



Dacryocystorhinostomy (DCR) – Endoscopic versus External approach: A Comparative Analysis

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Abstract

Purpose: To study the duration of surgery, outcomes, adverse events and success rates of external versus endonasal dacryocystorhinostomy (DCR) surgery.

Method: Prospective non-randomized comparative study. Study was conducted for 24 months duration in a teaching hospital with 50 cases of endoscopic and 30 cases of external DCR with a follow-up of minimum 6 months. Data regarding surgical outcome and complications were analysed and compared using Chi-square test.

Result: Functional success and symptomatic relief were equivalent in both procedures. Intranasal endoscopic DCR is a simple, minimally invasive, day care procedure and had comparable result with conventional external DCR. The follow-up duration was comparable in both groups (mean 6 months). Patient satisfaction was significantly higher in the endonasal DCR group.

Conclusion: Endonasal endoscopic DCR surgery offers a very attractive alternative to the well established technique of external DCR surgery for the treatment of primary acquired nasolacrimal duct obstruction with equivalent success rates, shorter surgical time and higher patient satisfaction.

Introduction

Dacryocystorhinostomy (DCR) is a surgery that creates a lacrimal drainage pathway into the nasal cavity to facilitate drainage of the previously obstructed excreting system. This surgery is indicated for nasolacrimal duct obstruction. The causes of nasolacrimal duct obstruction are idiopathic, iatrogenic, congenital, traumatic, lithiasis and infection. Suspicion of obstruction

may be confirmed by syringing, Jones test and dacryocystorhinography (DCG).

Classically, DCR been performed by using an external approach. This was first described by Addeo Toti in 1904.¹ Alternative pathway of DCR by intranasal route was described by Caldwell in as early as 1893.² It was modified by West in 1910.³ Later on, the introduction of rigid nasal endoscopes enabled an endoscopic approach.

McDonogh and Meiring first described endoscopic intranasal DCR in 1989.⁴

Although external DCR is still regarded as gold standard, endoscopic DCR is evolving as an equally effective alternative in the recent past.⁶ Various studies have showed that success rate for both procedures ranges from 63% to 97%.^{7,8} The wide range of success rate is likely due to surgical variability, patient demographics and lack of standardized outcome measures.⁶ With this background, the present study was done with the aim to compare the results and advantages of external and endonasal endoscopic DCR regarding the patency rate, patient compliance and intraoperative and postoperative complications.

Materials and Methods

This was a prospective, non-randomized study, conducted in the Department of Otorhinolaryngology, in conjunction of Department of Ophthalmology at MLB Medical College, Jhansi, UP, India for period of 2 years. A total 80 cases were taken. External DCR was done in 30 patients whereas endoscopic DCR was done in 50 patients. All patients were followed up to a minimum of 6 months, at 1 month, 3 months and 6 months interval.

Patency of the stoma was checked syringing of the lacrimal pucta. In all cases, dtailed history were taken. The preoperative diagnosis for the level of blockage was based on syringing test and infusion of fluorescein in the conjunctiva of lacrimal canaliculus (Jones test) with observation of stained nasal drainage. Patients with suspected canalicular obstruction were further investigated by dacryocystography to confirm this.

All external DCR operations were done under local anaesthesia whereas endoscopic DCR operations were done either under general anaesthesia or local anesthesia according to the compliance of patients.

The outcome of external and endoscopic DCR was categorized into complete cure or no improvement according to the degree of symptomatic relief following the operation.

Failure was defined as no symptomatic reduction of epiphora, inability to irrigate the lacrimal system postoperatively and/or postoperative nasal endoscopy with scarring in the intranasal osteotomy or no visualisation of fluorescein dye.

Data regarding surgical outcome and complications were analyzed and compared using Chi-Square test. The results were considered statistically significant at $P < 0.05$.

Results

In this study, total 80 patients were included. Out of which 50 had undergone endoscopic DCR and 30 had external DCR.

The commonest indication for DCR was epiphora. Fifty-eight eyes (72.5%) out of 80 presented with symptoms of lacrimation, 17 eyes (21%) had mucocoele at the time of presentation along with epiphora and five patients were diagnosed as having acute dacryocystitis preoperatively on the basis of symptoms and 3 were treated medically before External DCR, but 2 pateints having acute dacryocystitis were directly operated endoscopically without any any prior treatment. The result was equally good wihout any complication.

The average duration for endoscopic DCR surgery was 50 minutes and 120 minutes for external DCR ($P < 0.001$). The minimum time taken for endoscopic surgery in all groups was 30 minutes and maximum was 60 minutes. The minimum and maximum time for external DCR was 90 minutes and 150 minutes, respectively. The difference in duration of surgery between the groups was statistically significant.

Complication rate was low in both types of surgery. Complication included excessive intraoperative bleeding which was seen in 10 and 1 cases of external and endoscopic DCR respectively. Two patients had lacrimal sac flap loss during separation of sac from lacrimal fossa in External DCR. There were no such complications noted in Endoscopic DCR surgery. The difference in intraoperative bleeding between the groups was highly significant.

Table 1: Intraoperative bleeding associated with endoscopic and external DCR.

Intra operative bleeding	Endoscopic DCR		External DCR	
	No.	Percentage (%)	No.	Percentage (%)
Massive	1	2	10	33.3
Moderate	9	18	18	60
Minimum	40	80	2	6.7
Total	50	100	30	100

The average follow up period was 6 months. In endoscopic DCR group, out of 50 cases, 45 cases (90%) demonstrated primary surgical success, which is defined as decreased or absent epiphora and adequately patent lacrimal system in 1st month of follow-up period. However, at 6 month of follow-up, 48cases (96.7%) out of 50 ultimately had a successful surgical outcome in endoscopic DCR.

In external DCR group, 28 cases (93.3%) out of 30 cases had patent lacrimal passage and two presented with functional block after 1 month. During follow-up period at 3rd month and 6th month patency of lacrimal passage maintained in external DCR groups was same as 1st month. This difference was not statistically significant ($P = 0.609$)

In the first postoperative week, 92% of External-DCR patients were unhappy with the cosmetic result whereas this ratio was only 2 % in Endoscopic-DCR patients ($P < 0.001$).

In the first postoperative month, 60% of External-DCR patients and 4% of Endoscopic-DCR patients complained of pain, so Endoscopic-DCR group resulted in significantly less amount of pain in first postoperative month ($P < 0.05$).

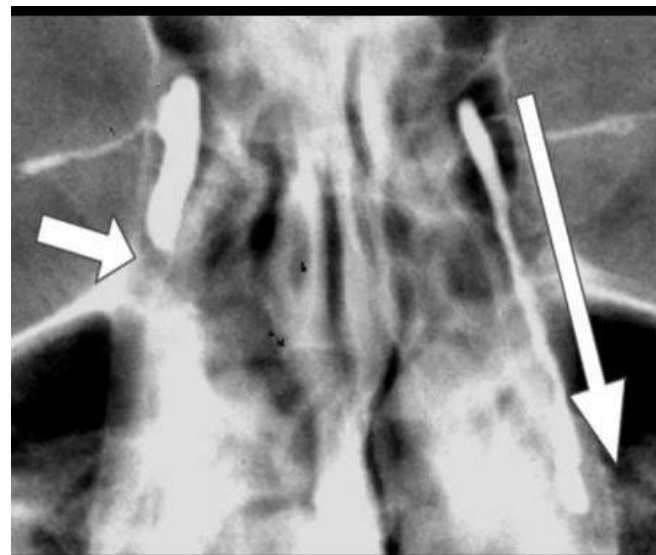
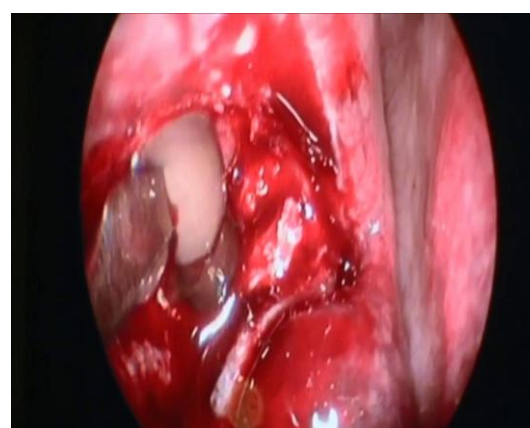


Fig-1. Dacrocystogram showing Right side nasolacrimal duct blockage. Left side normal Drainage.



Open DCR



Endoscopic view of Lacrimal Sac

Table 2 Summary of the study results.

	External DCR	Endonasal DCR
Surgical time (min)	120	50
Symptomatic relief (score out of 4)	3.45	3.43
Fluorescein in nose (functional success)	90.9%	91.3%
Intra-op hemorrhage excess	33%	2%
Infection	4.5%	Nil
Wound dehiscence	Nil	Nil
Duration of follow-up (months)	6	6
External scar after 6 months	70%	nil
Patient satisfaction (out of 10)	7.5	9.8

Discussion

External DCR surgery was regarded as the gold standard in treatment for nasolacrimal duct obstruction.⁹ This procedure has got advantages of direct visualization of the anatomical structures surrounding the lacrimal sac compared to endoscopic DCR.⁶ Disadvantages of this procedure includes cutaneous scar and the potential for injury to medial canthal structures, cerebrospinal fluid rhinorrhoea and functional interference with the physiological action of lacrimal pump.¹⁰

However, endoscopic DCR is getting popularity among patients due to equal promising results and especially due to lack of external scar.⁶ Endoscopic DCR allows direct inspection of lacrimal sac for underlying pathology. Assessment of failure can also be viewed endoscopically, so mistakes can be corrected immediately. Revision surgery can also be done successfully. It can also be combined with FESS and endoscopic septoplasty if indicated.

Our study was a prospective, non-randomized study done on 80 patients presented with epiphora or chronic dacryocystitis. In our study, female to male ratio was 2.69:1. This shows that the nasolacrimal sac and duct obstruction is more common in females than males. This result corroborates with previous studies.^{12,13,14}

The mean age of the patients who underwent endoscopic DCR was 33.6 years compared to external DCR group, which was 46 years. This indicates that acquired nasolacrimal duct

obstruction is more common in middle age group. There is a declining trend towards both extremes of age. This may be due to the fact that amount of lacrimal secretion is less in extremes of ages. Similar data was found by many previous workers.^{6,14,15,16} However, few workers found that the mean age group is slightly more than our findings.^{5,9,13,17}

In our study, epiphora was the commonest presenting symptom as found in similar studies.^{9,19,20} Lacrimal irrigation and Jone's dye test were done in patients presented with epiphora to determine the level of obstruction. Eighty percent eyes presented with epiphora and mucocele, had lacrimal sac and nasolacrimal duct obstruction; and remaining cases had canalicular obstruction.

Complication rate was low in both types of surgery. Complication of excessive intraoperative bleeding occurred in external DCR was 10 (33.3%) and in Endonasal Endoscopic DCR was 1 (2%) cases. This finding corroborates with study done by Moras *et al.*¹⁴ Again, in a study of 79 external DCRs, 14 patients had postoperative haemorrhage compared to 0 out of 51 patients in the endoscopic DCR group.²³

Other complications included lacrimal sac flap loss during separation of sac from lacrimal fossa and loss of nasal mucosa during cutting in external DCR. There were no such complications noted in endoscopic DCR surgery. However, there were no episodes of orbital hematoma, diplopia and cerebrospinal fluid (CSF) leakage in both groups in our study.

The average follow up period was 6 months in our study. The primary surgical success rate in endoscopic DCR group was 96.7% and in external DCR group was 93.3% after 6 months of follow-up period. This difference was not statistically significant ($P = 0.609$).

The success rate for endoscopic DCR appears to be comparable to the “gold standard” external approach, with success rate ranging from 78% to 97%.^{24,25} Our success rate in both group is comparable to various studies.

Endoscopic Endonasal DCR can be performed in acute cases of Dacryocystitis, without any complications whereas to perform Open DCR, surgeon needs to wait for the acute infection to subside.

Our study had some limitations. Our study was a hospital-based study, which caused some bias in patient selection. The study period is also short. There is a difference in age group between the patients of endoscopic and external DCR. This may affect the surgical outcome which is a limitation of our study. Again as the endoscopic and external DCR procedures were performed by different surgeons, which may also affect the surgical outcome. This is also a limitation of our study.

Conclusion

DCR is the treatment of choice for nasolacrimal duct obstruction. It can be performed by external or endoscopic approach. Both these approaches have minimal complications and comparable surgical outcome. This indicates that these two DCR techniques are acceptable alternatives. So it can be concluded that endoscopic DCR is a safe, minimally invasive effective day care technique with a good aesthetic result and the choice of surgery should depend upon patient's preference, availability of resources and surgeon's expertise.

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