



Comparative Study of Endonasal and External Dacryocystorhinostomy in a Rural Tertiary Care Centre

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Abstract

Dacryocystorhinostomy is the surgical procedure done for patients with nasolacrimal duct obstruction and epiphora. It can be done in an external as well as endonasal approach. Our prospective study was conducted over a period of one year, in 50 patients. The aim of our study was to establish a comparative analysis between the two procedures in terms of the success rates and complications.

Keywords: *Lacrimal Sac, Nasolacrimal duct, Dacryocystitis, Epiphora, Endonasal DCR, External DCR*

Introduction

Nasolacrimal duct obstruction leads to tearing and recurrent infections of the lacrimal sac. Obstruction of the lacrimal pathway, whether congenital or acquired is a common problem that can be corrected with dacryocystorhinostomy. The function of dacryocystorhinostomy is to divert lacrimal drainage into the nose through an osteotomy at the level of the lacrimal bone. This procedure is performed either through external or

endonasal approach.¹

Epiphora is now a challenge to the ophthalmologist and rhinologist. Medical treatment cures this problem temporarily but not permanently. Definitive management of this problem consists of the surgical procedure in which the patency of the lacrimal system is restored.

External dacryocystorhinostomy has traditionally been performed for primary acquired nasolacrimal duct obstruction and has been considered the gold

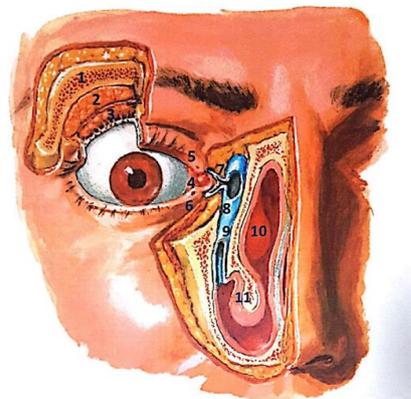
standard for the treatment of epiphora till a decade back. However it carries significant morbidity. The procedure is uniquely suited for an endoscopic approach.²

Endoscopic endonasal dacryocystorhinostomy is gaining popularity as it leaves no external facial scar and even in cases of lacrimal abscess, a nasal drainage can be done. In experienced hands, endoscopic DACRYOCYSTORHINOSTOMY has excellent results with less complications. It may be carried out surgically or with laser.³

Aims and Objectives

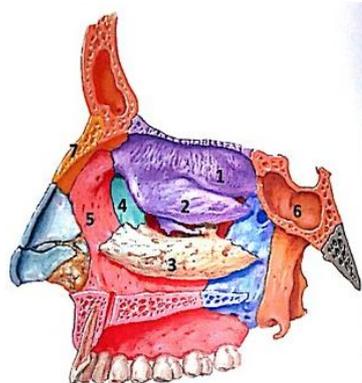
1. The effectiveness of endonasal dacryocystorhinostomy compared with external dacryocystorhinostomy.
2. The relative indications, advantages, contraindications and limitations of the procedure.
3. Variations in patient selection, surgical techniques and post operative care which may influence success rates.
4. Complications associated with these procedures.

LACRIMAL APPARATUS



- | | |
|-------------------------------------|------------------------|
| 1. Frontal bone | 7. Common Canaliculus |
| 2. Orbital part of lacrimal gland | 8. Lacrimal Sac |
| 3. Palpebral part of lacrimal gland | 9. Nasolacrimal Duct |
| 4. Lacrimal caruncle | 10. Middle turbinate |
| 5. Superior Punctum | 11. Inferior turbinate |
| 6. Inferior Punctum | |

Anatomy of the Lateral Nasal Wall



- | | |
|-----------------------|-------------------|
| 1. Superior turbinate | 5. Maxillary bone |
| 2. Middle turbinate | 6. Sphenoid sinus |
| 3. Inferior turbinate | 7. Nasal bone |
| 4. Lacrimal bone | |

Surgical Protocol and Methodology

Endoscopic Dacryocystorhinostomy

Indications

- ❖ Epiphora or infection in primary acquired nasolacrimal duct obstruction or nasolacrimal duct obstruction associated with specific inflammatory or infiltrative disorders.
- ❖ Nasolacrimal duct obstruction associated with previous paranasal sinus surgery or trauma in selected patients.
- ❖ Revision surgery following previous external or endonasal dacryocystorhinostomy.
- ❖ Intracanal and postsacral stenosis of the nasolacrimal duct.

Contraindications

- ❖ Acute sinusitis
- ❖ Obstruction of the lacrimal canaliculus
- ❖ Epiphora due to non obstructive causes.
- ❖ Atrophic rhinitis.

Instrumentation and techniques

The basic instruments used are:

- a) Telescopes (Hopkins rigid endoscopes) - 0 and 30 degrees, 4mm size
- b) Telescope handles
- c) Suction tips straight and curved
- d) Elevator
- e) Cold light fountain and fibre optic cable
- f) Sickle knife
- g) Forceps- Blakesley straight, upturned 90 degree and 45 degree.
- h) Endoscopic camera and adapter
- i) Medical monitor
- j) Anti fog solution
- k) Bipolar cautery
- l) Long curved needle 26 gauge, 1.5 inch with 1 ml syringe.
- m) Kerrison punch forceps
- n) Malleable probe and suction tips of

different angles.

- o) Ball probe
- p) Sinus surgery scissors

Selection of the patients

A careful preoperative evaluation is mandatory, including intranasal endoscopy. The deviated nasal septum or other nasal anatomic abnormalities can compromise access to the lacrimal crest. When the space between the lateral nasal wall and nasal septum is narrow, the endoscopic view will be blocked even by a small amount of haemorrhage. The normal intranasal anatomy allows a clear bird's eye view of the anterior portion of the middle turbinate with enough room for placement of instrumentation.

Diagnostic nasal endoscopy

This is done after surface anesthesia of the nose with packing of 4% lignocaine with adrenaline in equal parts using soaked cottonoids over the area needed for 5-15 minutes. This is to rule out nasal polyps, deviated nasal septum, anatomic abnormalities. Turbinate hypertrophy also can cause difficulty in instrumentation while surgery or normal NLD drainage system obstruction.

Anaesthesia

Endoscopic dacryocystorhinostomy can be done under hypotensive general anaesthesia or local anaesthesia.

Preoperative packing with 4% lignocaine 10 ml+ 1 ml of adrenaline cotton plugs in the agger nasi area, middle meatus, middle and inferior turbinates for 15-30 minutes. Slow IV sedation with Fortwin, atropine and phenergan can be given.

2% lignocaine with 1:100000 adrenaline to be infiltrated just anterior to the attachment of middle meatus in the agger nasi area, in the anterior portion of the middle meatus and turbinate.

Procedure

With a 15 blade or a Rosen's knife, a horizontal incision is made about 2 cm just anterior to the attachment of middle turbinate and on front of the uncinat process. A second horizontal incision is made lower down at the level of attachment of the inferior turbinate. A third vertical incision is made joining the two previous incisions. Now the mucosal flap is raised posteriorly and excised with scissors to expose the bar bone. The bone overlying the sac is removed by a chisel or a cutting burr or Kerrisons punch. 2% lignocaine is infiltrated to distend the sac. Once the medial wall of the sac is exposed, it is incised vertically with a sickle knife and removed completely by Blakesley forceps. Stenting of neo ostium may be done ideally with a silicone tube but we are using 1-0 prolene for our study. Wide removal of the medial wall of the sac followed meticulous nasal irrigation and cleaning performed regularly is sufficient to prevent restenosis of the sac. Stent removal will be done after 4-6 weeks.

Post operative management

Antibiotics, anti-inflammatory, douching of the sac to be done with a lacrimal syringing cannula.

Complications

Per operative complications

Hemorrhage occurs very rarely. It is seen in hypertensives, in infections and in patients with extensive nasal pathology.

Immediate post operative complications

- Epistaxis
- Infections in nose or orbit
- Adhesions
- Granulation in stent
- Sump syndrome
- Periorbital edema

Advantages

- Preserves the medial canthal anatomy
- More physiological- preserves lacrimal pump

- Less intra operative complications
- Relatively easier technique
- Cosmetically acceptable
- Low morbidity and early rehabilitation
- Revision surgery is easy
- Can be done as day care surgery

Limitations

- Needs sophisticated equipment
- Learning curve is more
- Difficulty in suturing the adjacent flaps intra nasally
- Intranasal bleed may abandon the procedure

External Dacryocystorhinostomy

It is the gold standard of the lacrimal bypass surgery. It creates a communication between the lacrimal sac and the nasal cavity bypassing the nasolacrimal duct.

Indications

- For symptomatic patients with epiphora and complete nasolacrimal duct obstruction.
- Acute or chronic dacryocystorhinostomy
- Dacryolith or mucocele of the nasolacrimal duct
- Chronic lacrimal fistula
- As a preliminary procedure to the placement of Jones tube in conjunctivo dacryocystorhinostomy

Contra-indications

- Atrophic rhinitis
- Pre saccal obstruction
- Rhinosporidiosis
- Acute dacryocystitis

Anaesthesia

General anaesthesia is preferred. Topical xylocaine 4% with adrenaline is instilled in the conjunctival sac at the medial canthus.

Procedure

The puncta are dilated and lacrimal sac is irrigated

with 1% methylene blue. The lacrimal fascia is incised 1 mm lateral to the anterior lacrimal crest and the medial canthal ligament divided. The sac is separated from the lacrimal fossa down to the opening of nasolacrimal duct. The periosteum is dissected from the lacrimal fossa. A vertical cut is made with the knife through the anterior wall of the sac. The nasal mucosa is then incised horizontally in the upper and the lower limit of the oval opening for its full diameter. These horizontal incision are joined by a vertical incision which results in a 4 mm anterior flap of the sac. The corresponding flaps are joined by interrupted sutures. Some surgeons prefer to suture a French rubber catheter or a Crawford silicone tube to the anterior wall of the sac and the nasal septum. The tubes are removed after 2 weeks. The wound is closed in layers and sterile dressing applied.

Complications

- Haemorrhage
- Wound infection
- Injury to medial canthus
- Epistaxis
- Subcutaneous emphysema
- Post operative edema
- Watering
- Closure of the ostium
- Hypertrophic scar and keloid
- Telecanthus
- Corneal abrasion
- Rarely CSF leak

Advantages

- Higher patency rates
- Easily performed
- Less recurrence because of mucosal flaps creation.

Disadvantages

- Prolonged operating time 45-60mts.
- Cosmetic blemish - external facial scar

- Potential injury to adjacent medial canthal structures
- Significant post operative morbidity.
- Resurgery is difficult because of scarring
- Nasal pathology, if present cannot be treated

Materials and Methods

A prospective randomised study was conducted on 50 patients out of which 25 underwent external dacryocystorhinostomy and 25 underwent endonasal dacryocystorhinostomy in our Department of Otorhinolaryngology, Government Vellore Medical College and Hospital, Vellore.

Inclusion Criteria

1. Patients with nasolacrimal duct obstruction.
2. Normal eyelid function
3. Patent canaliculus
4. Age between 20 and 60 years

Exclusion Criteria

1. Previous lacrimal surgery
2. Patients with canalicular pathology
3. Suspicion of malignancy
4. Patients with bleeding disorder

Clinical Evaluation

- ❖ A detailed history and examination was done for all cases presenting with long term watering and / or discharge and /or swelling in the region of the lacrimal sac. diagnosis of Chronic Dacryocystitis was made clinically.
- ❖ The clinical diagnosis of lower lacrimal drainage system obstruction (saccul and post-saccul) as based on regurgitation test (mucoïd reflex with lacrimal massage) and lacrimal syringing (simple mucopurulent regurgitation through the opposite punctum) was done with the help of ophthalmic surgeon.

❖ Observation was done to rule out, other causes of watering like lid abnormalities and facial palsy. Detailed slit lamp examination was done with the help of ophthalmic surgeon to uncover diseases of lid margin, conjunctiva, cornea, anterior chamber that causes reflex watering.

Schirmer's tests was done to rule out dry eye syndrome.

❖ Anterior rhinoscopy was done to assess the mucosal health and to rule out any other causes of obstruction to the nasolacrimal duct like inferior turbinate hypertrophy, polyp and mass in the nasal cavity.

Interpretation of syringing:

Results	Anatomic Interpretation
Difficulty advancing the cannula. Inability to irrigate. Regurgitation of same fluid through punctum	Complete canalicular obstruction
Difficult advancing cannula, reflux of clear fluid through opposite punctum.	Complete common canalicular obstruction
Easy cannicular placement. Mucoïd reflux through cannicular system	Complete nasolacrimal duct obstruction
Easy cannula placement. Irrigation with lacrimal sac distension.	Complete nasolacrimal duct obstruction
No reflux of fluid into the nose	Partial nasolacrimal duct stenosis. Possible complete functional obstruction under normal conditions.
Easy cannula placement. Combination of reflux and saline through the nose.	Patent nasolacrimal duct. Possible functional obstruction
Easy cannula placement. Successful irrigation into the nose.	Repeat evaluation for secondary irritative hypersecretion

Pre operative evaluation

Blood- complete hemogram

Blood sugar

Urea creatinine

Bleeding time

Clotting time

Urine sugar, albumin

ECG, echocardiogram

Chest X-ray PA view

Recording of blood pressure

Special investigations- X-ray lacrimal sac region

X-ray paranasal sinus

CT paranasal sinus

Diagnostic nasal endoscopy

Endonasal Dacryocystorhinostomy

A careful preoperative evaluation for all 25 cases including diagnostic nasal endoscopy done. 25 patients were underwent endonasal dacryocystorhinostomy. 22 out of 25 cases underwent surgery under local anaesthesia remaining cases done under general anaesthesia (only for surgeon convenience).¹⁵

Post Operative Period

Nasal pack was removed on the next day. Postoperatively an antibiotic eye drops 4 times per day along with a nasal decongestant three times per day was given. Patient was discharged on the 1st (or) 2nd postoperative day with oral antibiotics,

anti-inflammatory drugs and antibiotic eye drops and decongestant nasal drops for one week. Endoscopic cleaning of crust had done after a week. Lacrimal syringing was done on alternate days for a week, then after one week, one month, three months and six months under endoscopic visualization to know the patency.

External Dacryocystorhinostomy

25 patients underwent external dacryocystorhinostomy. All patients done under local anaesthesia.

Patient were advised to refrain from blowing the nose. Intranasal packing was removed after 24 hours and hemostasis obtained. First dressing was done along with gentle syringing repeated on alternate days. Oral antibiotics and anti inflammatory agents were given for 7 days. Broad spectrum eye drops were prescribed 6 times daily for 2-3 weeks. Suture removal was done on 7th day with gentle syringing.

Patient Data

Table -1 Age Distribution

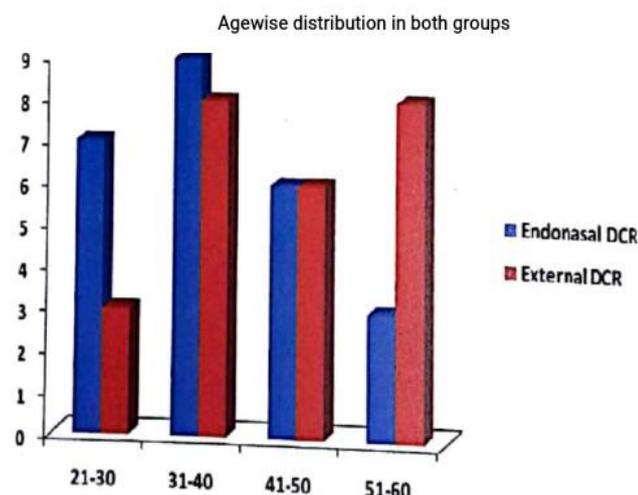
Age (Years)	Endonasal DCR	External DCR	Total (Both Groups)
Mean	36.84	44	40.42
Range	21-58	25-60	21-60

Patients were reviewed after 2 weeks, 1 month, 3 months and 6 months during which they were questioned regarding the relief from watering and lacrimal syringing was done. In case of block during syringing, the level of the block was ascertained and 2 weeks course of antibiotic eye drops were given.

The mean age was 42 years.

Analysis and Discussion

50 cases were included in our study. 25 underwent external dacryocystorhinostomy and 25 underwent endonasal dacryocystorhinostomy. The age group was between 20 and 60 years. There were 15 males and 35 females. The duration of symptoms was 3-24 months



Age wise distribution in both groups

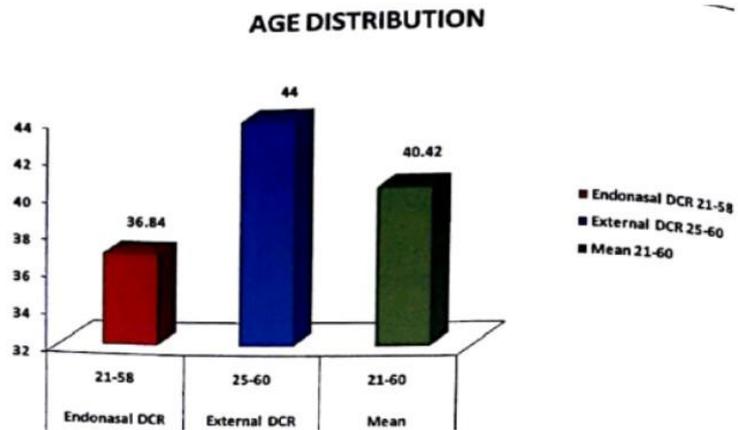


Table -2: Sex Distribution

Sex	Endonasal DCR	External DCR	Total
Male	8	7	15
Female	17	18	35
Total	25	325	50

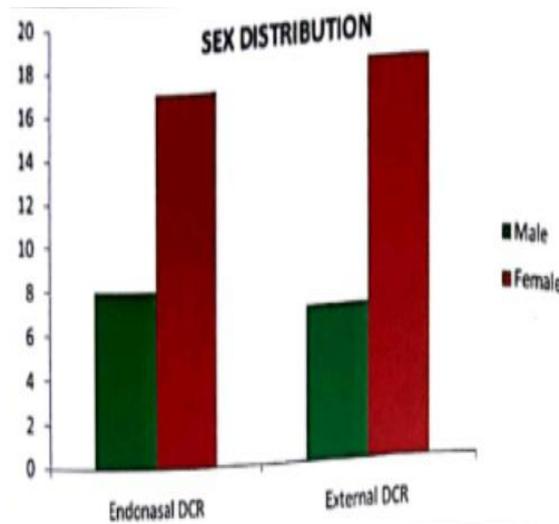
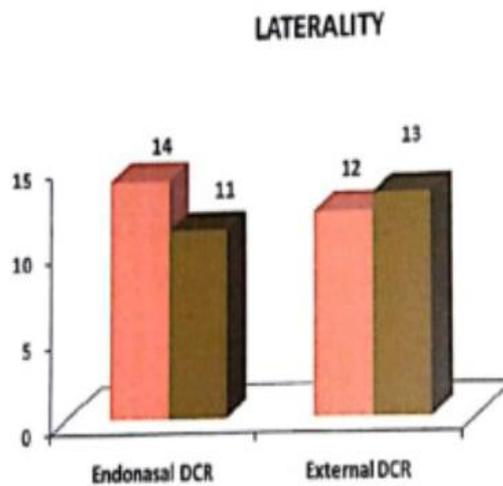


Table -2: Laterality

Laterality	Endonasal DCR	External DCR	Total
Right	14	12	26
Left	11	13	24
Total	25	325	50



Etiology

In the most of the cases the symptoms were seen more on Right side 26 (52%) than the left. 36 (72%) of cases were diagnosed to have chronic dacryocystitis. The rest 14 cases (28%) was constituted by primary NLD obstruction.

Anaesthesia

Anaesthesia	No. of cases	Percentage
Local	47	94
General	3	6
Total	50	100

The above table shows that 47 (94%) cases are operated under local anaesthesia and only 3(6%) cases are operated under general anaesthesia.

Of 25 cases who underwent endonasal dacryocystorhinostomy, 22 (94%) cases were

25 patients who underwent endonasal dacryocystorhinostomy were taken as - Group 1 and 25 patients who underwent external dacryocystorhinostomy taken as - Group II.

operated under local anaesthesia and only 3 (6%) cases were operated under general anaesthesia. Of 25 cases who underwent external dacryocystorhinostomy, all cases were (100%) operated under local anaesthesia.

Anaesthesia	No.of cases		Percentage	
	External DCR	Endonasal DCR	External DCR	Endonasal DCR
Local	25	22	100%	94%
General	-	3	-	6%
Total	25	25	100%	100%

Group I Follow Up

After surgery they were followed up 2nd week, 1st month, 3rd months and 6th month with lacrimal syringing under endoscopic visualization and enquired regarding relief of epiphora.

After 2 weeks and 1 month follow up 2 cases showed mucopurulent regurgitation on syringing in group I. These cases were treated conservatively. At the end of 6th month out of 25 cases 21 cases showed patent neo ostium, 2 drop outs and 2

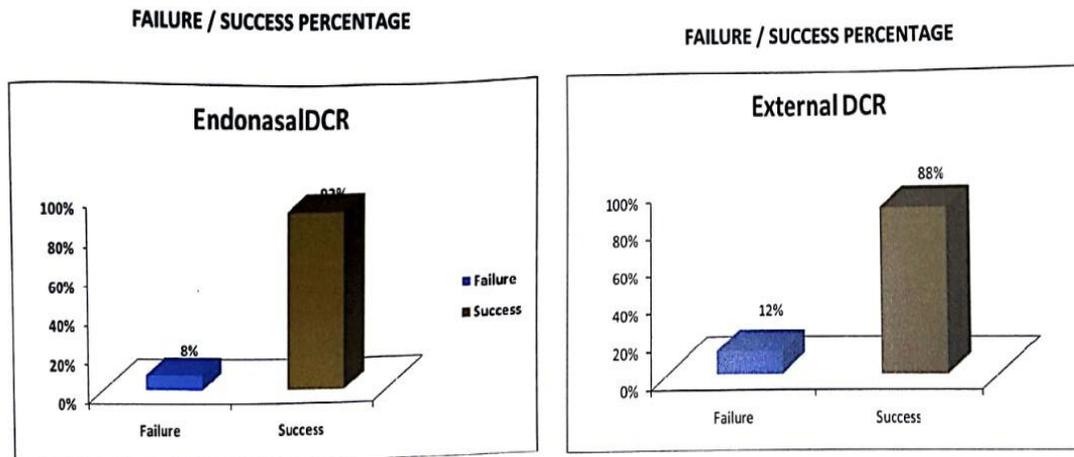
failures (patient not came for both 3rd and 6th month follow up considered as drop outs).

Group II Follow Up

After surgery they were followed up at 2nd week, 1st month, 3rd month and 6th month with lacrimal syringing and enquiry regarding relief of ephiphora

At 2 weeks follow-up 3 cases showed mucopurulent regurgitation on syringing in group II. They were considered as early failures and treated with conservatively (antibiotics, alternate day syringing). At the end of 6th month out of 25 cases 20 showed patency 2 drop outs and 3 failures.

Failure and Success Rates



Procedure	No. of success including drop out	No. of failure	No. of Complications
Endonasal DCR	23	2	7
External DCR	22	3	14

Total success, failure and complication of both procedures

Results

The success of the operation was rated by the objective demonstration of patent nasolacrimal drainage system by lacrimal irrigation test.

Assuming dropouts to be successful the following conclusion was arrived. They are considered as symptom free.

Procedure	Total eyes	No. of Success	No. of failure	Drop out	Success%
Endonasal DCR	25	21	2	2	92%
External DCR	25	20	3	2	88%

The success rate at 6 months follow up after surgery on the basis of primary surgery was 23 cases out of 25 (92%) for endonasal

dacryocystorhinostomy and 22 out of 25 (88%) for external dacryocystorhinostomy (assuming the dropouts to be successful)

Statistical Analysis**Chi-Square results****Procedure and Success Rates**

X^2 Value = 0.24

Df (degree of freedom) = 1

$p > 0.05$

since the p value is greater than 0.05, there is no statistically significant relation between the surgical procedure and the success rates

Procedure and Complications

X^2 Value = 4.10

Df (degree of freedom) = 1

$0.02 < p < 0.05$

Since the p value is greater than 0.05, there is a statistically significant relation between the surgical procedure and the complication rates.

Summary & Conclusion

In the present comparative study carried out over a period of one year at Govt. Vellore Medical College and Hospital,

The success rates and complications in 25 cases who underwent endonasal dacryocystorhinostomy are compared with the 25 cases who underwent external dacryocystorhinostomy.⁴

Most of the patients are in the age group 35-45 years (40.4%). Females constituted 35(70%) while males constituted 15(30%).⁵ Females are commonly affected than males and it is thought to be due to long term use of cosmetics and long duration of exposure to smoke & dusty environments.¹³⁻¹⁴

52% cases presented with nasolacrimal duct obstruction on right side. Right side is more affected than left side in our study.

All patients in our study were unilateral. Almost all the patients were operated under local anaesthesia (94%). 3 patients endonasal dacryocystorhinostomy group done under GA for

surgeon's convenience. All endonasal dacryocystorhinostomy stayed in the hospital overnight and were discharged on the first post operative day (or) second post operative day.⁶⁻⁷

All external dacryocystorhinostomy patients discharged on third or fourth post operative day.

In our study, 4 post operative visits were scheduled, the first being at 2 week, second at 1 month, third at 3 months and fourth at 6^h month. At each follow up visit all the patients were syringed to know the patency of the lacrimal passage.¹²

Success rate was defined by an anatomically patent nasolacrimal system ascertained by irrigation at 6 months after surgery which is anatomic success. The overall primary success rate of endonasal dacryocystorhinostomy is 92% and that of external dacryocystorhinostomy is 88% but the difference is statistically insignificant.

In the present study 7 (28%) cases operated by endonasal dacryocystorhinostomy and 14 (56%) cases operated by external dacryocystorhinostomy had complications (intra and post operative). But the difference is statistically significant.¹¹

In both endonasal and external dacryocystorhinostomy most common intra operative complication encountered was bleeding (Haemorrhage).

The post operative complications encountered after external dacryocystorhinostomy were edema 7 (28%), wound infection in 3(12%), scar 1 case (4%) watering in 1 (4%) eye and in endonasal dacryocystorhinostomy were postoperative epistaxis 3(12%).⁸⁻¹⁰

From our study it's evident that Endonasal dacryocystorhinostomy has the following advantages

- ✓ Less operative time
- ✓ Less hospital stay
- ✓ Better patient compliance
- ✓ No external scar

Hence it's clear that endonasal dacryocystorhinostomy is always advantageous than external dacryocystorhinostomy. Regular follow up is essential for both the procedures.

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