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Comparison of success between external and endonasal dacryocystorhinostomy in primary acquired nasolacrimal duct obstruction in South India population

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ABSTRACT

Background: Dacryocystorhinostomy (DCR) has been the standard procedure for primary acquired nasolacrimal duct obstruction (PANDO) for many years. This process can be performed either using an endoscopic or external approach. **Aims and Objectives:** The aim is to evaluate the results and recurrence rates of external DCR (ExDCR) and endonasal DCR (EDCR) surgery in patients with PANDO in the South Indian population. **Materials and Methods:** Medical records were reviewed in all patients who underwent surgery for PANDO between December 2021 and August 2023 at Government Medical College Mahabubabad. **Results:** This study was conducted in 92 patients; 34 males (36.96%) and 58 females (63.04%) were the gender split. ExDCR was used in 52 (56.52%) of the cases, and EDCR was used in 40 (43.487%) of the cases. Operation success rates of these data revealed that 50 (54.34%) cases were recorded as successful, 24 (26.10%) of the cases were accepted as partially successful, and 18 (19.56%) of the cases were deemed unsuccessful. There was no statistically significant difference between success rates and recurrences in both groups ($P > 0.05$). **Conclusion:** Endoscopic DCR produced simple, minimally invasive, and preferable results compared to ExDCR in the South Indian population. Although the success of ExDCR is higher and the recurrence is lower than endoscopic DCR, with the outcomes of this study, endoscopic DCR can be tried as the first choice to protect the patient from major surgery and anesthesia in PANDO.

Key words: External dacryocystorhinostomy; Endonasal dacryocystorhinostomy; Nasolacrimal duct obstruction; Primary acquired nasolacrimal duct obstruction

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INTRODUCTION

Dacryocystorhinostomy (DCR) surgery can be performed to restore tear drainage and is usually the definitive treatment. For many years, DCR has been the go-to procedure for primary acquired nasolacrimal duct obstruction (PANDO).[1] PANDO often causes annoying, intractable epiphora. Mucus can build up in long-lasting PANDO, which can lead to a mucocele in the nasolacrimal sac or potentially acute or chronic dacryocystitis.[2] This process can be performed either using an endoscopic or external approach.

In 1893, Caldwell developed the endonasal DCR (EDCR), which involved inserting a metal probe through the canaliculus and into the lacrimal sac before using an endonasal electric burr to remove the bone.[3] The challenges included proper visualization, hemorrhage, and precise excision of bone and soft tissue. Improvements in endonasal surgery using rigid nasal endoscopes, although the method was later changed, opened the door for developments in the field of EDCR.[4,5] McDonogh and Meiring[6] were the first to report the contemporary method for EDCR. It is currently acknowledged as an efficient method of managing epiphora brought on by nasolacrimal duct obstruction.

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While EDCR, an external procedure, was the most widely used method of treating DCR in the 20th century, it has subsequently been demonstrated that, with the right technique, avoiding a skin incision may be just as effective. It should be made clear that the phrase "endonasal" does not refer to a specific methodology but rather to a method of approach through the nose. An endonasal approach to DCR surgery has better results, is more widely accepted, and is preferred due to the proliferation and evolution of the different endonasal procedures over time.[7,8]

There has been a movement in the acceptance of EDCR as being as secure and efficient as external DCR (ExDCR) since the turn of the 20th century. A large bony ostium (similar to that achieved in an external approach) is essential, and the mucosal flaps created intraoperatively should be well apposed for mucosal anastomosis. Endoscopic procedures that remove the adequate bone for full lacrimal sac exposure, marsupialization, and mucosal flap apposition have very high success rates.[9-11]

Our study's objective was to compare the results of ExDCR and EDCR in a South Indian population at a government medical college. We evaluated the success rates and recurrence rates of ExDCR and EDCR for the treatment of nasolacrimal duct obstruction.

Aims and objectives

To evaluate the results and recurrence rates of ExDCR and EDCR surgery in patients with PANDO in South India Population.

MATERIALS AND METHODS

Place of study

Department of Otorhinolaryngology and Ophthalmology, Government Medical College, Mahabubabad, Telangana, India.

Period of study

December 2021 and August 2023.

Study design

Ours is a comparative study.

Study procedure

The Government Medical College's institutional ethics committee gave its approval to this study. Based on ophthalmic examination and/or radiological results, the PANDO was diagnosed. PANDO was assessed by nasal probing and verified with dacryocystography. Every patient displayed epiphora symptoms. Slit-lamp, fluorescein dye disap-pearance test (Jones test), lacrimal irrigation, and canaliculi probing were all part of the preoperative exams. ExDCR, or endoscopic EDCR, was randomly selected as the surgical procedure. However, the patients' chosen option was taken into account. Patients were checked by the ophthalmologist and otolaryngologist together after applying to the department of ophthalmology. An endoscopic assessment was performed before surgery to look for any potential concurrent nasal diseases. Both ExDCR and EDCR were carried out by experienced otolaryngologists and ophthalmologists, respectively.

Patients were routinely checked on the 1st postoperative day, the 1st month, the 3rd month, and the 6th month. All patients, including those with sac anomalies, had a preoperative dacryocystographic assessment. Patients with a history of prior DCR surgery, intravascular stones, tumors, or canalicular blockage were also excluded from this investigation. Dacryocystography with lipiodol was confirmed in every case with PANDO. It was observed that the lacrimal sacs of every patient were equally filled and that their integrity was unaffected. The obstruction was localized in all patients after the sac at the nasolacrimal duct level.

We categorized success into three parts: complete success, partial success, and failure. Full success was defined as the absence of any tears under normal circumstances, the absence of infection, and lacrimal channel clearing during syringe irrigation. A ripping symptom that improved from the preoperative state was considered a partial success. A fluorescein dye disappearance test came out negative; however, irrigation through the ostium partially or completely made things go away. Failure was diagnosed with an anatomically obstructed ostium with persistent tearing.

Surgical procedure[12,13]

Endoscopic DCR procedure

Intravenous propofol and remifentanil hydrochloride were administered during general anesthesia. Regarding anesthesia, all patients were questioned about drug usage (for example, cocaine use). Cotton swabs soaked in a mixture of 4 mL of sterile saline solution, 2 mL of cocaine 4%, and 1 mL of adrenaline 1:1000 were used to decongest the nasal mucosa. Due to the potential for visual disruption from bleeding, damage to the nasal mucosa was avoided. Before performing an endoscopic DCR, local vasoconstrictors were used to decongest the nasal mucosa during local infiltrating anesthesia. Hemostasis was performed by visualizing the lateral nasal wall with the endoscope.

A vertical mucosal incision was made on the superior part of the middle and lower concha. The mucosa was taken off the bone after the initial cut. The anterior-to-posterior or anterior-posterior view of the maxillary portion of the

lacrimal fossa was obtained. The lacrimal sac emerged after the bone was removed. The canal was used to insert the lacrimal probe, which was then pushed medially in the direction of the occluded sac. An endonasal observation of the probe's redness on the medial sac wall revealed a sort of incision that produced anterior and posterior flaps. After passing through the sac, canalicular silicone stenting was performed.

ExDCR procedure

The skin incision was made externally. The lacrimal sac was seen after an incision was created, and the inner canthal ligament was excised after blunt dissection had reached the periosteum.

The periost over the lacrimal crest was dissected using a periosteal elevator. The lacrimal sac was then taken out of the lacrimal fossa. Using a periosteal elevator, the front portion of the lacrimal bone was punctured. With Kerrison rongeur taken from the hole site, the bone window was made. From the top of the lacrimal fossa to the nasomaxillary sidewall in front of the inner bulging tendon, the bone window was widened. Smooth-edged bone panes ranging in size from 16 mm to 14 mm were produced on average. To prevent canalicular and ostial occlusion, a silicone tube advanced from the upper and lower punctum was pushed through into the nasal cavity after reciprocal suturing of the anterior and posterior flaps of the H-shaped lacrimal sac and nasal mucosa.

Statistical analysis

The statistical package for social sciences in the Windows 22.0 program was used for the statistical analysis. Descriptive analysis was used to summarize the data (mean, standard deviation), and the Chi-square test and likelihood ratio test were also employed to evaluate the qualitative data. Success and failure rates were compared. Statistics were deemed significant at $P<0.05$.

RESULTS

In the 92 patients that participated in this study, 34 males (36.96%) and 58 females (63.04%) were the gender split. The mean follow-up time was 32.16±9.89 months (range 4–56 months). The range of ages was 12–76, with a mean age of 52.36±11.98. ExDCR was used in 52 (56.52%) of the cases, and EDCR was used in 40 (43.487%) of the cases. 43 (46.73%) of the reported operation sides were on the left, whereas 49 (53.26%) were on the right. After the surgery, 76 (78.26%) of the patients had lavage clearance, 72 (78.60%) of the cases experienced no recurrence, 53 (57.60%) of the cases had positive fluorescein dye disappearance tests (Jones tests), and 59 cases (64.13%) lacked epiphora. Operation success rates of these data revealed that 50 (54.34%) cases were recorded as successful, 24 (26.10%) of the cases were accepted as partially successful, and 18 (19.56%) of the cases were deemed unsuccessful. Table 1 summarizes the demographic characteristics, case distribution, and postoperative results.

Table 2 shows a comparison of the achievement status by categorical characteristics. Based on these data, operative full success rates were found in 26 (52%) patients in ExDCR and 24 (48%) patients in EDCR. Surgical failure rates were 11 (11.95%) in ExDCR and 10 (10.89%) in EDCR.

Comparisons of operation success with gender, operation type with operation success, and operation success with operation side were all found to be statistically insignificant between the two surgical setup groups ($P>0.05$).

DISCUSSION

Epiphora is the most common sign of PANDO, which impairs vision and causes issues with eyelid irritation.[12,13] In individuals with blockage distal to the common canaliculus, DCR is the primary therapeutic option for epiphora.[14,15]

According to our study's analysis of these data, 50 (54.34%) instances were declared successful, 24 (26.10%) cases were

Table 1: Demographic characteristics and the distribution of the study population

Characteristics	Number of cases (%) (n=92)
Sex	
Male	34 (36.96)
Female	58 (63.04)
Surgery procedure	
ExDCR	52 (56.52)
EDCR	40 (43.48)
Side	
Right	49 (53.26)
Left	43 (46.73)
Recurrence	
No	72 (78.26)
Yes	20 (21.74)
Lavage	
Open	76 (82.60)
Close	16 (17.40)
Jones (2% fluorescein dye)	
Negative	39 (42.40)
Positive	53 (57.60)
Epiphora	
No	59 (64.13)
Yes	33 (35.87)
Success	
No success	18 (19.56)
Partial success	24 (26.10)
Full success	50 (54.34)

DCR: Dacryocystorhinostomy, ExDCR: External dacryocystorhinostomy, EDCR: Endonasal dacryocystorhinostomy

Table 2: Comparison of the achievement status by categorical characteristics

Characteristics	Success			
	No success (%) (n=18)	Partial success (%) (n=24)	Full success (%) (n=50)	P-value
Sex				
Male	8 (44.44)	10 (41.67)	16 (32)	0.552
Female	10 (55.56)	14 (58.33)	34 (68)	
Surgical procedure				
ExDCR	11 (61.11)	15 (62.50)	26 (52)	0.632
EDCR	7 (38.89)	9 (37.50)	24 (48)	
Side				
Right	11 (61.11)	12 (50)	26 (52)	0.748
Left	7 (38.89)	12 (50)	24 (48)	
Recurrence				
No	0 (0)	22 (92)	35 (70)	0.000
Yes	18 (100)	2 (8)	15 (30)	

DCR: Dacryocystorhinostomy, Chi-square test P-value

deemed moderately successful, and 18 (19.56%) cases were deemed failed. A partial success rate of 52% for ExDCR and 48% for EDCR was noted. Probably, the lateral lacrimal sac wall's defense and its connections to the orbicularis oculi muscle and medial canthal tendon make the lacrimal pump simpler to operate and more effective than after ExDCR, which disrupts these structures. Similar findings were also made in the current investigation.[12,16] ExDCR is more successful than endoscopic DCR in several trials, leading to the consensus that endoscopic DCR has lower success rates than ExDCR.[16,17]

Dolman,[18] the experimental report, confirmed that full success was observed in 90.2% of ExDCR patients and 89.9% of EDCR patients. In patients with PANDO, partial success was shown in 2.0% of ExDCR and 4.0% of EDCR. In our study, 71 instances of ExDCR and 7 cases of EDCR had surgical failure. As a result, there was no evidence of a statistically significant difference between the results of any technique. When we compared our findings to those of Dolman's study, we concluded that the current study group had a high partial success rate.[18]

It may be because we sutured the bottom and top ends of the H-shaped mucosal flap separately, or it may be connected to the various anatomical characteristics in the Turkish population. On the other hand, these outcomes might be a result of the medial canthal ligament's partial injury or from the use of silicone tubes in every case in the current research. This does not demonstrate that it is better than endoscopic DCR. According to the Royal College of Ophthalmologists, the achievement of the surgery was defined as the absence of tearing at least 3 months after an operation. Therefore, we applied these recommendations to patients who had at least 6 months of surgical follow-up.[19]

Jawaheer et al.,[20] and Jung et al.,[21] both research documents supporting the failure of the surgery, found fibrosis of the intranasal ostium of ExDCR and EDCR.

There was no recurrence in the ExDCR group due to ostium closure. It will depend on the H-shaped mucosal flap and the removal of the wide bone ostium in ExDCR. The limitation of our study was related to its retrospective design. On the other hand, there were some advantages to our study. One of them was investigated by a large subset of the Turkish population. The partial success rate was different from similar studies.[22] It can depend on surgical procedures or anatomical variations in the Turkish population. The advantage of endoscopic surgery is that it heals with no scar and protects the lacrimal pump system, contrary to ExDCR.

The limitations of our study

Its retrospective design.

CONCLUSION

In conclusion, EDCR is a procedure that has recently gained popularity among ophthalmologists due to its minimally invasive nature, high patient satisfaction, and high success rates. Although the success of ExDCR is higher and the recurrence is lower than endoscopic DCR, with the outcomes of this study, endoscopic DCR can be tried as the first choice to protect the patient from major surgery and anesthesia in PANDO in the south Indian population. We believe that this study may be a guide for treatment options for South Indian patients with PANDO.

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MR- Concept and design of the study prepared the first draft of the manuscript; **FMR-** Interpreted the results; reviewed the literature and manuscript preparation; **MNK, FMR**- Concept, coordination, statistical analysis and interpretation, preparation of manuscript and revision of the manuscript.

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