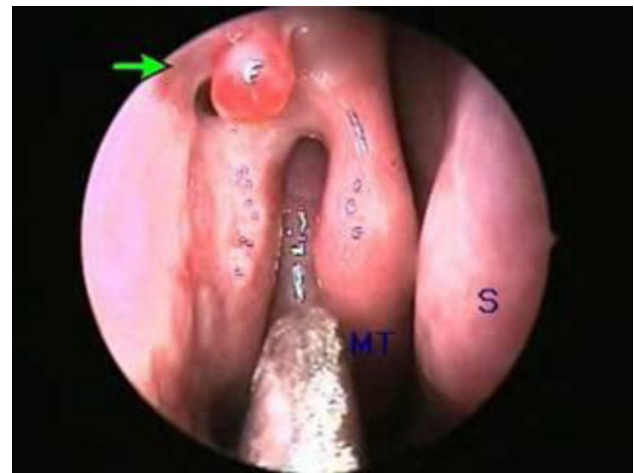
Endoscopic DCR has many advantages over external DCR (e.g., avoidance of facial scarring, disruption of lacrimal sac pump action from the orbicularis oculi muscles, and of division of the medial canthal ligament [10]. However, this technique does not have same success rate as external DCR [1].

We support the proposal of Wormald [12] that a large bony ostium and complete lacrimal sac exposure are important for achieving both a patent post-operative ostium and a result comparable to external DCR.

Conclusion

Endonasal DCR success rate are comparable to those of external DCR when there is complete sac exposure, adequate bone removal, and good lacrimal and nasal mucosal flap apposition. Meticulous surgical technique can ensure high success rates with the use of conventional cold steel instruments alone. A wide surgical window, creating a flap of lacrimal sac mucosa and approximating it to the nasal mucosa, and regular post-operative endoscopic follow up to remove crust, synechiae, and granulations. Creation of a wide surgical window helps ensure a success rate comparable to that of the external procedure.

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