

## ORIGINAL RESEARCH

### **A Hospital Based Prospective Study to Evaluate the Functional/ Anatomic Success for Endoscopic Versus External Dacrocystorhinostomy (DCR) Surgeries in Naso Lacrimal Duct Obstruction (NLDO) at Newly Established Tertiary Care Centre**

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#### **ABSTRACT**

**Background:** Dacryocystorhinostomy (DCR) is the standard treatment for nasolacrimal duct obstruction. The purpose of the current study was to evaluate functional/ anatomic success for endoscopic versus external dacrocystorhinostomy (DCR) surgeries in nasolacrimal duct obstruction (NLDO) at newly established tertiary care centre.

**Materials& Methods:** A hospital based prospective study done on 100 patients with complaining of excessive tear formation in department of ophthalmology & Otorhinolaryngology at Government Medical College Pali, Rajasthan, India during one year period. Documented obstruction on syringing and probing or obstruction on lacrimal scintigraphy were used in the diagnosis of NLDO. Patients with previous DCR surgery to the same eye were excluded from the study. Success was defined as full resolution of symptoms and no postoperative dacryocystitis without additional postoperative lacrimal duct surgery. Regarding the analysis of long-term outcome, only the first side was included in bilateral cases. Patients were also asked to rate their satisfaction on a scale of 1 to 10 (1 = extremely dissatisfied to 10 = extremely satisfied).

**Results:** Demographics between the two surgical groups were similar. There was no statistically significant difference in comorbidities, previous sinus disease or surgery, ocular history, or presenting symptoms. 94 had unilateral DCR (right side, 48 (51.06%); left side, 46 (48.93%)), and 6 patients had bilateral DCR. The complication incidence was low and similar in both operations. Two patients had postoperative hemorrhage (one who had endonasal DCR surgery and one having external DCR surgery). Seven patients who underwent DCR surgery had tubes that fell out before the 2-month assessment, of which three were in the endonasal group and four in the external group. There was no statistical significance between the external DCR group and the endoscopic endonasal group ( $P > 0.05$ ). The success rate of external DCR for patients with previous episodes of dacryocystitis was 82.8%, compared to 83.5% for patients without previous episodes of dacryocystitis. The difference was not statistically significant ( $P > 0.05$ ). The success rate in patients without previous lacrimal duct surgery

was 88.6% compared to 74.4% for patients with previous lacrimal duct surgery. The difference was also not statistically significant ( $P>0.05$ ).

**Conclusion:** The advantage of endoscopic surgery is that it leaves no scar and preserves the lacrimal pump system, unlike external DCR. Choice in regards to surgical techniques should depend on patient preference, with consideration given on the availability of resources amongst health care systems.

**Keywords:** External DCR, Endoscopic DCR, Dacryocystitis, Epiphora, Lacrimal Duct Surgery.

## INTRODUCTION

Tearing and recurrent or chronic conjunctival discharge are the most-frequent symptoms and signs of a lacrimal pathway obstruction. Different symptoms attributable to lacrimal pathway obstruction are common among middle-aged and older patients.<sup>1</sup>

Dacryocystorhinostomy (DCR) is the standard treatment for nasolacrimal duct obstruction. There are two main types of DCR: external and endonasal. External DCR was first described by Toti in 1904<sup>2</sup>, and the procedure has been modified many times by different surgeons over the years.<sup>3</sup> The endonasal technique was first described by West in 1910.<sup>4</sup>

Standard treatment for nasolacrimal duct obstruction has been dacryocystorhinostomy (DCR) surgery. The external approach is performed through a cutaneous incision to access the lacrimal sac. The procedure gained popularity due to its efficacy and relatively low complication rates. Endoscopic endonasal DCR has gathered momentum with direct visualization under endoscopic guidance. Caldwell first introduced the endonasal approach for lacrimal surgery in 1893. However endoscopic endonasal DCR has only become recently employed with new endoscopy instruments and technique.<sup>5</sup> This approach avoids an external scar and neurovascular disruption along the tract exposing the lacrimal sac. The reported success rates of both procedures range from 63% to 97%.<sup>2-4</sup> The wide range of success is likely due to surgical variability, patient demographics, and lack of standardized outcome measures in the medical literature.

However, since the early 1990s minimally invasive microendoscopic transcanalicular therapeutic techniques such as laser dacryoplasty (LDP) or microdrill dacryoplasty (MDP) have become more and more popular.<sup>6,7</sup> These procedures allow the physiology of the lacrimal drainage system to be preserved intact and obviate the need for an external DCR. Thus, in specialized centers the number of external DCRs performed has decreased markedly, and external DCR is usually chosen only when transcanalicular microendoscopic techniques are contraindicated, such as in revision operations or in complicated or traumatic cases.<sup>6-8</sup> The purpose of the current study was to evaluate functional/ anatomic success for endoscopic versus external dacryocystorhinostomy (DCR) surgeries in nose lacrimal duct obstruction (NLDO) at newly established tertiary care centre.

## MATERIALS & METHODS

A hospital based prospective study done on 100 patients with complaining of excessive tear formation in department of ophthalmology & Otorhinolaryngology at Government Medical College Pali, Rajasthan, India during one year period.

A diagnosis of NLDO was made from ophthalmic examination and/or radiological findings. All patients included had symptoms of epiphora. Documented obstruction on syringing and probing or obstruction on lacrimal scintigraphy were used in the diagnosis of NLDO. Patients with previous DCR surgery to the same eye were excluded from the study.

## **SURGICAL PROCEDURE**

In our department external DCR is generally performed under general anesthesia. An incision was made medial to the angular vein at the level of the medial canthal ligament. An osteotomy with a mean diameter of 10 mm was created and the lacrimal sac opened. Posterior and anterior mucosal flaps were made and all patients were intubated with silicone tubes. The skin was closed with a 6-0 polypropylene suture. The silicon tubes were usually kept in place for 3–6 months.

Irrigation of the nasolacrimal systems and fluorescein dye disappearance test was performed at postoperative follow-up appointments in all patients. Postoperatively, all patients were assessed within 1 month of surgery. Patient follow-up included 2 months follow-up for tube assessment and subsequent 4–12-month follow-up for progress and symptom surveillance. During postoperative visits, patients were asked about symptomatic resolution of epiphora and assessed with patency on irrigation, fluroscein dye disappearance test, and intranasal examination. Postoperative complications were also noted at each visit. All patients were followed up for at least 6 months (range 6–24 months).

## **ENDOSCOPIC ENDONASAL DCR**

Endoscopic endonasal DCR was performed under general anesthesia. After vasoconstriction of the nasal cavity by neurosurgical pledges soaked in cocaine, the head of the middle turbinate and the mucosa surrounding the lacrimal sac are infiltrated with a (lignocaine and lidocaine combination) local anesthetic. The dose of local anesthetic was not recorded in the data template. A surgical incision is made at the lateral nasal wall, anterior superior to the insertion of the middle turbinate. The posterior mucosal flap is elevated off the maxillary bone and incision made until the sac is exposed. Metallic lacrimal probes are passed medially through both canaliculi so as to tent the sac lumen. By preserving the nasal submucosal injection in the presumed lacrimal fossa during opening of the sac, marsupialization can occur to appose the nasal mucosa. A silicone bicanalicular tube is then positioned and tied. All patients were given postoperative chloramphenicol and prednisone drops to the affected eye four times a day for a month as well as oral cephalosporin. Medication variation was only considered if the patient had a known allergy. Patients are encouraged to wash using nasal rinse or sprays to prevent crust formation.

Success was defined as full resolution of symptoms and no postoperative dacryocystitis without additional postoperative lacrimal duct surgery. Regarding the analysis of long-term outcome, only the first side was included in bilateral cases. Patients were also asked to rate their satisfaction on a scale of 1 to 10 (1 = extremely dissatisfied to 10 = extremely satisfied).

## **STATISTICAL ANALYSIS**

Data management was performed with Microsoft Excel 2010. Independent-samples *t*-test and  $\chi^2$ -nonparametric analysis were used to compare numerical variables and proportions, respectively, between successful and failed cases and between endoscopic and external DCRs.

## **RESULTS**

A total of 100 patients were included in the study (67 females and 33 males), with a mean age of 63.7 years. Demographics between the two surgical groups were similar. There was no statistically significant difference in comorbidities, previous sinus disease or surgery, ocular history, or presenting symptoms (table 1).

**Table 1: Demographics of endoscopic endonasal and external dacryocystorhinostomy groups**

Demographics variables	Total (100) Cases	Endoscopic (50) Cases	External (50) Cases	Overall P value Cases
Age (yrs)	63.7±26.3	62.8±17.43	64.9±18.32	>0.05
Female sex	67	34	33	>0.05
Male sex	33	17	16	>0.05
Co morbidities	62	32	30	>0.05
History of epiphora	80	42	38	>0.05
History of dacrocystitis	55	35	20	0.062
Trauma	7	6	1	0.05
History of conjunctivitis	8	5	3	>0.05
Post-treatment duration in months (SD)	32.43±25.12	28.3±22.56	34.82±23.58	>0.05

94 had unilateral DCR (right side, 48 (51.06%); left side, 46 (48.93%)), and 6 patients had bilateral DCR.

The complication incidence was low and similar in both operations. Two patients had postoperative hemorrhage (one who had endonasal DCR surgery and one having external DCR surgery). Postoperative hemorrhage was either wound hemorrhage or epistaxis. All of these patients were treated conservatively, including nasal spray and/or packing. Hemostasis was achieved with no secondary hemorrhage resulting in surgical intervention. Canalicular obstruction was documented in three cases, with two in endonasal DCR surgery and one having external DCR surgery. There was no documented orbital and subcutaneous emphysema, conjunctival fistula formation, retrobulbar hemorrhage, medical rectus paresis, orbital fat herniation, or nasal mucosal synechia formation (table 2).

**Table2: Post operative results and complications stratified by dacryocystorhinostomy surgery, endoscopic endonasal and external**

Postoperative results	Total (100) Cases	Endoscopic (50) Cases	External (50) Cases	Overall P value Cases
Intra-operative complications	4	2	2	>0.05
Change in routine treatment	13	5	8	>0.05
Lacrimal irrigation no patency	8	3	5	>0.05
Tubes fallen out	7	3	4	>0.05
Adjunct surgery	9	6	3	>0.05
Associated conditions example	12	9	3	>0.05
Sinus disease diagnosedReferral for other pathology or ocular conditions	15	10	5	>0.05
Postoperative complications				
Postoperative hemorrhage	2	1	1	>0.05
Punctal erosion	0	0	0	
Canalicular obstruction	3	2	1	>0.05

Seven patients who underwent DCR surgery had tubes that fell out before the 2-month assessment, of which three were in the endonasal group and four in the external group. There was no statistical significance between the external DCR group and the endoscopic endonasal group ( $P > 0.05$ ).

The success rate of DCR in different subgroups is summarized in Table 3.

**Table 3: Success rates in the entire group and different subgroups.**

	Success rate
<b>Entire group</b>	82.7
<b>Patients with previous episodes of dacryocystitis</b>	82.8
<b>Patients without previous episodes of dacryocystitis</b>	83.5
<b>DCR as primary procedure</b>	88.6
<b>DCR after any form of initial lacrimal surgery</b>	74.4

The success rate of external DCR for patients with previous episodes of dacryocystitis was 82.8%, compared to 83.5% for patients without previous episodes of dacryocystitis. The difference was not statistically significant ( $P>0.05$ ). The success rate in patients without previous lacrimal duct surgery was 88.6% compared to 74.4% for patients with previous lacrimal duct surgery. The difference was also not statistically significant ( $P>0.05$ ).

## DISCUSSION

External DCR surgery at the turn of the century was regarded as the gold standard in treatment for nasolacrimal duct obstruction. The case for this procedure lies in its predictability of success and direct visualization of the anatomy compared with a nasoendoscope.<sup>9</sup> Over the last decade, however, endoscopic DCR has shown equally promising results for long-term success in nasolacrimal duct obstruction with the benefits of minimal invasive surgery. Endoscopic DCR allows direct inspection of the lacrimal sac for underlying pathology. With an understanding of the intranasal anatomy, assessment and treatment of obstruction can be a routine procedure. The assessment of failures can also be viewed endoscopically. This allows recognised mistakes to be immediately revised at the time of surgery. Intranasal biopsy of suspicious mucosa can be taken for further assessment. The option of converting an endoscopic DCR to external approach during initial surgery is always available for difficult cases or those with lacrimal sac tumours.<sup>10</sup> Hence, patients with a concomitant nasal and paranasal disorder that may contribute to the nasolacrimal obstruction can be diagnosed and treated simultaneously if the endoscopic endonasal procedure is performed.<sup>11</sup>

Both surgical procedures have minimal rates of hemorrhage, but there is a lower to nil risk of cerebrospinal fluid rhinorrhea in endoscopic endonasal surgery.<sup>12,13</sup> Dacryocystitis is not a direct contraindication to the endoscopic surgery, and patients with chronic dacryocystitis can be treated with the endoscopic technique.<sup>13</sup>

Tsirbas and Wormald used a similar technique in endoscopic DCR to fully expose the lacrimal sac and marsupialize it into the lateral nasal wall with the nasal and lacrimal mucosa in apposition. They achieved high long-term success rates with this approach at 89%.<sup>14-16</sup>

Serious complications including orbital and subcutaneous emphysema, retrobulbar hemorrhage, medial rectus paresis, and orbital fat herniation<sup>17</sup> are rare in the medical literature for both forms of DCR surgery. Of the 226 patients who underwent endoscopic endonasal DCR in the Sonkhya retrospective case series, only two patients had complications of orbital fat prolapse and lamina papyracea damage. Both had no sequelae from this complication.<sup>13</sup> We found no serious complications in our study, with only two patients with postoperative hemorrhage requiring conservative treatment.

Comparing success rates of lacrimal duct surgery is a difficult task because different studies use different success criteria (anatomic patency, improvement in tearing, or full resolution of symptoms) and the follow-up time varies widely. Evidence of anatomic patency to irrigation does not provide any information about the physiologic function of the DCR or patient satisfaction and can overestimate surgical success.<sup>18-20</sup>

**CONCLUSION**

DCR is the treatment of choice for the treatment of nasolacrimal duct obstruction. Both operations have low complication rates. The advantage of endoscopic surgery is that it leaves no scar and preserves the lacrimal pump system, unlike external DCR. Choice in regards to surgical techniques should depend on patient preference, with consideration given on the availability of resources amongst health care systems.

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