

**EXTERNAL DACRYOCYSTORRHINOSTOMY VERSUS ENDOSCOPIC
ENDONASAL DACRYOCYSTORRHINOSTOMY**Vijay Joshi¹, G. S. Titiyal², Swati Gupta³, Kavita Lohani⁴**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: The objective of present study was to compare the results of endonasal endoscopic dacryocystorhinostomy and external dacryocystorhinostomy. It was a prospective study. Forty two consecutive patients having complaints of epiphora, swelling near medial canthus, angular conjunctival congestion, with naso lacrimal duct obstruction were selected for the study. Selection of type of operation was left to the patient's choice. All patients had preoperative counseling and both the procedures were explained in detail with their advantages and disadvantages. Twenty two patients underwent endonasal dacryocystorhinostomy and twenty had external dacryocystorhinostomy. The follow-up was done at 7th, 21st, & 3 months after surgery. The patency of lacrimal passage was confirmed by syringing and patients were questioned about their symptoms. There was no significant difference in the results of both surgeries. The complication rate in both groups was almost equal. Thus we came to the conclusion that these two different dacryocystorhinostomy techniques are acceptable alternative. Success of external DCR & endonasal DCR based on patency of passage on 3rd month was 85% & 81.8% respectively.

KEYWORDS: Chronic dacryocystitis, Nasolacrimal duct, External dacryocystorhinostomy, Endonasal endoscopic dacryocystorhinostomy.

INTRODUCTION: Tears from the conjunctival sac pass through the lacrimal puncta in the upper and lower lids to the upper and lower lacrimal canaliculi, then to the common canaliculi to empty into the lacrimal sac located in the lacrimal fossa. From the lacrimal sac, tears pass to the nasolacrimal duct (NLD) along the lateral wall of the nose to open at the inferior meatus. Obstruction anywhere along this course can result in symptomatic epiphora.¹ A persistent symptomatic nasolacrimal duct obstruction is a very common disorder sparing no specific age group.

A study showed that the incidence of NLD obstruction was 20.24 per 100 000 in Olmsted County, Minnesota from 1976 to 2000.²

The most common symptoms of acquired NLD obstruction are epiphora and acute or chronic dacryocystitis. Epiphora caused by lacrimal duct obstruction is a common ophthalmologic problem and accounts for approximately 3% of all ophthalmologic clinic visits.³

There may be swelling at the site of the sac (mucocele), and the neighboring parts of the conjunctiva are frequently inflamed, due to nasolacrimal duct obstruction. Bacteriological examination of the fluid from the sac, collected due to NLD obstruction, demonstrates the presence of an extraordinary number of bacteria-staphylococci, pneumococci, streptococci. This fact is of considerable importance since it explains the frequency with which a hypopyon, ulcer arises in these cases and the danger of panophthalmitis if any intraocular operation is undertaken. Dacryocystitis secondary to NLD obstruction is a constant menace to the eye since minute abrasions is liable to become infected and give rise to an ulcer.⁴

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Dacryocystitis may complicate to orbital cellulitis, leading further to even meningitis, so warrants proper management.^{4,5}

Chronic epiphora, secondary to NLD obstruction beyond age of 3 years would necessitate a DCR. A DCR should not be performed earlier as the bones are not adequately developed till then ⁴. Dacryocystorhinostomy (DCR) has been established as the prevailing procedure for acquired NLD obstruction.⁶ DCR is a surgical method that allows the direct drainage of tears from the lacrimal sac into the nasal cavity, bypassing the blocked NLD. There are two main types of DCR, namely external DCR and endonasal DCR.

The basic indication is same in all cases and either route can be used. External DCR was first described in 1904 by Toti and the modified version by Dupuy-Dutemps and Bourguet has remained the gold standard in the treatment of acquired NLD obstruction.⁷ The procedure entails a skin incision and drilling or rongeur the bone of the anterior lacrimal crest and lacrimal sac fossa to reach the lacrimal sac.⁸

The advent of the nasal endoscopes brought fresh consideration to lacrimal sac surgery. It became possible to approach the operation area from nasal side, thereby, avoiding facial scarring and unnecessary dissection of both orbicularis oculi and orbital periosteum. Thus, endoscopic surgery provided a new alternative for the treatment of naso-lacrimal duct obstruction.

Caldwell first described endonasal DCR in 1893 and West and Halle later modified it⁹ Endonasal DCR can be carried out in various ways, either with or without the help of an endoscope; and with the use of different equipment such as rongeur, drill, chisel and various types of lasers.^{10,11} McDonogh and Meiring first used endoscopes in transnasal DCR in 1989.¹² In our study the endonasal DCR was done with use of endoscopes.

AIM OF THE PRESENT STUDY:

1. To study the outcome of external dacryocystorhinostomy.
2. To study the outcome of endoscopic endonasal dacryocystorhinostomy.
3. To compare the outcome of external dacryocystorhinostomy with that of endoscopic endonasal dacryocystorhinostomy.
4. To study the advantage or disadvantage of the two procedures over each other.
5. To study demographic, other causes of chronic dacryocystitis.

No such type of study has been carried out in the study area. So, in view of public health importance, this study will provide important information at Dr. Susheela Tiwari Government Hospital, Haldwani, Uttarakhand.

METHODS AND MATERIALS:

PLACE OF STUDY: Department of Ophthalmology & ENT department, Dr STM hospital Haldwani.

PERIOD OF STUDY: June 2011 to June 2012.

STUDY DESIGN: Prospective study.

STUDY POPULATION: We included participants of age group >3yr diagnosed with primary post-canalicular obstruction of the lacrimal passages.

We excluded studies that included participants who had previous surgical procedures to the lacrimal apparatus.

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STUDY PROCEDURE: A prospective study was conducted on patients from June 2011 to June 2012. These patients were seen in our outpatient department or were referred from other departments as case of epiphora. Patients who had the symptoms of epiphora and mucopurulent regurgitation on pressure over medial canthus and a block in the nasolacrimal duct, which was confirmed by sac syringing, were selected for our study.

Patients reporting to ENT OPD were examined pre operatively and followed post operatively.

A DETAILED HISTORY AND SYSTEMIC EXAMINATION OF PATIENTS WAS DONE WITH SPECIAL REFERENCES TO THE FOLLOWING POINTS:

1. Mode of presentation
2. Predisposing factors
3. History of previous DCR done
4. Site of block

A THOROUGH CLINICAL EXAMINATION INCLUDED: EXAMINATION OF EYE: Regurgitation of discharge on pressure over medial canthus Swelling over the medial canthus, tenderness

Scar over the skin

Fistula near the canthus

Visual acuity, sac syringing, extraocular mobility

EXAMINATION OF NOSE & SINUSES:

DNS Polyps Adhesions Atrophic rhinitis.

TYPES OF INTERVENTIONS: Dacryocystorhinostomy involves the creation of an alternative route for drainage of tears, between the lacrimal sac and nasal cavity, bypassing the nasolacrimal duct.

- This can be done either by an external approach (External DCR/conventional) or through the nasal cavity using an endoscope (Endonasal DCR).

PROCEDURES: A. EXTERNAL DCR:

1. Surgery was performed under local anesthesia with sedation, if required.
2. Incision was taken over anterior lacrimal crest.
3. Medial palpebral ligament was identified and orbicularis oculi was separated.
4. Reflection of periosteum and dissection of lacrimal sac from lacrimal fossa was done.
5. Sac was excised to make 'H' shaped anterior and posterior flaps.
6. Bony osteum of sufficient size was made with bone punch.
7. Nasal mucosa was cut to make anterior and posterior flaps.
8. Subsequently anterior to anterior and posterior to posterior flaps were sutured with 2 to 3 interrupted sutures by 6-0 vicryl.
9. Skin sutured with 6-0 monofilament polyamide.

B. ENDOSCOPIC DCR

1. Surgery usually performed under general anaesthesia.
2. Dye (methylene blue) is passed through the lacrimal puncta and canaliculi into the lacrimal sac and viewed from within the nasal cavity with an endoscope. The remainder of the procedure is performed via the nose.

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3. The mucosa over the frontal process of the maxilla is stripped.
4. A part of the nasal process of the maxilla is removed.
5. The lacrimal bone is broken off piecemeal
6. The lacrimal sac is opened.
7. Thus, the nasolacrimal duct is bypassed in the drainage of the tears.

SELECTION CRITERIA FOR CASES WITH NLDO:

INCLUSION	EXCLUSION
<ul style="list-style-type: none"> • All symptomatic cases of Epiphora/Mucocele/Angular conjunctival congestion of age >3 years who were diagnosed for primary nasolacrimal duct obstruction or chronic dacryocystitis as evidenced by syringing. • Those who give consent to undergo surgery. 	<ul style="list-style-type: none"> • Previous DCR to same eye. • Age < 3 years. • Canalicular obstruction. • Common canalicular obstruction • Lacrimal sac obstruction due to tumors. • Patients with an acute attack of dacryocystitis within last month. • Sino-nasal abnormalities like deviated nasal septum, polyposis, hypertrophied turbinates, tumor causing NLD obstruction • Cases with ectropion or entropion. • Cases with noticeable lower lid laxity.

TYPES OF OUTCOME MEASURES PRIMARY OUTCOMES:

SUCCESS	FAILURE
Patency on Syringing on day 1, 7, 21 & 3rd month. Resolution of symptoms Improvement of symptoms	Obstruction on syringing No visualization of fluorescein in dye disappearance test Persistent symptoms Requiring revision or adjuvant intervention

SECONDARY OUTCOMES: We collected and collated data on the following adverse events for the two types of interventions.

1. Hemorrhage requiring intervention:
 - Intra operatively;
 - In the immediate postoperative period (within seven days).
2. Infection.
3. Wound dehiscence (break down).

RESULTS: With the study done we get the following results:

A total of 42 patients underwent DCR procedure out of which 20 patients opted for external DCR & 22 patients underwent endoscopic DCR.

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Male: female ratio was 1:3. Thus incidence was more in females as confirmed by studies by Jokinen (1974) & Sprekelson (1996). Left eye (50%) was found to be more involved in 50 % patients as compared to right eye in 43% patients where as 7 % patients had bilateral involvement.

Age (year)	No. of patients	External DCR	Endonasal DCR	Test of significance
	Total	No. (%)	No. (%)	
3-13	1	0(0.0)	1 (4.5)	$\chi^2=4.9$ DF=6 p= 0.5
14-23	4	2 (10.0)	2 (9.1)	
24-33	9	5 (25.0)	4 (18.2)	
34-43	14	5 (25.0)	9 (40.9)	
44-53	6	2 (10.0)	4 (18.2)	
54-63	3	2 (10.0)	1 (4.5)	
>64	5	4 (20.0)	1 (4.5)	
Total	42	(100.0)	22(100.0)	

Incidence was found to be max in age group 34-43 years followed by age group 24-33 yrs. 81 % patients presented with epiphora. Swelling near the medial canthus was found in 14.3 % patients. Angular conjunctival congestion was seen as a less common presentation in 4.8 % pts.

Association with literacy status was also considered. 42.9 % patients had literacy status below 5th standard whereas only 7.2 % patients were graduate or better educated. This is secondarily associated with better health hygiene and early approach to doctor in educated patients than the less educated ones.

67 % patients belong to village, where they don't have better access to health facilities, and therefore present late and with complications, whereas 33% patients were from city and local adjoining area.

85.7 % patients were Hindus and only 14.3 % patients were Muslim by religion. (Fisher's Exact test, P=0.1).

An inverse relation was seen between socioeconomic status and the disease. 69% belong to lower/ lower middle class and whereas only 4.8% patients belonged to upper class according to modified BJ Prasad classification.

Surgical success was considered after syringing at the end of 3 months. 85% patients who underwent external DCR showed patent passage at end of 3 months which was comparable with endoscopic DCR where surgical success was seen to be 81.8 %.

Surgical results Passage patency	External DCR (20)	Endonasal DCR (22)	Test of significance
	No. (%)	No. (%)	
Syringing day 7	20 (100.0)	21 (95.4)	(Fisher's Exact test) P=1
Syringing day 21	18 (90.0)	19 (86.4)	(Fisher's Exact test) P=1
Syringing day 3rd month	17 (85.0)	18 (81.8)	(Fisher's Exact test) P=1

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Secondary complications, as hemorrhage, infection and wound dehiscence was seen in 1 patient each who underwent external DCR whereas no wound dehiscence was seen in cases of endonasal DCR. 1 patient each had hemorrhage and infection. (Fisher's exact test, P=1)

88 % patients had fast recovery and slow rehabilitation was seen in just 12 % pts. After surgical intervention is studied and evaluated under following criteria's:

1. **Pain:** After 12 hours of surgery for which oral/ IV medication is taken.
2. **Periorbital/nasal swelling:** Persisting even after 12 hours of surgery.
3. **Wound gapping/ abscess:** Seen in and around wound after 1 week of surgery.
4. **Nasal bleeding:** For which active intervention in terms of operative/ medical management is taken after 12 hours of surgery.

If in a patient

3/ >3 criteria are present - Slow Rehabilitation.

2/ <2 criteria are present - Fast Rehabilitation.

Criteria	External DCR	Endonasal DCR	Total	Test of significance (Fisher's Exact test)
	No. (%)	No. (%)	No. (%)	
Slow Rehabilitation	3 (15.0)	2 (9.1)	5(11.9)	P=0.6
Fast Rehabilitation	17 (85.0)	20 (90.9)	37(88.1)	
Total	20 (100.0)	22(100.0)	42(100.0)	

DISCUSSION: Chronic Dacryocystitis, a smoldering low grade infection ultimately lead to total nasolacrimal duct (NLD) obstruction. DCR is the treatment of choice for Chronic Dacryocystitis.^{6, 13}

External DCR surgery is regarded as the gold standard in treatment for nasolacrimal duct obstruction. The advantage for this procedure lies in its predictability of success and direct visualization of the anatomy compared with a nasoendoscope. However, the procedure leaves a cutaneous scar and the potential for injury to medial canthal structures, cerebrospinal fluid rhinorrhea, and functional interference with the physiological action of the lacrimal pump¹⁴. Both the procedures either external or endoscopic DCR is indicated for obstruction beyond the medial opening of the common canaliculus (i.e., the canalicular system is patent).¹⁵

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 endoscopic approach has a reduced risk of interfering with the medial canthal tendon and physiology of the lacrimal pump mechanism. There is the advantage of no external scar, providing a desired cosmetic effect for patients¹⁶. More importantly endoscopic endonasal DCR surgery has been shown to have earlier postoperative recovery time & rehabilitation, as also seen in our study.^{17, 18}

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Tsirbas and Wormald used a technique in endoscopic DCR to fully expose the lacrimal sac and marsupialize it into the lateral nasal wall with nasal and lacrimal mucosa in apposition. They achieved success rate of 89% with this approach.^{19, 21} In this study success rate was 73.3% with endoscopic approach and 80% with external approach. Karim et al has carried out a recent study which showed both the approaches had similar success rates (endoscopic endonasal DCR 82.4% versus external DCR 81.6%; $p=0.895$).²² The success rate of ExDCR has been mentioned as 80% to 99% by Hartikainen et al, (1998).²³

In our study 85% patients who underwent external DCR showed patent passage at end of 3 months, whereas, in endoscopic DCR surgical success was seen to be 81.8 %. The results are in correlation with studies done by previous authors & support their results.²⁴⁻²⁷ Out of 42 patients, 88 % patients had fast recovery and slow rehab was seen in just 12 % pts., of which 91% (20 out of 22) who show faster rehabilitation had undergone endonasal DCR, and 85% (17 out of 22) had undergone external DCR, as seen in studies of Metson R & Watters GWR.¹⁷⁻¹⁸ Male: female ratio was 1:3. Thus incidence was more in females as confirmed by studies by Jokinen (1974) & Sprekelson (1996).²⁸ The striking predilection for females can be explained by the narrower lumen of the bony naso-lacrimal canal. It is also possible that endocrine factors may be playing a role in the etiology of chronic dacryocystitis.

Eye involved	External DCR	Endonasal DCR	Total	Test of significance
	No. (%)	No. (%)	No. (%)	
Right eye	8 (40.0)	10 (45.5)	18 (42.9)	$\chi^2=0.5$ DF=2 p= 0.7
Left eye	11 (55.0)	10 (45.5)	21 (50.0)	
Both eye	1 (5.0)	2 (9.0)	3 (7.1)	
Total	20(100.0)	22(100.0)	42(100.0)	

We found chronic dacryocystitis to be more common in the lower socio-economic groups, maximum incidence was seen in the 3rd and 4th decades of life, same as seen in Kuldeep Moras study.²⁹

CONCLUSION: Dacryocystorhinostomy is the treatment of choice for Chronic Dacryocystitis. There was no statistically significant difference between endoscopic and external DCR. Both the procedures (external & endonasal endoscopic) have some advantages and disadvantages. Complication rates are low in both procedures. However, in external DCR the success rates are marginally higher but the endoscopic DCR has an important advantage of not having external scar & early post-operative rehabilitation. The choice in regards to surgical technique should depend upon patient's preference, availability of resources and surgical expertise, explaining the patient well about the advantages and disadvantages of each technique.

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