Endoscopic Transnasal Dacryocystorhinostomy – The Way We Do it - A Cross Sectional Study

Achin Pant[1*], Bhavini Jain[2], Ashutosh Kumar Singh[3]

[1*]Assistant Professor, Department of Otorhinolaryngology& Head and Neck Surgery, Government Medical College, Haldwani
[2,3]Junior Resident, Department of Otorhinolaryngology& Head and Neck Surgery, Government Medical College, Haldwani

***Corresponding Author:** Dr. Achin Pant
*Assistant Professor, Department of Otorhinolaryngology & Head and Neck Surgery, Government Medical College, Haldwani, Uttrakhand, India
Email: doctorachin30@gmail.com Orchid id- 0000-0003-1264-7189

Abstract:
Background: The aim of our study was to determine the success of endoscopic endonasal dacryocystorhinostomy using powered instrument (microdebrider) and removing the nasal mucosal and posterior saccal flaps.
Methodology: A prospective hospital based case study was conducted in patients attending ENT, Head & neck surgery department of Government Medical college hospital between April 2023 to April 2024 with complaint of epiphora including nasolacrimal duct obstruction. A total of 30 cases of epiphora secondary to nasolacrimal duct obstruction were operated using endoscopic endonasal DCR technique.
Result: Complete resolution of epiphora was reported in 28 patients of the 30 procedures, (93.3% success rate) with patent ostia on syringing. None of the patients developed recurrence , 2 patients developed synechiae and mucosal overgrowth over the canalicular sight post operatively. There were no intra-operative or post-operative complications.
Conclusion: The technique of endoscopic dacryocystorhinostomy with creation of wide bony ostium around the medial aspect of the lacrimal sac by drilling out the bony borders and removing mucosal and posterior saccal flaps with the help of powered instrument (microdebrider and drill) has shown good longterm results comparable with other studies. It also has the additional advantage of less granulation tissue formation, less chance of redundant flap obstructing the ostia and practically no synechiae formation. The technique is relatively easy with favourable outcome.

Keywords – Endoscopic dacryocystorhinostomy, microdebrider, removal of posterior saccal flaps and nasal mucosa

Background

Epiphora, or abnormal tearing, results from a blockage in the lacrimal drainage system, leading to inadequate tear drainage into the nose. This stagnation can cause recurrent infections. Dacryocystorhinostomy surgery, involving the creation of a connection between the lacrimal sac and the nasal cavity, can help alleviate these symptoms.[1] The primary causes of nasolacrimal duct obstruction (NLDO) are acute or chronic inflammation, trauma, and congenital malformations. Patients typically experience symptoms such as epiphora, swelling of the eyelids and lacrimal sac, purulent discharge, blurred vision, and facial pain.[2] A common surgical procedure for NLDO involves performing dacryocystorhinostomy (DCR) to establish a connection between the nasal cavity and the lacrimal sac cavity for tear drainage.[3] However, EN-DCR has encountered issues such as misidentification of the lacrimal sac, formation of granulation tissue around stent tubes, presence of retained bony spicules, insufficient opening of the sac, and adhesions between the

lateral wall and middle turbinate.[4] This study proposes a modification that involves creating a wide bony opening around the medial side of the lacrimal sac by removing bony borders, nasal mucosal, and posterior saccal flaps using powered instruments. The study aims to evaluate the outcomes and recurrence rate following this modification to the traditional endoscopic DCR procedure.

Methods

Study design: Prospective hospital based case study

Study setup:Department of ENT, Head & Neck surgery, Government Medical College Haldwani, Uttrakhand, India

Study duration: Over a period of one year from April 2023 to April2024 .Patients with complaint of epiphora including nasolacrimal duct obstruction were recruited in the study after taking informed written consent and ethical clearance..

Samplesize:A totalof30 caseweretaken

Inclusioncriteria:

- Patients between age group of 20-60 years
- Patients having nasolacrimal duct blockage

Exclusioncriteria:

- All patients who refused to give consent
- Patients underwent pervious nasolacrimal duct surgery.
- Any other causes leading to epiphora (watering of eyes)
- Patients having evidence of presaccalcanalicular obstruction or associated sinonasal disease like polyps

Preoperative evaluation included detailed ENT history, and clinical examination , and other routine blood work up was done .Patients between age 20-60 years with complaint of epiphora including nasolacrimal duct obstruction were screened by detailed history, clinical examination, eye syringing and all other routine blood investigations .All patients were assessed by an ophthalmologist and had repeated sac washouts , which failed to improve symptoms.

OPERATIVE PROCEDURE –

The surgical technique employed by the same surgeon involved the following key steps: The middle meatus was prepared using a 1:2 lakh lignocaine-adrenaline solution. A 0° Storz Hopkins endoscope was utilized to visualize the middle meatus. A Bowman lachrymal probe was used to assess the patency of the superior, inferior, and common canaliculi. Eye syringing was performed with methylene blue dye, and local infiltration was administered along the maxillary line(fig 1). A Rosen tympanoplasty knife was employed to elevate the mucosa and underlying lacrimal bone off the lacrimal sac, with a posterior-based flap being elevated. The thick frontal process of the maxilla overlying the anterior portion of the lacrimal sac was trimmed using a karrisonspunch(fig 2). This exposed the entire medial wall of the lacrimal sac, which was then incised in its vertical length as anteriorly as possible(fig 3), revealing the internal structure and contents of the lacrimal sac to the middle meatus. Methylene blue dye was observed exiting the sac, and eye syringing demonstrated free flow.(fig 4,5)A wide bony ostium was created around the medial aspect of the lacrimal sac by drilling out the bony borders and removing the nasal mucosal and posterior saccal flaps using a powered instrument(microdebrider).(fig 6,7) No stents were used, and no packing was done. The patients were discharged the following day after the surgical procedure.

Postoperative care and follow up

Post-operatively, patients were followed up within one month, at three months and, finally, at 9 to 12 months. Lacrimal syringing was performed daily in the first three days postoperatively and subsequently alternate days in the first week and weekly thereafter for the first month. The patient's relief of symptoms and endoscopic visualisation of a middle meatal ostium into the lacrimal sac measured success.

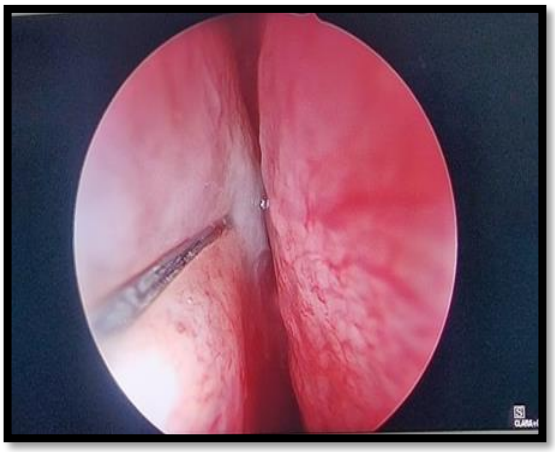

Fig1- Local infiltration over maxillary line

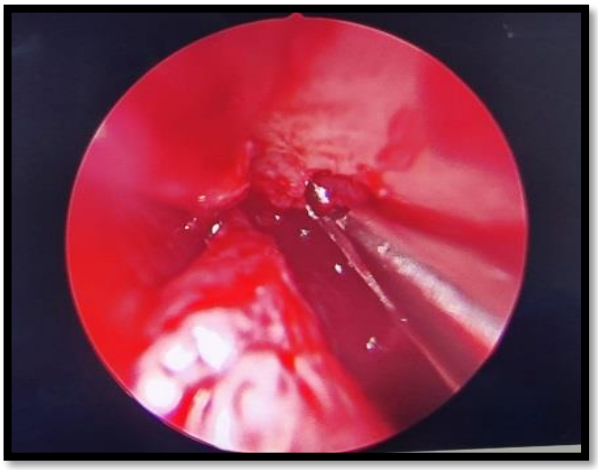

Fig -2 Frontal process of maxilla tried using Karrisons punch

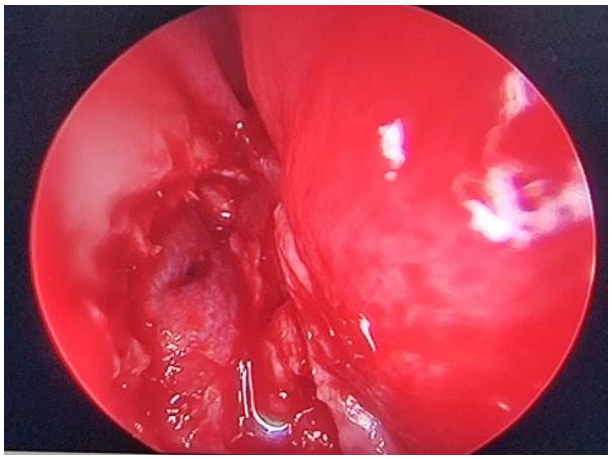

Fig -3 Incision given over lacrimal sac

Fig -4 Probbing done with bowmens probe

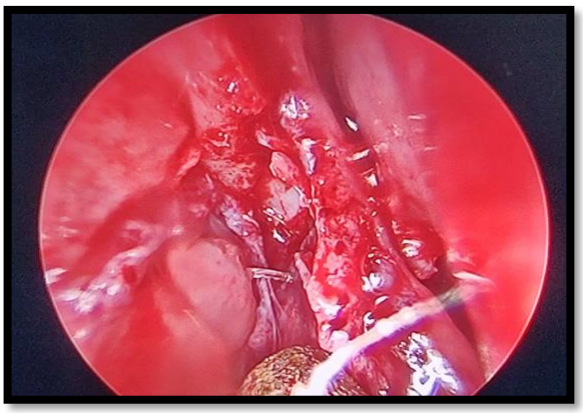

Fig -5 Free flow seen on eye syringing

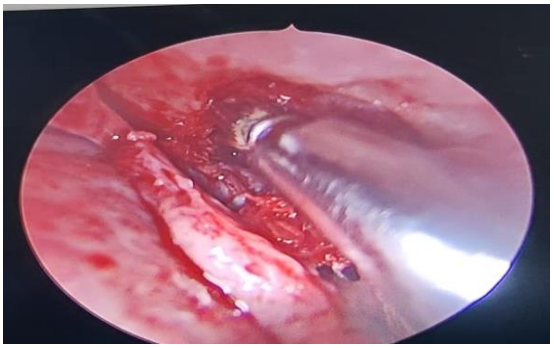

Fig 6- Creation of wide bony ostium and removal of nasal mucosal and posterior saccal flaps by powered instrument like microdebrider and drill

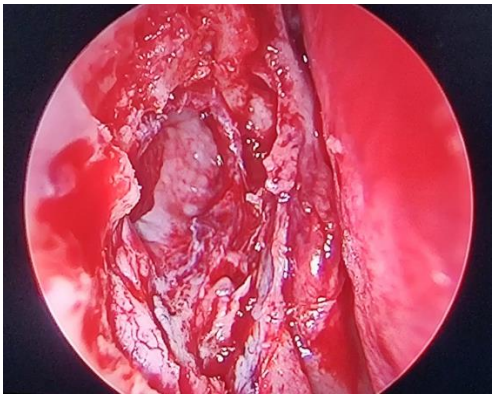

Fig 7 – wide bony ostium created nasal mucosal and posterior saccal flap removed

Results

Endoscopic DCR'S was performed in 30 patients presenting with chronic dacryocystitis using powered instrument (drill and debrider) . The mean age of patients at presentation was 32.5 years age , out of thirty patients who were selected 20 were females and (66.6%) and 10 were male (33.3%) .These patients had presented to outpatient department with epiphora of duration of 3 months to 6 years (mean 3.2 years) Chronic dacryocystitis was of right side in 16 (53.3%) and of left side in 14 (46.6%) of these patients. Out of these thirty patients, 4 (13.3%) patients had sufficient amount of deviated septum which warranted them to undergo septoplasty. The patients were followed up for a period of minimum 8 months (range 8 months–1 year). Complete resolution of epiphora was reported in 28 patients of the 30 procedures, (93.3% success rate) with patent ostia on syringing. None of the patients developed recurrence , 2 patients developed synechiae and mucosal overgrowth over the canalicular sight post operatively. There were no intra-operative or post operative complications.

Discussion

Endoscopic dacryocystorhinostomy (DCR) has become the procedure of choice for treating nasolacrimal duct obstruction (NLDO). Advancements in endoscopes, lasers, and powered instruments such as microdebriders and drills have revolutionized endonasal DCR, simplifying the surgical technique and enhancing surgical outcomes. Variation in the healing response among patients, characterized by differences in granulation tissue formation and fibrosis, contributes to diverse treatment outcomes.[5] Several studies have debated the necessity of preserving the mucosal flap over the lacrimal sac area during endoscopic DCR. In a study by Ramakrishana et al., 27 endoscopic DCR procedures were performed on 20 patients without preserving the mucosal flap. The study reported a 100% success rate in achieving anatomical patency and a 93% success rate in complete resolution of epiphora. This led to the conclusion that preserving the mucosal flap is not crucial for achieving favorable outcomes. To adhere to the study, a cold instrument like a 45-degree upturn Beksely's forceps is typically used to remove the mucosa, resulting in mucosal tags that can lead to adhesions and failure. However, utilizing powered instruments such as a microdebrider and a drill can help minimize these complications.Welham&Wulc[6] discovered that the primary reason for failure in 52% of cases was related to issues concerning the size and position of the internal ostia. Their research revealed that placing the ostium too close to the middle turbinate can lead to adhesions and stenosis, ultimately leading to failure. A larger ostium size is crucial for successful surgery, necessitating the removal of a significant portion of the medial wall of the sac. While incising the medial wall with a sickle knife can achieve this, there is an alternative.While this can be accomplished by simply cutting the sac's medial wall with a sickle knife, doing so may accidentally damage the sac's lateral wall, remove insufficient wall to reduce the size of the ostium, and leave tags behind that increase the risk of ostium restenosis. Again, using a microdebrider can help to minimize this difficulty. In their study, Neil C Tan et al. concluded that surgical success is determined by ostium size and that considerable reduction of the DCR ostium occurs within the first four weeks after surgery [7]. As a result, it is not only vital to create a large sac ostium; the initial few weeks of healing also have a significant impact on long-term patency.

It is therefore safe to conclude that successful endoscopic DCR is reliant on a variety of parameters. The first step was to remove the mucosa from the lacrimal sac. Step 2 was to remove the bone that covered the sac. Step 3 incising the medial wall of the lacrimal sac and creating a large bony ostium with removal of nasal mucosal and posterior saccal flaps with the help of powered instruments like microdebrider and drill can futher improve the success rate of endoscopic transnasalDCR .

Our new technique's overall success rate of 93.3% is similar to that of earlier studies, and larger randomised control trials are necessary for this new method's further validation. Comparing

endoscopic DCR to external DCR, there are a number of benefits: no face scarring, preservation of the lacrimal sac of the orbicularis oculi muscle, non-division of the medical canthal ligament, daycare operation, reduced tissue injury, and retention of the pump function [8].

The preferred method for treating nasolacrimal duct blockage (NLDO) is now endoscopic dacryocystorhinostomy (DCR). Endonasal DCR has been transformed by advancements in endoscopes, lasers, and powered devices including drills and microdebriders, which have improved surgical results and simplified the surgical method. Treatment outcomes vary depending on the patient's variation in the healing response, which is defined by variations in granulation tissue production and fibrosis. The need to maintain the mucosal flap over the lacrimal sac region during endoscopic DCR has been discussed in a number of publications. Twenty patients had 27 endoscopic DCR procedures in a research by Ramakrishana et al., none of which preserved the mucosal flap. Anatomical patency was achieved with 100% success rate and complete resolution of epiphora with 93% success rate, according to the study. This led to the conclusion that favorable results can be obtained without retaining the mucosal flap.

C**oncussion**

The aforementioned endoscopic DCR approach, which involves the formation of a sizable bone ostia and the total removal of posterior saccal and nasal mucosa, has demonstrated satisfactory long-term outcomes that are equivalent to those of other research. It also offers the added benefit of virtually minimal synechiae formation, less possibility of superfluous flap obstructing the ostia, and less production of granulation tissue. We were able to attain a success rate of approximately 93.3% using this procedure, which is reasonably easy to use and has favorable results. With all of the benefits that endoscopic DCR has to offer, such as the absence of skin scarring, these success rates were comparable to those of external DCR surgery.

However our sample size is small and further research work need to be carried out but whatever results we observed, it is our belief that this technique can be used to increase the success rate of Endoscopic surgery and to minimise the complications faced by the patients.

References

1 Singh AP, Narula V, Meher R. A new approach to endoscopic DCR. Brazilian Journal of Otorhinolaryngology.2012;78(5):7–11.https://doi.org/10.5935/1808-8694.20120002
2 Trimarchi M, A. Giordano Resti, Concetta Catherine Bellini, Forti M, Bussi M. Anastomosis of nasal mucosal and lacrimal sac flaps in endoscopic dacryocystorhinostomy 2009;266(11):1747–52.https://doi.org/10.1007/s00405-009-1002-z
3 Yigit O, Samancioglu M, Taskin U, Ceylan S, Eltutar K, Yener M. External and endoscopic dacryocystorhinostomy in chronic dacryocystitis: comparison of results. European Archives of Oto-Rhino-Laryngology 2007;264(8):879–85.https://doi.org/10.1007/s00405-007-0286-0
4 Metin O, Mehmet O, Oguz O, Murat I. Long-term results and reasons for failure of intranasal endoscopic dacryocystorhinostomy. 2000;120(2):319–22.https://doi.org/10.1080/ 00016480075 0001170
5 Prakash MD, Viswanatha B, Rasika R. Powered endoscopic endonasaldacryocystorhinostomy with mucosal Flaps and trimming of anterior end of middle turbinate. Indian journal of otolaryngology and head and neck surgery 2014;67(4):333–7.https://doi.org/10.1007/s12070-014-0807-2
6 Welham RA, Wulc AE. Management of unsuccessful lacrimal surgery. British Journal of Ophthalmology 1987;71(2):152–7.https://doi.org/10.1136/bjo.71.2.152
7 Tan N, Rajapaska S, Gaynor J, Nair S. Mechanical endonasaldacryocystorhinostomy--a reproducible technique. Rhinology journal 2009;47(3):310–5.https://doi.org/ 10.4193/ Rhin08.150

8 Weidenbecher M, Hosemann W, Buhr W. Endoscopic Endonasaldacryocystorhinostomy: results in 56 patients. Annals of Otology, Rhinology & Laryngology 1994;103(5):363–7.https://doi.org/ 10.1177/000348949410300505