Original Article

External Dacryocystorhinostomy Versus Endoscopic Dacryocystorhinostomy: A Comparison

Ophthalmology Section

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ABSTRACT

Toti's technique of external dacryocystorhinostomy (DCR) has been the treatment of choice for epiphora due to nasolacrimal duct obstruction since 1904. With the introduction of rigid nasal endoscopes in the 1970s and the advent of endoscopic sinus surgery, intranasal endoscopic dacryocystorhinostomy has come into existence. This study compares the outcome of external dacryocystorhinostomy with endoscopic endonasal dacryocystorhinostomy. 40 patients who were diagnosed with primary acquired nasolacrimal duct obstruction or chronic dacryocystitis were included in the study. They were randomized into two groups. Group I included 20 patients who underwent external dacryocystorhinostomy and group II included the rest of the 20 patients who underwent endoscopic endonasal dacryocystorhinostomy. Although both the procedures had a success rate of 90%, endoscopic DCR was helpful in avoiding a scar on the face and injury to the neighbouring structures like the medial palpebral ligament and the angular facial vessels. The surgical duration for endoscopic DCR was short as compared to that of the external approach.

Our study concludes that endoscopic DCR is as good as external DCR for the treatment of primary nasolacrimal duct obstruction and chronic dacryocystitis.

Key Words : Endoscopic dacryocystorhinostomy, external dacryocystorhinostomy.

INTRODUCTION

Chronic dacryocystitis is defined as the chronic inflammation of the lacrimal sac due to stricture of the nasolacrimal duct secondary to chronic inflammation, which is usually nasal in origin. The essential symptom is epiphora, which is aggravated by conditions such as exposure to wind. There may be swelling at the site of the sac (mucocele), and the neighbouring parts of the conjuctiva are frequently inflamed. On applying pressure over the sac, mucopus or sometimes frank pus regurgitates through the puncta. The bacteriological study of the fluid demonstrates the presence of a number of bacteria, both aerobic and anaerobic. The diagnostic procedures include lacrimal probing, lacrimal irrigation, dacryocystography, the jones dye test, the fluorescein test and radionuclear cystography. Appropriate clinical and radiographical testing when indicated, will aid in the diagnosis of dacryocystitis.

For over a century, the gold standard of treatment for epiphora due to nasolacrimal duct obstruction has been dacryocystorhinostomy. It was Toti, who in 1904, reported this procedure for external dacryocystorhinostomy. He made a hole in the lacrimal sac and another hole in the nose and approximated the two with a tight pressure bandage.[1] This operation has got refined over the years into the present day external dacryocystorhinostomy. Since the time of Toti, the only major advance in the technique has been the use of a sialastic tubing.

Endonasal dacryocystorhinostomy procedures were first described in 1893 by Caldwell, in which a portion of the inferior turbinate was removed and the nasolacrimal duct was followed till the lacrimal sac[1].

With the advent of rigid nasal endoscopes in the 1970s, the intranasal endoscopic approach to the lacrimal sac was feasible. A cadaveric study demonstrating endoscopic intranasal dacryocystorhinostomy was reported by Rice in 1988, followed by a review of 4 patients in 1990.[2] The first clinical study on endoscopic intranasal dacryocystorhinostomy was published by Mc Donagh and Meiring in 1989.[3]

Many variations of endoscopic dacryocystorhinostomy with little modificationslike the use of stents, laser and mitomycin-C have been described in the last decade, withequally good results.

Although Toti's operation of external dacryocystorhinostomy has in good hands, a success rate of about 90%, endoscopic dacryocystohinostomy is gaining popularity as there is no facial scar and no disruption of the medial palpebral ligament or the angular facial vessels.

This study compares the outcome of external dacryocystorhinostomy with that of endoscopic endonasal dacryocystorhinostomy.

AIMS OF THE 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.

MATERIALS AND METHODS

The Present Study: "External dacryocystorhinostomy versus endoscopic endonasal dacryocystorhinostomy: A Comparison", was conducted in the Department of Otorhinolaryngology, Fr. Muller Medical College Hospital, Mangalore.

Source of data: The patients attending the opthalmology and the ENT out patient departments of Fr. Muller Medical College Hospital, Mangalore, who were diagnosed for primary acquired

nasolacrimal duct obstruction or chronic dacryocystis by an opthalmologist.

Sample Size: The study included 40 cases who were diagnosed with primary acquired nasolacrimal duct obstruction or chronic dacryocystitis. They were randomized into two groups. Group I included 20 patients who underwent external dacryocystorhinostomy and group II included the rest of the 20 patients who underwent endoscopic endonasal dacryocystorhinostomy.

Inclusion Criteria:

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

Exclusion Criteria:

1. Cases with canalicular and punctal obstruction.
2. Cases with ectropion or entropion.
3. Cases with noticeable lower lid laxity.

METHOD OF COLLECTION OF DATA

A detailed history was taken. A thorough anterior rhinoscopy was done and any abnormalities like a deviated nasal septum, polyposis and hypertrophied turbinates were looked for. The opthalmic examination was done by an opthalmologist. The eyelids were examined for entropion, ectropion and lid laxity. The puncti were examined for their normal location and size. Any medial canthal swelling was noted. Nasolacrimal duct obstruction was diagnosed by the regurgitation of fluid into the conjunctival sac by applying pressure over the lacrimal sac area. Lacrimal sac syringing was done to confirm the diagnosis. Routine blood investigations were also done.

THE TECHNIQUE OF EXTERNAL DACRYOCYSTORHINOSTOMY

All external dacryocystorhinostomy operations were performed under local anaesthesia.

After anaesthetizing the nasal mucosa with a 10% xylocaine spray, the nasal cavity was packed with a roller gauze which was soaked in 4% xylocaine with adrenaline 1:10,000. All patients were given local anaesthesia for the sac region, consisting of 2% xylocaine with adrenaline 1:2,00,000. A curvilinear incision, 1.5 to 2cms in length, was made lateral to the angular vein, 3mm from the medial canthus. The orbicularis muscle fibers were separated. The lacrimal fascia was incised 1mm lateral to the anterior lacrimal crest and the bony attachment of the medial canthal ligament was divided. The lacrimal sac was separated from the lacrimal fossa. The lamina papyracae, the papery thin bone of the posterior half of the lacrimal fossa was fractured and the nasal mucosa was stripped from the lacrimal bone to avoid damage to it. A bony osteotomy, approximately 10mm in diameter, was created. Oozing of the blood was controlled by packing with ribbon gauze which was moistened with 2% xylocaine with adrenaline.

After anaesthetizing the eye with 4% xylocaine drops, the upper punctum was dilated and a Bowman's probe was passed through it to tent the medial sac wall. With a 11 No. Bard Parker blade, the lacrimal sac and then the nasal mucosa were opened in an "H" shaped fashion to form larger anterior and smaller posterior flaps. The anterior flaps of the nasal mucosa and the lacrimal sac were sutured by using interrupted sutures with 6.0 vicryl. The incision was closed in layers and a dressing was applied. The duration of surgery was measured from the making of the incision on the skin to the end of the closure of the skin incision by suturing.

THE TECHNIQUE OF ENDOSCOPIC ENDONASAL DACRYOCYSTORHINOSTOMY

All procedures were done under local anaesthesia. The nasal cavity was sprayed with a 10% xylocaine spray and it was packed with a roller gauze which was soaked in 4% xylocaine with adrenaline 1:10,000.

The mucosa of the lateral nasal wall was infiltrated with 2% xylocaine with 1:2,00,000 adrenaline, just anterior to the attachment of the middle turbinate. A 1x1cm piece of mucus membrane which was anterior to the uncinate process was incised and excised with a 15 No. Bard Parker blade. The lacrimal bone overlying the lacrimal sac area was removed by using punch forceps. The lacrimal sac was visualized after the removal of the lacrimal bone. More bone was removed to expose the medial wall of the sac. The lacrimal part of the fossa was removed upto the base of the uncinate process. Thus, about 1x1cm of bone was removed to expose the medial wall of the sac completely. The excessive bleeding was controlled by applying gauze strips which were dipped in a solution of 4% xylocaine with 1:10,000 adrenaline. The lacrimal sac was confirmed endoscopically by applying pressure on the outside over the medial canthus and the bulging of the sac was noticed intranasally. Externally, the eye was anaesthetized with 4% xylocaine drops, the lower punctum was dilated and a Bowman's probe was inserted in order to tent the medial wall of the sac intranasally. The tented mucosa of the sac was incised by a sickle knife and the medial wall of the sac was excised. Lacrimal sac syringing was done with normal saline and a free flow of the fluid was observed endoscopically. The nose was packed with Neosporin ointment smeared ribbon gauze on the operated side. All the patients were discharged on the day following surgery and were called for regular follow-up. The patency of the lacrimal passage was investigated by sac syringing.

OBSERVATION AND RESULTS

The present study involved 40 cases. They were divided into two groups of 20 each. Group I underwent external DCR and Group II underwent endoscopic endonasal DCR

Age	Group I		Group II		Total	
	No	%	No	%	No	%
20-30	2	10	3	15	5	12.5
30-40	6	30	6	30	12	30
40-50	6	30	7	35	13	32.5
50-60	4	20	2	10	6	15
60-70	2	10	2	10	4	10

[Table/Fig-1] P=0.5825

AGE DISTRIBUTION OF THE PATIENTS

It was found that a majority of the patients who underwent surgery were in the 3rd and 4th decades of life (62.5%).

SEX DISTRIBUTION OF THE PATIENTS

A female preponderance was noticed in this study. Only 20% (8 patients) were males as compared to 80% (32 patients) females.

ETIOLOGICAL DISTRIBUTION OF CASES

Chronic dacryocystitis was the most common aetiology (80%), followed by mucocoele of the lacrimal-sac (20%). Both were idiopathic in nature.

Diagnosis	Group I		Group II		Total	
	No	%	No	%	No	%
Chronic dacryocystitis	15	75	17	85	32	80
Mucocoele of the sac	5	25	3	15	8	20

[Table/Fig-2] P=0.6938

LATERALITY OF SYMPTOMS

60% of the patients (12) presented with left sided symptomatology, as compared to 40% (8) with right sided symptomatology.

Complication	Group I	
	No	%
Moderate bleeding	7	35
Severe bleeding	2	10
Tearing of anterior nasal flap	2	10
Laceration of punctum	1	5
Accidental entry into anterior ethmoidal air cells	4	20

[Table/Fig-3]

INTRA-OPERATIVE COMPLICATIONS IN GROUP I

- In this study, it was found that bleeding was the most common intra-operative complication (45%). 35% of the patients had moderate bleeding, whereas 10% of the patients had severe bleeding.
- Tearing of the anterior nasal flap was seen in 2 patients, as the nasal flaps were thin and friable. It was difficult to suture these flaps to the lacrimal sac flap.

Complication	Group 2	
	No	%
Moderate bleeding	6	30
Severe bleeding	-	-
Trauma to the middle turbinate	1	5
Accidental entry into anterior ethmoidal air cells	3	15
Difficulty in making a bone window	3	15

[Table/Fig-4]

INTRA-OPERATIVE COMPLICATIONS IN GROUP II

6 patients (30%) had moderate bleeding and 3 patients (15%) had severe bleeding during the surgery.

- The middle turbinate was traumatised in 1 patient (5%).
- The ethmoidal air cells were accidentally entered in 3 patients (15%).
- There was a difficulty in making a bone window in 3 cases (15%) because of thick bones.

Duration in minutes	Group I		Group II	
	No	%	No	%
< 30 minutes	-	-	4	20
30-60 minutes	4	20	11	55
60-90 minutes	14	70	5	25
>90 minutes	2	10	-	-

[Table/Fig-5]

TIME TAKEN FOR SURGERY

It was observed that endoscopic DCR took less time (Mean duration = 46 mins) as compared to external DCR (Mean duration = 76 mins), which was statistically significant (P = 0.0001), as the duration of surgery was shorter in group II.

Complication	Group I	
	No	%
Epistaxis	1	5
Wound infection / gaping	2	10
Obstruction at rhinostomy site	2	10

[Table/Fig-6]

POST-OPERATIVE COMPLICATIONS IN GROUP I

It was found that obstruction at the rhinostomy site and wound infection were seen in 10% of the patients and epistaxis was seen in 5% of the cases.

POST-OPERATIVE COMPLICATIONS IN GROUP II

As in group I, obstruction at the rhinostomy site was the most common post operative complication (10%),.

Complication	Group II	
	No	%
Epistaxis	-	-
Synechiae	1	5
Granulations	1	5
Obstruction at rhinostomy site	2	10

[Table/Fig-7]

POST-OPERATIVE PATENCY RATES

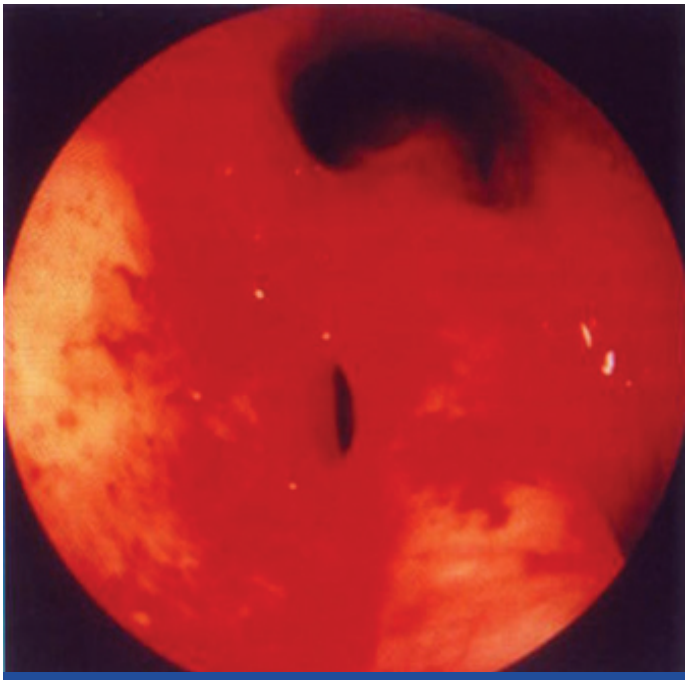
The lacrimal drainage system was patent in 18 patients (90%) at the end of 6 months in both the groups. Hence, the success rate was 90% in both the groups.

DISCUSSION

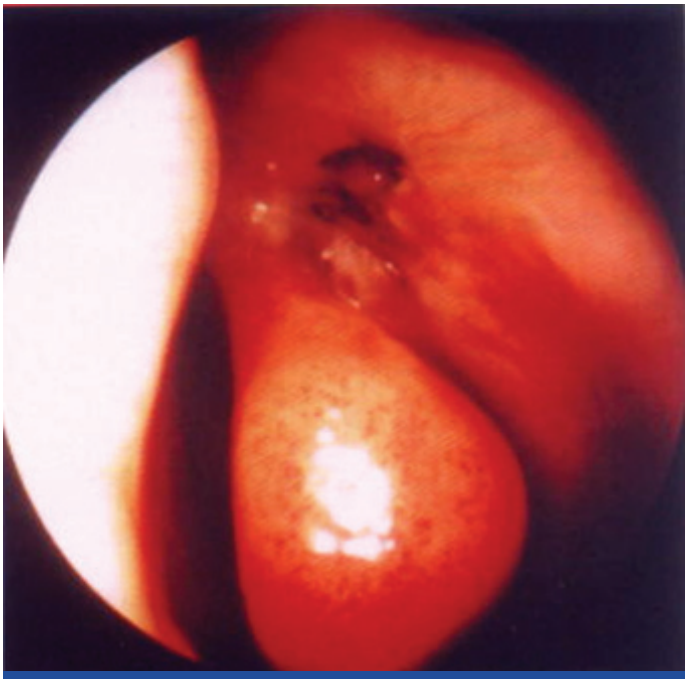
We found chronic dacryocystitis to be more common in the lower socio-economic groups. A maximum incidence was seen in the 3rd and 4th decades of life. In a study which was conducted by Cokker et al (2000), the age of the patients ranged from 4 to 76 years. [4] HB Whittet et al (1993) observed that the age of their patients ranged from 14 to 80 years.[5] In the present study, the patients were aged between 16 to 68 years of age. 80% of the patients were females and 20% were males. In a study conducted by Sprekelsen et al (1996), 80% of the patients were females and only 20% were males.[6] Most studies have demonstrated that 70 to 80% cases of chronic dacryocystitis occurred in females. 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 aetiology of chronic dacryocystitis.

The commonest cause of chronic dacryocystitis was found to be idiopathic blockage of the naso-lacrimal duct. In a study by Manfred Weidenbecher et al (1994), it was found that 78.5% of the cases had an idiopathic cause,[7] while Kristin J Tarbet et al (1995) found it in 72% of the cases.[8] The rest of the cases were either traumatic or infective (Lacrimal abscess, acute dacryocystitis).

The major difficulty which was encountered in Group I, was bleeding that hampered visualization. 7 cases (35%) had moderate bleeding,



[Table/Fig-8] : Endoscopic photograph showing a patent rhinostomy opening at the end of one week



[Table/Fig-9] : Endoscopic photograph showing obstruction at the rhinostomy site because of fibrosis and scaring at the end of 6 months

either during punching of the lacrimal bone or while making an incision on the nasal mucosa. The bleeding was stopped by placing a ribbon gauze which was soaked in dilute adrenaline. One patient (5%) had severe bleeding while making the skin incision, due to injury to the angular vein, which may have been due to the varied anatomical position or the accessory vein. Haemostasis was attained by clamping and ligating the vein and the operation was continued.

Identification of the sac was difficult in Group II, because of the variable position of the sac and the middle turbinate attachment. One patient required the resection of the anterior end of the middle turbinate, because it was hypertrophied and was obscuring the endoscopic view, as the sac was located posteriorly.
Woog et al (1998) reported that 33% of their patients required the resection of the anterior end of the middle turbinate.[9]

Rebeiz et al., in his study, noticed that during the endonasal procedure, the removal of the anterior end of the middle turbinate was helpful to expose the sac area, to locate the sac and to decrease the risk of scarring and fibrosis after the operation.[10]
The surgical duration in group I was between 60 to 90 minutes with an average of 75 minutes and in group II, it was between 30 to 60 minutes with an average of 45 minutes. The endonasal approach took less dissection time as compared to that in the external approach. Tarbet et al (1988) recorded an average of 100 minutes for external DCR.[11] Our study correlates well with Hartikainen et al's study, who noticed a surgical duration of 38 minutes for endoscopic dacryocystorhinostomy and 78 minutes for external dacryocystorhinostomy.[12] Both the procedures had minimal intra-operative and post-operative complications. Endoscopic DCR totally avoided an external scar, injury to the medial palpebral ligament and injury to the angular vein. The greatest advantage of endoscopic DCR was that, after having made a wide excision of the lacrimal sac, the result could be checked on the operating table itself. The procedure was accomplished without interference from any of the external structures surrounding the eye-ball. A success rate of 90% was observed in both the approaches. The success of the procedure was defined as a patent lacrimal drainage system at the end of 6 months.The success rate of external DCR has been reported at 90% to 97%, depending on the surgeon's experience. (Olver JM, 2003)[13]. The success rate of endoscopic DCR has been reported between 82% to 86% (Rice DH et al, 1990; Shun Shin et al, 1998).[2,14] Our success rate with endoscopic DCR was comparable to the success rate which has been described for external DCR.

CONCLUSION

It can be concluded that endoscopic DCR is as good as external DCR for the treatment of primary nasolacrimal duct obstruction and chronic dacryocystitis.

The surgical duration for endoscopic DCR is short as compared to that of the external approach. Endoscopic DCR avoids a scar on the face and injury to the neighbouring structures like the medial palpebral ligament and the angular facial vessels. With the wide-spread use of nasal endoscopes, this surgery is gaining popularity over external dacryocystorhinostomy.

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