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A retrospective, observational, nonrandomized, comparative clinical study on external vs. endoscopic dacryocystorhinostomy

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Abstract

Background: Chronic Dacryocystitis is an inflammatory condition of the lacrimal sac most commonly associated with partial or complete obstruction of the nasolacrimal duct. It usually presents with watering and sometimes purulent discharge, but some may progress and cause severe ocular and extra ocular complications.
Objective: To compare the study subjects and the outcomes between the External vs. Endoscopic Dacryocystorhinostomy.
Methodology: The present study was a retrospective, observational, nonrandomized, comparative clinical study done by Reviewed medical records of 48 patients who underwent DCR at Kodagu Institute of Medical Sciences from January 2018 to December 2021. Data regarding the intra-operative course, surgical outcomes, and postoperative complications were analyzed. Anatomical success was defined as patency confirmed by intranasal endoscopic inspection of the ostium and successful lacrimal sac syringing whereas functional success was defined as complete resolution of epiphora assessed and documented post-operatively.
Results: Primary acquired nasolacrimal duct obstruction (NLDO) is a common cause of epiphora in adults, and it is 4-5 times more common in females. Of the 48 cases, 47 were primary cases and 1 case was a revision External DCR and only in this patient stent was placed and in all other cases in both Endoscopic and External DCR we have not used stents. Both External and Endonasal DCR had comparable outcomes. In the Endonasal DCR group it was seen that out of the 34 patients operated, 2 patients had continued epiphora. Thus the success rate stands at 94%. It was noted that both patients who continued to have epiphora after Endonasal DCR had lot of pus in the nasolacrimal apparatus with thick sac wall noted intraoperatively.
Conclusion: In our study we chose patients based on examination findings by an Ophthalmologist & Otorhinolaryngologist and advised the patient to undergo either of the procedures. This with a meticulous surgical technique has given us good post-operative results. Thus we conclude that detailed examination and appropriate selection of patients with meticulous surgical technique is what gives good results in

Dacryocystorhinostomy, be it Endoscopic or External.

Keywords: Lacrimal duct, endoscopic, endonasal, epiphora

Introduction

Chronic dacryocystitis is an inflammatory condition of the lacrimal sac most commonly associated with partial or complete obstruction of the nasolacrimal duct. It usually presents with watering and sometimes purulent discharge, but some may progress and cause severe ocular and extra ocular complications.
Even in mild conditions it may be distressing by causing loss of work place efficiency as it causes watering which can blur the vision momentarily and at times can be socially embarrassing. It affects all ages and all social strata but women are more likely to develop dacryocystitis because their nasolacrimal ducts are anatomically narrower as compared to males.
Dacryocystorhinostomy (DCR) describes the creation of a functional pathway from the canaliculi into the nose by means of creating an osteotomy and opening the lacrimal sac into the nose. It can be performed via an external or endonasal approach [1].
This surgery is performed by creating a fistula between the lacrimal sac and the nose, thus bypassing any obstruction in the naso-lacrimal duct and allowing passage of tears directly into the nose.
Lacrimal surgery has evolved rapidly over the past decade. Scientific advancements have made it possible to give improved results of this very common disease. Dacryocystorhinostomy (DCR) is being used currently with various modifications by different surgeons worldwide.
Dacryocystorhinostomy (DCR) is an operation that has been used for the past 100 years. The original intranasal approach was described in 1893 by Caldwell and the external approach in 1904 by Toti [2, 3]. The external approach became very popular and the mainstay of treatment with modification in the 1920s with the addition of flaps, and in 1962 with silastic tube intubation by Jones. Ophthalmologists believe that external DCR is the gold standard treatment for nasolacrimal duct obstruction (NLDO) with success rates of 90%+ reported [4, 5].
Endonasal DCR was first introduced by Caldwell in 1893, who used an endonasal electric burr to remove the bone once a metal probe had been passed through the canaliculus and into the lacrimal sac [1]. Difficulties included adequate visualization, bleeding, accurate bone and soft tissue removal. Although the technique was later modified by West in 1910 and Halle in 1914, real endonasal surgical improvements came with the rigid nasal endoscopes, which paved the way for advances in the field of endoscopic DCR [1]. The modern-day approach to endonasal dacryocystorhinostomy was first reported by McDonogh and Meiring in 1989. It now being accepted as an effective approach to DCR in the management of epiphora due to nasolacrimal duct obstruction [1].
Endoscopic endonasal dacryocystorhinostomy (DCR) is gaining popularity as the procedures leave no external facial scar and even in cases of lacrimal abscess, a nasal drainage can be performed and scar avoided. Although initially success rates were less than that of external DCR, improved techniques have presently shown excellent results.

Objectives: To compare the study subjects and the outcomes between the External vs. Endoscopic Dacryocystorhinostomy.

Methodology

The present study was a retrospective, observational, nonrandomized, comparative clinical study done by Reviewed medical records of 48patients who underwent DCR at Kodagu Institute of Medical Sciences from January 2018 to December 2021. Data regarding the intra-operative course, surgical outcomes and postoperative complications were analyzed. Anatomical success was defined as patency confirmed by intranasal endoscopic inspection of the ostium and successful lacrimal sac syringing whereas functional

success was defined as complete resolution of epiphora assessed and documented post-operatively.
In our institute the Departments of Ophthalmology and Otorhinolaryngology assessed the patients requiring DCR and suggested the patients to undergo External DCR or Endonasal based on the clinical examination findings, the co-morbidities and general condition of the patients.
Our patients were evaluated initially with a thorough history. The time of onset, laterality and type of discharge was noted.
History of prior facial trauma, orbital radiation, use of ophthalmic medications, nasal allergies and any prior intranasal surgeries undertaken was noted.
On examination 2 important tests were performed followed by Endoscopic Nasal Examination [6].

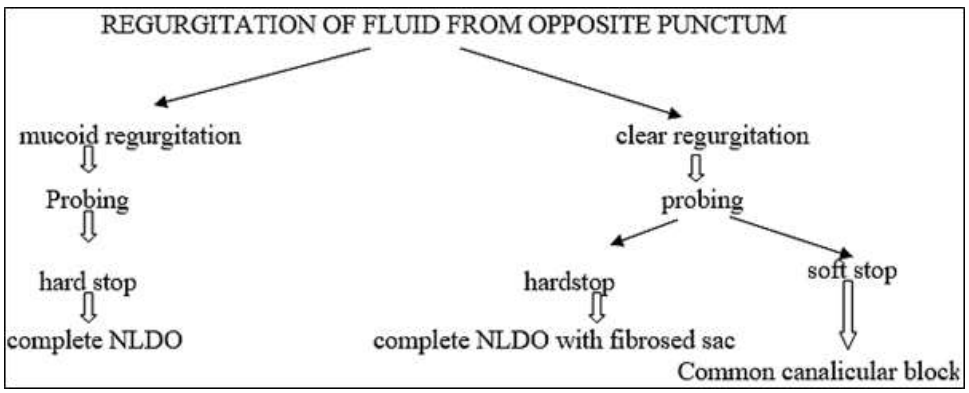
1. ROPLAS (Regurgitation on Pressure over the Lacrimal Sac area)

A firm pressure was applied over the sac area and noted for any regurgitation. Any regurgitation of fluid was considered as ROPLAS positive and no regurgitation was considered as ROPLAS negative. When positive, the type of regurgitate was noted-watery, mucoid, mucopurulent or blood-stained. Clear watery fluid is seen in atonic sac. Reflux of mucoid or mucopurulent material is indicative of NLDO. Blood-stained discharge is seen in malignancy or dacryolith.

2. Lacrimal Sac Syringing

Lacrimal sac syringing is the most important procedure in the evaluation of epiphora. Lacrimal irrigation was performed with the patient reclining in the examination chair. The conjunctiva is anaesthetized with topical anaesthetic drops. A 2 cc syringe filled with sterile water is flushed from lower punctum and patient is asked to raise his/her hand if he/she feels it in his/her nose/throat. This procedure was later repeated on the upper punctum and same to be followed in the opposite eye.

Regurgitation from same punctum
⇩
Clear regurgitation
⇩
Probing done with Bowman's probe
⇩
Soft stop
⇩
Canalicular block



Endoscopic nasal examination [6]:

A good nasal examination was performed to rule out the common nasal conditions which cause epiphora, as also impede the success of a good surgery. The commonly used nasal endoscope for the diagnostic office procedure is a 2.7 mm, 30° endoscope. This provides a good view of the lateral nasal wall. Presence of any nasal pathology including nasal polyps and anatomical variation of nasal structures were documented.

Following this a decision was made to take up the patient for Endoscopic Endonasal DCR or External DCR.

All patients undergoing Endonasal DCR were given General Anesthesia, however all the External DCRs was performed under Local Anesthesia.

A standard procedure was followed for external DCR which was performed without stenting except in revision cases where stents were used. There are different techniques of performing Endonasal DCR. As the operative technique of endonasal DCR can influence the outcome, here we have described the operative technique we followed.

The operative technique for Endonasal Endoscopic DCR followed at our institute is as depicted in the following figures. A posteriorly based nasal mucosal flap is raised just anterior to the middle turbinate, the lower extent of which is upto the level of the inferior turbinate (Fig. 1). The underlying bone is punched out using a Kerrison's DCR punch (Fig. 2), following which the Nasolacrimal duct and sac are exposed and a vertical incision along the length of it is placed with two horizontal incisions placed superiorly and inferiorly as shown in Fig. 3 and the sac is marsupialized. A portion of the nasal mucosal flap is excised and the remaining part of it is repositioned to cover any exposed bone (Fig. 4) Stenting was not performed in any of our cases undergoing endonasal DCR.

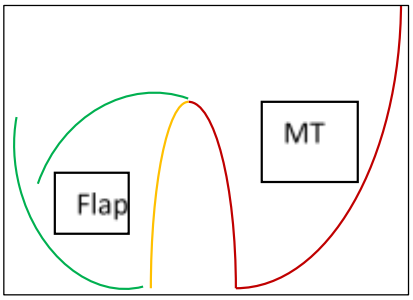


Fig 1: Posterior based flap is created

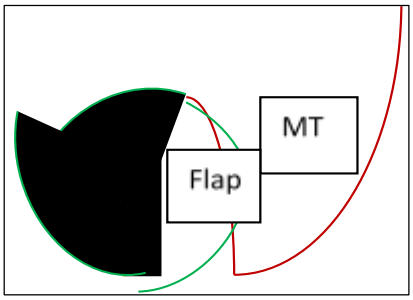


Fig 2: Bone in the shaded region is punched out

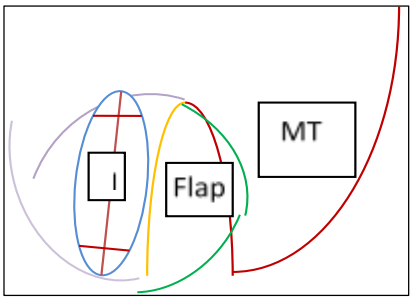


Fig 3: Incisions on Nasolacrimal Sac & duct

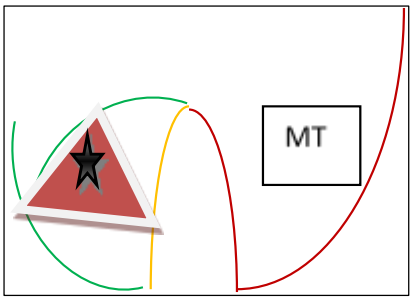


Fig 4: Replacement of the nasal flap with partial excision of the flap as required

Results

It was seen in our study that most patients undergoing DCR for Primary acquired nasolacrimal duct obstruction (PANLDO) were females, with F: M ratio-4:1.

This is in concurrence with other studies which state the occurrence of Primary acquired NLDO to be more commonly seen in females.

Primary acquired nasolacrimal duct obstruction (NLDO) is a common cause of epiphora in adults and it is 4-5 times more common in females [7].

Also, it was seen in our study that most patients presenting with chronic Dacryocystitis had disease on the Right side. As our sample size is low, it is to be ascertained whether this is an incidental finding or if there is something scientific influencing the occurrence of this disease more commonly on the right side.

Of the 48 cases, 47 were primary cases and 1 case was a revision External DCR and only in this patient stent was placed and in all other cases in both Endoscopic and External DCR we have not used stents.

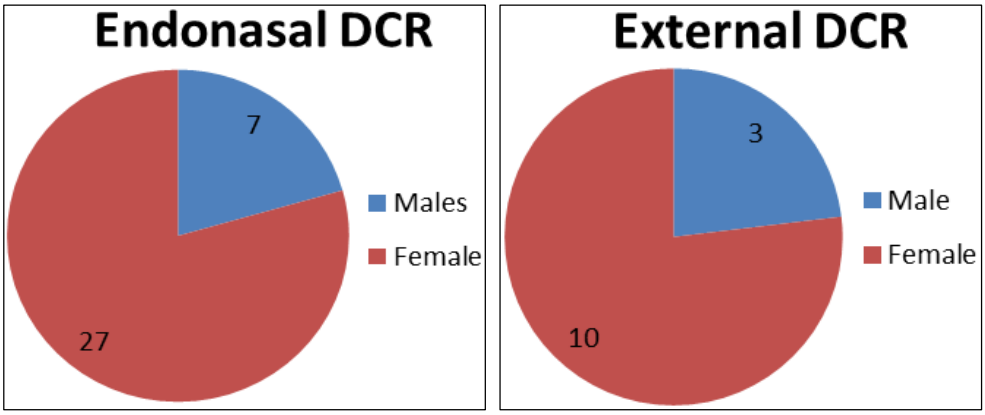


Fig 1: Comparison of Gender distribution among subjects in both the groups

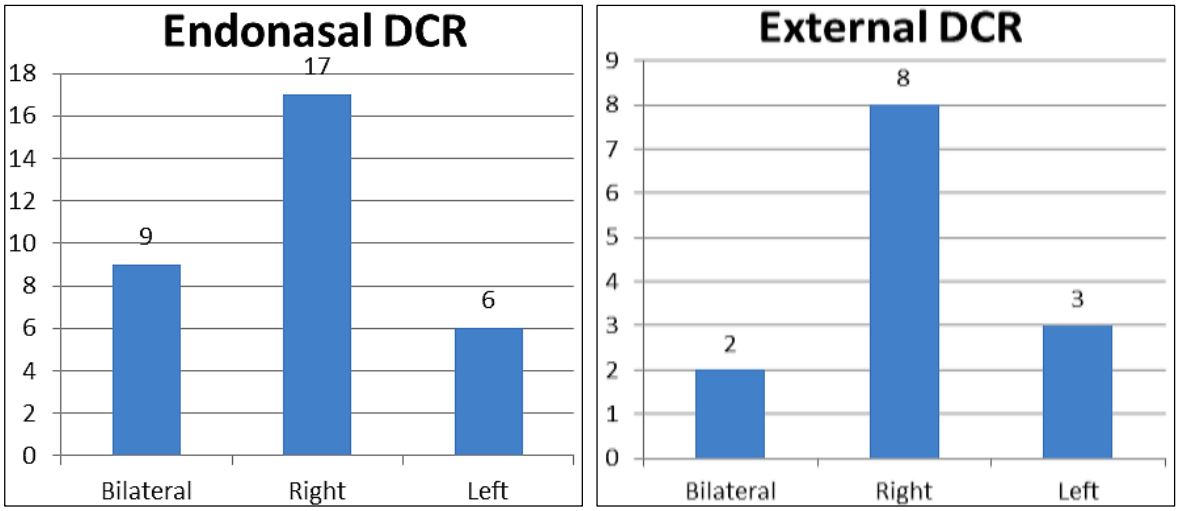


Fig 2: Comparison of Side distribution among subjects in both the groups

In the course of the surgery we have noted that patients who presented with unilateral disease had a significant nasal septal deviation towards the side of the pathology especially around the region of the nasolacrimal duct, that is, anterior to the axilla of the middle turbinate.

Outcomes of DCR

Both External and Endonasal DCR had comparable outcomes. In the Endonasal DCR group it was seen that out of the 34 patients operated, 2 patients had continued epiphora. Thus the success rate stands at 94%. It was noted that both patients who continued to have epiphora after Endonasal DCR had lot of pus in the nasolacrimal apparatus with thick sac wall noted intraoperatively. Though the patients were rid of the purulent discharge post-operatively they continued to have epiphora. One of these patients underwent

a revision external DCR with stenting which was done at our institute itself, following which she was rid of her symptoms. Endoscopic evaluation of this patient postoperatively showed excessive growth of nasal mucosa blocking the fistula created surgically.
In the External DCR group, out of the 14 patients operated one patient had epiphora post-surgery (93%). This patient had developed an abscess that had opened out on to the skin pre-operatively. Also healing of the incision wound post-operatively was delayed in this patient.

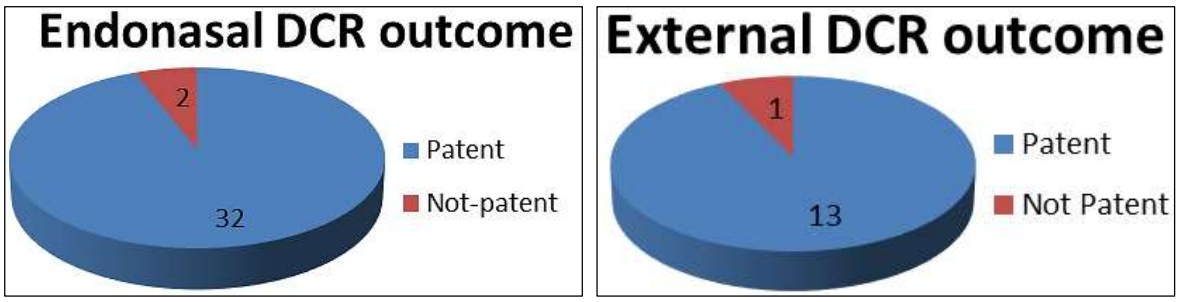


Fig 3: Comparison of Outcome among subjects in both the groups

In the Endonasal DCR group post-operative complications noted include nasal stuffiness noted in few patients which resolved within 15days. The intra-operative course largely dictates the immediate post-operative outcomes. The patients who had nasal stuffiness had surgical duration of more than 30 minutes. All patients in whom Endonasal DCR was performed in around 30minutes were extremely comfortable in the immediate post-operative period. The surgical duration was largely dependent on the time required to punch out the bone, and the infection status of the Nasolacrimal apparatus. It was noted that in young male patients the bone was considerably thick which prolonged the intra-operative course. Patients who had sacs filled with purulent content had associated increased bleeding noted intra-operatively which prolonged the intra-operative course. 2 patients had bleeding from the nose with lasted for 2 days post-operatively and it was minimal. It was treated by nasal decongestants drops.
In the External DCR group, bleeding was of concern in 5 patients intra-operatively, all of whom had infected sacs with purulent content.

Discussion

Primary acquired nasolacrimal duct obstruction (NLDO) is a common cause of epiphora in adults, and it is 4-5 times more common in females [7].
Many factors were considered in the etiology of acquired NLDO, chronic inflammation being the most popular one. Local trauma, iatrogenic causes, including complications of maxillary sinus surgery, rhinoplastic surgery, and midfacial fracture repair were assumed to be some other causative factors [7].
In our study we have also noted that Deviated Nasal septum was a finding in patients who presented with unilateral disease.
In a study done to compare external DCR with endonasal DCR over a period of 6 years which included 178 DCR surgeries the result noted is as follows-One hundred and seventy patients (37 males, 133 females, mean age 57 years) underwent 178 DCR surgeries for PANLDO. The overall anatomical success rate was 94.4% (93.5% in EN-DCR vs. 95.8% in EX-DCR, P = 0.511) and functional success rate was 90.4% (90.7% in EN-DCR and 90.1% in EX-DCR, P = 0.909). Surgical outcomes were comparable between two groups. Complication rate was low in both groups [8]. We have seen similar results with both procedures in our study.
In a review done to compare the success rates of endonasal DCR with that of external DCR which included all randomised controlled trials (RCTs) comparing endonasal and external DCRs, the following results were noted.[9] Two trials were included in the review. One trial from Finland compared laser-assisted endonasal DCR with external DCR, and one trial from India compared mechanical endonasal

DCR (using punch forceps) with external DCR. The trials were poorly reported and it was difficult to judge the extent to which bias had been avoided. Different effects were seen in these two trials (I^2 = 76%). People receiving laser-assisted endonasal DCR were less likely to have a successful operation compared with external DCR (63% versus 91%; risk ratio (RR) 0.69, 95% confidence intervals (CI) 0.52 to 0.92; 64 participants). There was little or no difference in success comparing mechanical endonasal DCR and external DCR (90% in both groups; RR 1.00, CI 0.81 to 1.23; 40 participants). There were no cases of intraoperative bleeding in any participant in the trial that compared laser-assisted endonasal DCR to external DCR. This was in contrast to the trial comparing mechanical endonasal DCR to external DCR in which 45% of participants in both groups experienced intraoperative bleeding (RR 1.00, 95% CI 0.50 to 1.98; 40 participants). The authors judged the latter study evidence to be very low-certainty, downgrading for risk of bias, imprecision and inconsistency. They concluded that there is uncertainty as to the relative effects of endonasal and external DCR. Differences in effect seen in the two trials included in the review may be due to variations in the endonasal technique, but may also be due to other differences between the trials was the conclusion drawn by the authors. They recommended that future larger RCTs are required to further assess the success and complication rates of endonasal and external DCR [9].
In our study we chose patients based on the factors mentioned a priori and have seen good results with both External and Endoscopic DCR. Intra-operative bleeding was noted to be more in patients with infected sacs with pus in both procedures. Thus detailed examination and appropriate selection of patients with meticulous surgical technique is what gives good results in Dacrocystorhinostomy, be it Endoscopic or External.

Conclusion

In studies conducted comparing the outcomes of External vs. Endoscopic DCR different results were seen and there is lack of definitive evidence as to what gives the best results. In our study we chose patients based on examination findings by an Ophthalmologist &Otorhinolaryngologist and advised the patient to undergo either of the procedures. This with a meticulous surgical technique has given us good post-operative results. Thus we conclude that detailed examination and appropriate selection of patients with meticulous surgical technique is what gives good results in Dacryocystorhinostomy, be it Endoscopic or External.

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