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A Comparative Study of External and Endoscopic Endonasal Dacryosystorhinostomy

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Abstract
Purpose: *To compare the results of Endoscopic Endonasal DCR with External DCR.*
Methods*: All patients with the symptom of epiphora from period between June,2016 to june , 2018 were included*
Results: *Of total 60, 30 operated for external DCR & 30 for endoscopic DCR. At 6 months postop, success rate of external DCR was 85%, whereas, it was 81.8 % of endoscopic DCR.*
Conclusion: *No statistically significant difference noted between these procedures with low complication rates. However, endoscopic DCR has an important advantage of not having external scar & early post operative rehabilitation.*
Key words: *External DCR, Endoscopic DCR, Epiphora*

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I. Introduction

Obstruction of the nasolacrimal pathway is a common disorder, especially in elderly patients, clinically manifested by the presence of tearing and/or infection . It is the commonest symptom of lacrimal disorders. It can be extremely troublesome and a source of social embarrassment.[1,2,3]

Epiphora is defined as overflow of tears results in "watering eye".Epiphora is a coconsequence of either excessive production of tears or their inadequate drainage. True epiphora refers to watering due to obstruction in the tear drainage pathway and it must be differentiated from lacrimation and pseudoepiphora. Lacrimation is a condition in which watering occurs secondary to excessive tear production in presence of normal excretory system wheares in pseudoepiphora there is excessive watering due to hyperlacrimation .[4,5,6]

Epiphora may be classified as a physiological epiphora (non obstructive epiphora) or anatomical epiphora (obstructive epiphora). Physiological causes includes Lacrimal pump failure either due to Lower lid laxity or Weakness of Orbicularis muscle . Anatomical causes inclde Complete or partial obstruction at punctum , canaliculi , lacrimal sac or NLD.[7,8,9]

There are various NLD causes of epiphora which includes congenital , acquired and nasal causes. Congenital causes include Non-canalization, Partial canalization, Imperforated membranous valves and agenesis of NLD. Acquired causes includes Traumatic strictures, inflammatory strictures, idiopathic stenosis and tumors of NLD. Some nasal conditions also contribute for NLD obstruction like severe DNS and turbinate hypertrophy. In the majority of cases the cause of obstruction is unknown. Such idiopathic obstruction becomes more common with increasing age and shows a female preponderance. Other less common causes include surgical trauma, midfacial fracture, malignancy and granulomatous conditions, such as Wegener's granulomatosis and sarcoidosis. The incidence of nasolacrimal duct obstruction is estimated to involve approximately 10 percent at 40 years increasing to 35-40 percent at 90 years of age.[10,11]

NLDO causes inflammation of the lacrimal sac known as dacryocystitis. It generally affects two age groups, infants and adult females over 40 years of age. Congenital dacryocystitis is almost always chronic, while acquired dacryocystitis may be acute or chronic. Chronic dacryocystitis is the common form of dacryocystitis which arises from nasolacrimal duct occlusion. While obstruction of the nasolacrimal duct may present with epiphora, it may also present with a mucocele, pyocele or recurrent acute dacryocystitis.[12,13,14]

The definitive treatment for chronic dacryocystitis is DCR surgery in which the patency of the nasolacrimal pathway is restored. There are two main types of DCR, namely external DCR and endoscopic endonasal DCR. External DCR was first described in 1904 by Toti and the modified version by Dupuy-Dutemps and Bourguet in 1921.The same remained the gold standard in the treatment of acquired NLD obstruction. In this procedure anastmosis is made between lacrimal sac and nasal mucosa via bony osteum.[5] This procedure has some complications in form of wound dehiscence, wound infection, excessive bleeding, granuloma formation, rhinostomy fibrosis, webbed facial scar, medial canthal distortion and failed DCR .[15,16]

Then endosnasal endoscopic approach came in existence which was first described by Caldwell in 1893, and later in 1911 by West. Endoscopic dacryocystorhinostomy is becoming more popular, compared with conventional external dacryocystorhinostomy. The principal advantage of this technique is that it is performed endoscopically through the nose and does not require an external skin incision.[17.18]

In Present study an effort was made to is compare the results of Endoscopic Endonasal DCR with External DCR.

II. Materials And Method

Place of Study

Department of Ophthalmology & ENT department, JLN Medical College & Hospital, Ajmer (Rajasthan), India.

Source of Data

All patients attending ophthalmology OPD at JLN Medical College & Hospital, Ajmer for the symptom of epiphora from period between June 2017 to June 2018.

Study Design

It was a Prospective , randomized comparative study.

Sample Size

60 cases of epiphora which fulfills the inclusion and exclusion criteria were taken for external dacryocystorhinostomy and endonasal endoscopic dacryocystorhinostomy randomly from the period of June 2017 to June 2018 as a time bound study. (Approximately 60 cases i.e. 30 cases for each by hospital statistics).

Statistical Analysis

Descriptive statistics included computation of percentages, means and standard deviations. The independent t test (for quantitative data within two groups) was used for quantitative data. Chi-square test used for qualitative data whenever two or more than two groups were used to compare. Level of significance was set at $P \leq 0.05$.

A written fully explained consent stating the voluntary participation of subjects in the study was taken before the enrollment of the subjects.

Eligibility Criteria

Inclusion Criteria

1. All symptomatic epiphora cases diagnosed for primary acquired nasolacrimal duct obstruction or chronic dacryocystitis.
2. Those who were willing to undergo surgery.

Exclusion Criteria

1. Ectropion / Entropion / Lower lid laxity
2. Canalicular and punctal obstruction.
3. Post traumatic bone deformity.
4. History of radiation therapy.
5. Some nasal conditions like atrophic rhinitis, sino-nasal malignancy, nasal polyps and chronic granulomatous conditions etc.
6. Systemic condition like bleeding manifestations, patient on chronic anticoagulant & aspirin therapy, ischaemic heart disease uncontrolled hypertension and haemodynamicaly unstable patients.

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

Types of Outcome Measures

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

III. Results

In the present study, 60 cases were enrolled for DCR. These cases were further randomized into two groups: group I and group II. There were 30 cases in Group I for external dacryocystorhinostomy with and 30cases in Group II for endonasal endoscopic dacryocystorhinostomy .

Male: female ratio was 1:2.Thus incidence was more in females as confirmed by studies by Jokinen (1974) & Sprekelson (1996). Left eye was found to be more involved in 53.3 % patients as compared to right eye in 40% patients where as 6.67 % patients had bilateral involvement.

Age Distribution

			Groups		Total
			External DCR	Endonasal DCR	
Age	10-20	N	0	0	0
		%	0%	0%	0%
	21-30	N	4	5	9
		%	13.3%	16.7%	15.0%
	31-40	N	4	10	14
		%	13.3%	33.3%	23.3%
	41-50	N	6	6	12
		%	20%	20%	20%
	51-60	N	6	3	9
		%	20%	10%	15%
	>60	N	10	6	16
		%	33.4%	20.0%	26.7%
mean±SD			49.2±18.81	44.83±19.16	
Total		N	30	30	60
		%	100.0%	100.0%	100.0%

X^2=4.96, df=5, p value=0.42

Incidence was found to be max in age group >60 years of age followed by age group 31-40 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 presented late and with complications, whereas 33% patients were from city and local adjoining area.

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.

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 of both procedures

Passage patency	External DCR (30)	Endonasal DCR (30)	Test of significance
	No. (%)	No. (%)	
Syringing at day 7	30 (100.0)	29 (96)	(Fisher's Exact test) P=1
Syringing at 1 month	27(90.0)	26 (87)	(Fisher's Exact test) P=1
Syringing 3 month	26 (87.0)	25(85)	(Fisher's Exact test) P=1
Syringing at 6 month	25(85)	24(81.8)	(Fisher's Exact test) P=1

External DCR groups recorded more complication i.e. excessive bleeding (60%) followed by lacrimal sac flap loss (23.3%) and loss of nasal mucosa during bone removal (13.35) while endonasal groups have less complications in 36.6% in form of excessive bleeding which was statistically non-significant.

IV. 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.] 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 pump [14]. 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 patients [16]. More importantly endoscopic endonasal DCR surgery has been shown to have earlier postoperative recovery time & rehabilitation, as also seen in our study.[17, 18] In our study 85% patients who underwent external DCR showed patent passage at end of 6 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.[17-18.]

V. 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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