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Original Research Article

Powered endoscopic endonasal dacrocystorhinostomy using inferiorly based mucosal flap: our experience

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ABSTRACT

Background: The most critical element for successful management of lacrimal system pathology distal to common canaliculus that requires endoscopic endonasal dacrocystorhinostomy (EEDCR) is the creation of widest possible marsupialisation of the medial wall of the lacrimal sac. With minor modifications and simplication of the original technique of EEDCR, common surgical failures like obstruction of neo-ostium by granulation tissue or infolding of flap can be avoided. To determine the success of EEDCR using inferiorly based mucosal flap, removal of overlying bone using Kerrison's punch followed by vertical incision of the medial wall of lacrimal sac with microdebrider assisted trimming of the lacrimal sac flaps.
Methods: A total of 31 patients with epiphora secondary to nasolacrimal duct obstruction (NLDO) were operated using the above technique with 3 bilateral cases amounting to a total of 34 procedures. The surgical outcome and long term patency of neo-ostium were evaluated.
Results: Of the 34 procedures, 32 procedures (94.1%) had complete resolution of epiphora at the end of one year follow up. The 2 failures were due to canaliculitis.
Conclusions: Powered EEDCR with trimming of medial wall of lacrimal sac and inferiorly based mucosal flap preservation to cover the exposed part of bone is a simple procedure with favourable long term outcome.

Keywords: Endoscopic endonasal dacrocystorhinostomy, Inferiorly based mucosal flap, Microdebrider

INTRODUCTION

Dacrocystorhinostomy is a procedure performed to drain the lacrimal sac in cases of nasolacrimal duct obstruction (NLDO). Caldwell first described the endoscopic endonasal dacrocystorhinostomy (EEDCR) procedure in 19th century and Toti external DCR procedure in 1904. Since then many technical modifications have evolved for better outcome rates. With the advent of fibre optic and rigid endoscopes, computed tomography (CT) and Dacrocystogram, the intranasal anatomy of lacrimal sac has been better understood. These developments have paved the way for renewed interest in EEDCR. It has the advantage of avoidance of facial scar, non division of medial canthal ligament and preservation of the pumping action of lacrimal sac.

Currently three types of procedures are commonly practised: external DCR, endoscopic DCR with contact laser and surgical endoscopic DCR without laser. The most common cause of surgical failure resulting in the guarded acceptance of the procedure is obstruction of neo-osteum by granulation tissue. This study is conducted to evaluate the outcome of EEDCR with creation of inferiorly based mucosal flap and microdebrider assisted trimming of the lacrimal sac flaps so as to create a wide neo-osteum in the medial wall of lacrimal sac.

METHODS

This study was conducted at Sri Venkateshwara ENT Institute, Bangalore Medical College and research institute over a period of 2 years from June 2015 to May 2017. A total of 31 cases of epiphora with 3 cases being bilateral were clinically confirmed by lacrimal syringing. Patients above 16 years of age, epiphora due to nasolacrimal duct obstruction (NLDO) and chronic dacrocystitis clinically confirmed by lacrimal syringing were included in the study. Patients with canalicular obstruction and primary nasal pathology (atrophic rhinitis, sinonasal polyposis, nasal mass etc.) were excluded from the study. All patients were operated by same surgeon raising an inferiorly based mucosal flap and microdebrider assisted trimming of medial wall of lacrimal sac. The outcome and long term patency of neo-osteum were evaluated.

Surgical technique

All cases were operated endonasally under local anaesthesia using 0° rigid nasal endoscope. Nasal cavities were packed with decongestant solution (03 ampoules of adrenaline in 30 ml of 4% lignocaine for about 7-10 minutes. Local infiltration of 2% lignocaine with 1 in 100,000 adrenaline was given along the lateral wall of the nose. Now, the initial horizontal incision was taken 8 mm above and 3 mm behind the axilla of the middle turbinate. At the anterior end the incision is then turned vertically downwards at the frontal process of the maxilla to end just above the upper border of inferior turbinate. The C-shaped incision is got by taking another vertical incision just anterior to the uncinate process from the posterior end of the initial horizontal incision (Figure 1). Hence the inferiorly based flap is elevated and rolled down over the inferior turbinate. The bone over the frontal process of maxilla is removed, initially starting with a Kerrisons bone punch and then with a 2 mm gouge, upto the horizontal incision above the axilla of the middle turbinate (Figure 2). This provides a wide exposure of the lacrimal sac. Once the bone is removed, the medial wall of the lacrimal sac is identified and confirmed by applying pressure externally over the nasolacrimal sac region.

Lacrimal probing is done using Bowmann's lacrimal probe at this stage to determine the level of the common canaliculus. The lacrimal sac is opened above downwards and further incisions are made to create anterior and posterior based flaps (Figure 3). These posterior and anterior flaps are then trimmed with a microdebrider in order to remove any excess mucosa. This ensures that the sac mucosa is unlikely to fold back into the sac lumen and obstruct the ostium. The inferiorly based mucosal flap is then cut horizontally along the junction of its upper 2/3rd & lower 1/3rd to create an inferior flap which is so positioned as to cover the exposed bone below the newly created ostium (Figure 4). Light nasal packing was done which was removed after 24 h. The patients were discharged on the next day with antibiotic coverage and saline nasal sprays.

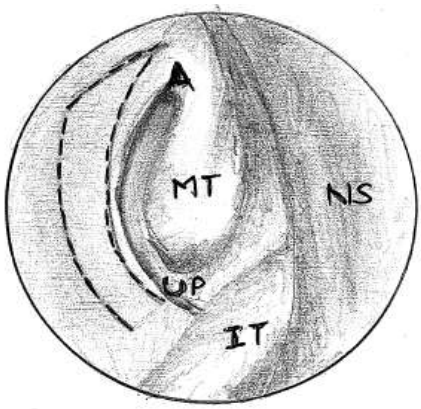

Figure 1: Inverted U shaped incision.
A=axilla; MT=middle turbinate; IT=inferior turbinate; UP=uncinate process; NS=nasal septum.

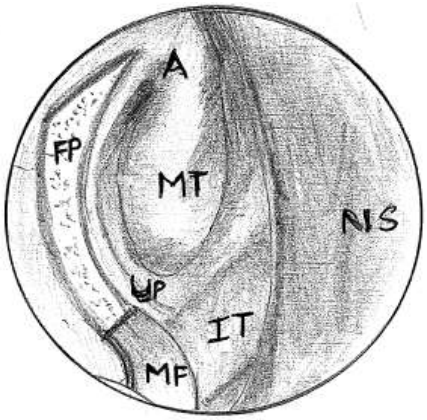

Figure 2: Elevation of inferiorly based mucosal flap.
A=axilla; MT=middle turbinate; IT=inferior turbinate; UP=uncinate process; FP=frontal process; MF=mucosal flap; NS=nasal septum.

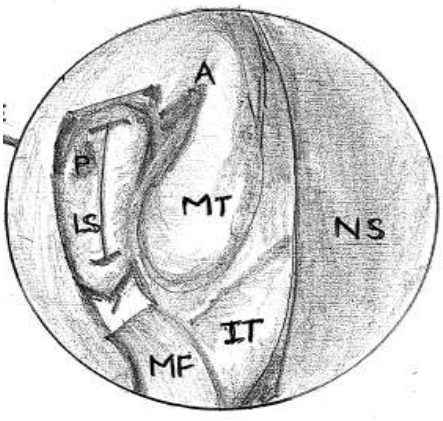

Figure 3: Vertical incision in medial wall of lacrimal sac.
A=axilla; MT=middle turbinate; IT=inferior turbinate; MF=mucosal flap; P=tip of the probe; NS=nasal septum.

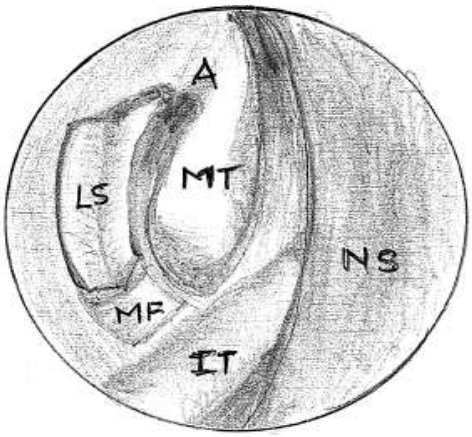

Figure 4: Trimming of anterior & posterior flaps of lacrimal sac with placement of mucosal flap inferiorly over the exposed bone.

A=axilla; MT=middle turbinate; IT=inferior turbinate; MF=mucosal flap; NS=Nasal septum.

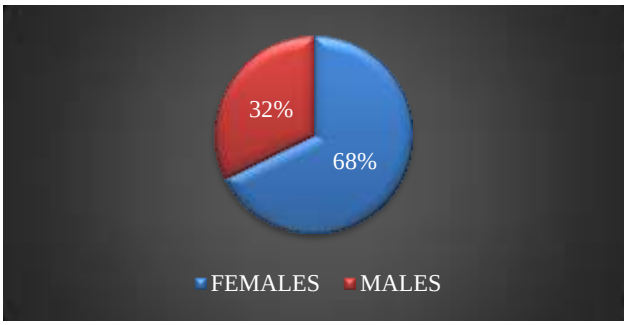

Figure 5: Gender distribution.

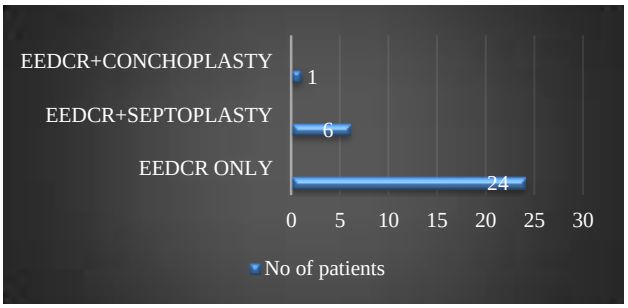

Figure 6: Procedures performed.

Lacrimal syringing was done on the first post-operative day and weekly thereafter for 6 weeks, following which they were followed-up twice monthly for minimum of 08 months to 01 year. At each follow-up visit, lacrimal syringing with nasal endoscopy was done to visualise the patent ostium.

RESULTS

The patients were followed up for a period of one year post operatively. Post-op follow up was done once weekly for 4 weeks, once a month for 6 months and then once in 6 months. Lacrimal syringing was done on 1st post-op day followed by once weekly for 6 weeks then, twice a month for 12 months. Complete resolution of epiphora was reported in 32 of the 34 cases with patent neo-ostia demonstrated on syringing (94.1% success rate). Two cases continued to have epiphora and anatomical obstruction of the NLD, due to canaliculitis.

Septoplasty was needed in 6 of the 31 patients prior to endonasal DCR (17.6%) for better visualisation of the lacrimal sac region. One patient had concha bullosa for which conchoplasty was done.

The average age of the patients was 36.5 years (ranging from 22–51 years). The male to female ratio was 1:2 (Figure 1: 10 males and 21 females).

Of the 31 patients operated by this technique, three had bilateral procedure making it a total of 34 procedures (Table 1).

Table 1: Laterality.

DCR side	No. of patients	Percentage (%)
Right sided DCR	20	64.5
Left sided DCR	8	25.8
Bilateral	3	9.7
Total	31	

Table 2: Surgical outcome.

Surgical outcome	No. of patients	Percentage (%)
Patent neo ostia	32	94.1
Canaliculitis causing failure	2	5.9
Nasal Synechiae	Nil	

DISCUSSION

DCR is an accepted standard procedure of choice for the treatment of NLDO. The advent of endoscopes and lasers has eased the surgical technique and thereby improved the surgical outcome of endonasal DCR procedure. Due to differences in host response to healing (granulation tissue formation and fibrosis) varied outcomes of the same procedure in different patients has been observed. The use of mucosal flaps to form an epithelium lined fistula is one of the cornerstones of successful endoscopic DCR surgery. Refinement in the surgical technique coupled with better understanding of endoscopic surgical anatomy have now produced success rates in endoscopic DCR paralleling those reported with conventional external techniques.[6,7] The extent of lacrimal sac exposure and the size of the ostium are important factors that determine long term patency. The importance of mucosal flap preservation is still under debate.[8]

The idea of mucosal apposition is to speed up the process of healing by primary intention and avoidance of granulation tissue formation. This is shown to have excellent functional outcome.[9]

In our technique, we follow Wormald's principle of mucosal apposition, but instead of trimming the nasal mucosal flap, we have trimmed the sac flap in order to achieve coverage of the exposed bone and mucosal apposition. This also ensures a wide ostial opening. Analysis of the outcome showed good patency at the end of 08 to12 months after surgery. This technique showed less chances of stenosis of ostium due to rolling back of the lacrimal flap or granulation tissue formation.

Tan et al in their study, concluded that surgical outcome depends on the ostium size and that significant shrinkage of the DCR neo-ostium occurs in the first 4 weeks postoperatively.[10] Hence, it is not just the creation of a wide sac ostium which is important; the first few weeks of healing also plays a big role in determining long term patency.

Wormald et al in his study said that adequate exposure of the lacrimal sac requires exposure above the level of the axilla of middle turbinate using a drill. This was found that above factor was of paramount importance to ensure success of the procedure.[2] Massegur et al in his study showed that, with the use of Smith Kerrison bone punch forceps alone to perform osteotomies, the risk of accidental orbital entrance is reduced and also simultaneously providing the adequate exposure of the lacrimal sac.[13]

Nishi suggested that proper case selection is paramount to ensure success. Assessment of lid, atonic sac, canaliculi block or canaliculitis is important and failure of surgery is often due to inadequate exposure of sac, unnecessary removal or injury to surrounding nasal and lacrimal sac mucosa.[5] Hence it is safe to suggest that successful endoscopic DCR is dependent on a number of factors: (1) complete removal of the frontal process of maxilla to expose the medial wall of the lacrimal sac, (2) opening of the sac adequately to expose the opening of the common canaliculus, (3) primary juxtaposition of mucosal edges to allow healing by primary intention.[8]

The overall success rate (94.1%) of our new technique is comparable to the previous studies and further validation of this new method requires larger randomised control trials.

Endoscopic DCR has many advantages as compared to external DCR—avoidance of facial scaring, non-division of medical canthal ligament, short hospital stay as it is performed as a day care procedure, limited tissue damage and preservation of the pump action of the lacrimal sac of the orbicularis oculi muscle.[11,12] Hence, endoscopic endonasal DCR offers the advantages of avoiding a skin incision with similar success rates with experienced surgeons.

CONCLUSION

Endoscopic DCR with trimming of medial wall of lacrimal sac and inferiorly based mucosal flap preservation to cover the exposed part of bone is a simple procedure with favourable long term outcomes. It has the advantage of keeping the flaps apart by covering the lower half of sac which aids in the formation of neo-ostium.

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