Endoscopic Vs External Dacryocystorhinostomy in Cases of Deviated Nasal Septum and/or Turbinate Hypertrophy

Original Article

Mohamed Kamel Al Awady[1], Mostafa F. Mohammed[2], Mahmoud Hamdy Alboghdady[3]

Department of [1,3]Otorhinolaryngology, [2]Ophthalmology, Faculty of Medicine of Boys, Al-Azhar University, Cairo, Egypt.

ABSTRACT

Background: Dacryocystorhinostomy (DCR) is a surgical procedure that improves lacrimal system drainage by establishing a lacrimal drainage channel into the nasal cavity. External DCR and endoscopic DCR for the treatment of primary acquired nasolacrimal duct blockage in the context of deviated nasal septum and/or hypertrophy of the turbinates were compared.

Patients and Methods: This study included 60 patients complaining of epiphora due to nasolacrimal duct obstruction (NLDO). Patients were subdivided into two groups; group A included 30 patients submitted to endoscopic DCR and group B included 30 patients submitted to external DCR.

Results: The right eye was afflicted more frequently than the left. Right eye involvement was 63.6 % and left was 36.4 %. Excessive intraoperative bleeding occurred in 5 cases (16.5%) in group A and 9 cases (29.7%) in group B. The difference was not statistically significant. (*P value =0.39*). 28 of 30 eyes (93.3%) that had endoscopic DCR surgery and 20 of 30 eyes (66.7%) that underwent external DCR surgery had a successful surgical outcome after six months. The difference was significant as *p value = 0.009*.

Conclusion: DCR is better performed by endoscopic approach especially in cases of deviated nasal septum and/or turbinate hypertrophy. Endoscopic DCR is a safe, less invasive method with superior outcomes compared to external DCR.

Key Words: Concha bullosa, dacryocystorhinostomy, deviated nasal septum, external DCR, endoscopic DCR, inferior turbinate hypertrophy, nasolacrimal duct obstruction.

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Corresponding Author: Mohamed Kamel Al Awady, MD, Department of Otorhinolaryngology, Faculty of Medicine of Boys, Al-Azhar University, Cairo, Egypt. **Tel.:** 01002255375, **E-mail**: mohamedkamel292@yahoo.com

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INTRODUCTION

Dacryocystorhinostomy (DCR) is appropriate for nasolacrimal duct obstruction (NLDO) to establish a lacrimal drainage channel into the nasal cavity. NLDO is caused by idiopathic, congenital, iatrogenic, lithiasis, trauma, and infection. The Jones test, syringing, and dacryocystorhinography may determine whether a blockage exists[1].

The external DCR was created by Toti around the start of the twentieth century. External DCR is conducted through a skin incision in order to reach the lacrimal sac. The external DCR has gained popularity due to its efficacy and low risk of complications[2].

Caldwell initially described the Endonasal approach to the lacrimal sac in 1893[3], and West later introduced it in 1911[4]. Endonasal DCR remained limited because to the invisibility of endonasal characteristics[1]. The introduction of rigid endoscopes and microscopes has allowed endonasal DCR, and cooperation between the ophthalmologist and otorhinolaryngologist is quite beneficial[5]. The ophthalmologist aids in the differential diagnosis of epiphora by suggesting surgery, concomitant therapy of obstruction sites, and intraoperative probing[6].

The otorhinolaryngologist is responsible for pre-operative diagnostic and intraoperative treatment of concurrent nasal disorders (e.g., nasal conchae hypertrophy, obstructive deviation of the nasal septum, synechia, polyps and chronic rhinosinusitis). The otolaryngologist uses nasal endoscopy to uncover, open, and assist lacrimal sac flaps[7].

Aim of the work

This study compared the success rates and side effects of external and endoscopic DCR for the treatment of primary acquired NLDO in cases of nasal septum deviation and/or turbinates hypertrophy.

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PATIENTS AND METHODS:

This prospective study was conducted at Ophthalmology and Otorhinolaryngology Departments, Al-Azhar University Hospitals at duration from January 2020 to April 2021. This study was approved by Ophthalmology and Otorhinolaryngology Departments and by medical ethical committee of Al-Azhar university faculty of medicine. The study was conducted in accordance with Helsinki standards as revised in 2013 and informed written consents were obtained from all participants. Written consent was obtained from all participants included.

Sixty patients (38 females & 22 males) were included complaining of epiphora due to NLDO associated with nasal problems. The age range was 18-50 years. Patients were assigned into two equal groups:

Group (A) included 30 patients submitted to endoscopic DCR.

Group (B) included 30 patients submitted to external DCR.

Both groups were compared with each other as regards operative time, intraoperative bleeding, surgical outcome and postoperative complications.

Inclusion criteria:

• Middle aged patients who had primary acquired chronic dacrocystitis with NLDO.

• Patients who had nasal disorders such as nasal turbinate hypertrophy, conchae bullosa or deviation of the nasal septum.

• Obstruction evidence on irrigation or probing.

Exclusion criteria:

• Acute dacrocystitis or lacrimal sac tumors.

• Children with congenital chronic dacrocystitis.

• Patients not complaining of nasal obstruction.

all patients were subjected preoperatively to:

• Ophthalmological examination of epiphora to detect its possible causes.

• Level of obstruction determined by syringing test, injection of fluorescein into the eye (fluorescein test) and viewing of stained nasal discharge. Dacryocystography was performed on patients with a suspected canalicular blockage to confirm this obstruction.

• Otorhinolaryngological examination by rigid nasal endoscopy and CT para nasal sinuses to detect unilateral or bilateral turbinate hypertrophy, septal deviation or nasal conchae hypertrophy (Fig. 1).

Statistical Methods:

For statistical analysis, IBM® Statistical software for social sciences (SPSS)®; Statistical Version 22 for Windows was used. Continuous data were represented by the range, mean, and standard deviation. The presenting of qualitative data were percentages and statistics. Using the Student's t-test, continuous data from two independent groups were compared. To compare qualitative data between groups, the Chi-square test was applied. A *P value < 0.05* for two tails was statistically significant.

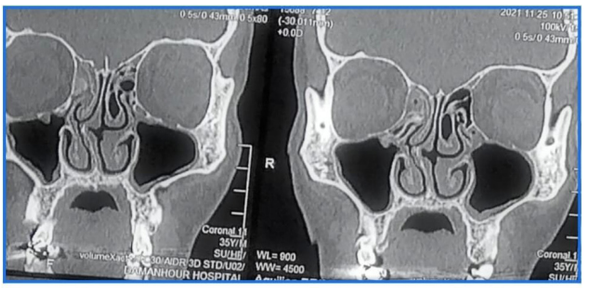

Fig. 1: CT paranasal sinuses shows deviated nasal septum, concha bullosa on left side and turbinate hypertrophy

Surgical Methods:

Endoscopic dacryocystorhinostomy:

In each case, hypotensive general anesthesia was used. Cotton strips soaked in 2% xylocaine and 1:100,000 adrenalines were administered to the nose 10 to 15 minutes before to operation. This allowed for proper decongestion, mucosal anesthesia, straight forward access, and a sterile field. Before starting Endoscopic dacryocystorhinostomy, partial turbinectomy were done for correction of inferior turbinate hypertrophy, lateral lamellectoy for correction of concha bullosa and endoscopic septoplasty for correction of deviated nasal septum On the lateral nasal wall, above and anterior to the attachment of the middle turbinate, and along the maxillary line, submucosal injections of

xylocaine 2% and adrenaline 1:100,000 were done. The 0 degree and 30 degree rigid 4 mm endoscopes were used. The lateral nasal wall flap was raised after endoscopic correction of the deviated nasal

septum (Figure 2) and turbinate hypertrophy.

Fig. 2: Endoscopic correction of deviated nasal septum before DCR

Osteotomy was performed with the use of Kerrison straight punch forceps (Fig. 3). When it was essential to remove thick bone from the frontal process of the maxilla, a drill with a 1-2 mm diamond burr was used. The lacrimal bone was extracted using a Freer's elevator. The ophthalmologist next placed a trans canalicular lacrimal probe into the inferior canaliculus to detect the medial sac wall (Fig. 4). The lateral wall right below the medial canthus area was then subjected to external pressure, causing the sac to protrude medially into the nasal cavity.

Fig. 3: Removal of thick bone of medial wall of the maxilla by Kerrison.

Fig. 4: Passing of lacrimal probe through the inferior canaliculus

Using a sickle knife, the lacrimal sac was severed. Using Blakesley forceps, the medial wall of the sac was then removed to produce the biggest possible hole. The silicone tube was then inserted and secured in the nose (Fig. 5), and a soft nasal pack was worn for 24 hours. To limit the formation of granulation tissue as much as possible, just the minimum amount of nasal mucosa was removed to expose the sac. In cases of septoplasty, nasal splints were inserted for a week to prevent synechia.

Fig. 5: Both ends of silicone tube are passed from lacrimal sac before its ligature. passed from lacrimal sac after removal of its medial wall.

External dacryocystorhinostomy:

A straight 11mm incision was made medially from the inner canthus to the angular vein. To correctly expose the front lacrimal crest, traction sutures were used to open the incision. After an osteotomy, anterior and posterior flaps were created by opening the lacrimal sac and mucosa. After inserting and anchoring a silicon tube, the flaps were sewn with 6/0 vicryl sutures. The incision was closed with tiny stitches, and the skin was sutured for aesthetic effect. All patients were given local antibiotics four times per day for one month after surgery.

Follow up: Postoperatively, all patients were assessed every week for one month then monthly for six months. During postoperative visits, patients were inquired about the remission of epiphora symptoms and had an endoscopic intranasal inspection to remove crustations or granulation tissues. All patients were advised to regular use of saline nasal sprays to prevent Granulation tissues and synechia formation. Postoperative complications were reviewed at each visit. All patients were observed for at least six months.

RESULTS:

There were no statistically significant differences between both groups regarding age and sex. The eye involvement distribution for both groups A and B is shown in (Table 1). The right eye was affected (63.6 %) more than left eye (36.4 %), but this was not statistically significant (*P > 0.05*).

Table 1: shows the side of affected eye in both groups

The side of affected eye	group A endoscopic DCR N=30 eyes	group B external DCR N=30 eyes	Total N=60 eyes	*P value*
Right eye	17(56.1%)	22(73.6%)	39(63.6%)	0.17
Left eye	13(43.9%)	8(26.4%)	21(36.4%)	

According to CT findings, associated pathological nasal problems in both groups are shown in (Table 2). the mean duration of endoscopic DCR operation was 100± 20 minutes and mean duration of external DCR operation was 50 ± 15 minutes. The longer time in endoscopic DCR was duo to correction of associated deviated nasal septum, turbinate hypertrophy or concha bollusa . There was no statistically significant difference (*P > 0.05*).

Table 2: shows CT findings of pathological nasal problems in both groups

CT findings	endoscopic DCR (total N=30cases)	external DCR (total N=30cases)	*P value*
Bilateral ITH and deviated nasal septum	N=19 (63.3%)	N=15 (50%)	0.525
deviated nasal septum only	N=5 (16.7%)	N=7 (23.3%)	
Bilateral ITH and Concha bullosa	N=4 (13.3%)	N=3 (10%)	
Bilateral ITH only	N= 2 (6,7%)	N=5 (16.7%)	

The intraoperative bleeding in this study were excessive, moderate and minimum. Intraoperative bleeding were compared in two groups (Table 3). Excessive bleeding was more than 1liter by suction and more than 15 soaked gauzes, moderate bleeding was less than 1 liter by suction and less than 15 soaked gauzes, minimal bleeding was less than 0.5 liter by suction and less than 5 soaked gauzes. The difference was not statistically significant as regards intraoperative bleeding in both groups (*P > 0.05*).

Table 3: shows Intraoperative bleeding in both groups

Intraoperative bleeding	Endoscopic DCR Group A	External DCR Group B	Chi - square test	
Excessive	5 (16.7%)	9 (30 %)	X2 = 1.8	*P. Value = 0.39*
Moderate	17 (56.7%)	16 (53.3%)		
Minimal	8 (26.6%)	5 (16.7%)		
Total	N= 30	N= 30		

The incidence of complications was lower in endoscopic DCR (group A) than external DCR (group B). Three patients had postoperative hemorrhage in group A and five patients had postoperative hemorrhage in group B and all of them required temporary tamponade after surgery for 3 days.

One patient had orbital emphysema in group A while 3 patients had orbital emphysema in group B, which subsided within 24 hours with local treatment.

In external DCR, neither lacrimal sac flap loss nor nasal mucosa loss occurred. In the current study, neither group exhibited orbital hematoma, diplopia, or cerebrospinal fluid (CSF) leakage.

The surgical result was evaluated after six months based on objective evidence of a normal nasolacrimal system and symptom improvement. Patency was achieved in 28 (93.3%) of 30 eyes for the endoscopic DCR and 20 (66.7%) of 30 eyes for external DCR surgeries. Recurrence of epiphora and NLDO occurred in two eyes (6.7%) for the endoscopic DCR group and in 10 eyes (33.3%) for external DCR group (Table 4). The difference was statistically significant (*P = 0.009*).

Table 4: Successful surgical outcome after 6 month

Surgical Results	Endoscopic DCR Group A	External DCR Group B	Chi- square test
Anatomical patency and symptoms relief	28 (93.3%)	20 (66.7%)	X2 = 6.6 *P. Value = 0.009*
Revision surgery	2 (6.7%)	10 (33.3%)	

Two occurrences of endoscopic DCR recurrence were linked to recurrent granulation tissue formation. To prevent the development of granulation tissue and synechia, patients were instructed to wash nasal cavity using saline sprays and rigorously clean granulation tissue at subsequent sessions. In 10 cases with external DCR, the recurrence was irreversible due to the presence of a deviated nasal septum, inferior turbinate hypertrophy, or concha bullosa.

DISCUSSION

Trans nasal DCR has gained renewed attention because to the utilization of microscopic and endoscopic technologies in nasal and sinus surgical operations[8]. Not only does the endoscopic trans nasal technique eliminate the need for an external incision and scar, but it also improves the surgeon's ability to diagnose and treat common intranasal causes of DCR failure, such as adhesions, nasal septal deviation, paranasal sinus disorders, and an enlarged middle turbinate[9].

At the start of the twentieth century, external DCR surgery was used to address nasolacrimal duct obstruction[10].

Visualization of the anatomy is the primary benefit of external DCR, which permits exact bone excision in the lacrimal fossa and faultless anastomosis of the nasal mucosa and lacrimal sac wall. The disadvantages of this approach include cutaneous scarring and the possibility of harming medical canthal structures, cerebrospinal fluid rhinorrhea, and disruption of the physiological function of the lacrimal pump[11].

The strength points of the present study include the teamwork between otorhinolaryngologists and ophthalmologists to give good results and endoscopic corrections of deviated nasal septum, turbinate hypertrophy and concha bollusa were done at the same time of DCR surgery, and that gave good results and reduced recurrence.

The limitations of the present study include small number of cases and the study was done in single surgery center. So, large number of cases and multi centered surgeries for further studies are recommended.

In the present study The right eye was affected (63.6 %) more than left eye (36.4 %), but this was not statistically significant (*P > 0.05*).

Nichlani *et al*.[12] discovered, that the right eye was more active than the left, which is compatible with our findings. In this inquiry, the precise cause of the right eye involvement in dacryocystitis remained unclear.

In accordance with our findings, Moras *et al*.[13] reported that the average endoscopic DCR duration was 90 minutes ± 15 minutes, whereas the external DCR time was 55 minutes ± 20 minutes. Moreover, Muscatello *et al*.[14] shown that the mean duration for endoscopic DCR was 122.25 minutes, and that this time decreased as surgical competence grew.

Similar to our results, Khan *et al*.[15] found that 13.3% of endoscopic DCR patients and 20% of external DCR patients had significant bleeding. In addition, Karim *et al*.[8] observed no significant problems in their

trial, with the exception of three patients who required conservative therapy for postoperative bleeding, one in the external DCR group and two in the endoscopic DCR group.

Comparable to previous studies, 28 of 30 patients (93.3%) submitted to endoscopic DCR surgery and 20 of 30 patients (66.7%) undergoing external DCR surgery reported a favorable surgical results 6 months after surgery. The success rate of endoscopic dacryocystorhinostomy ranges between 80 and 95 percent, according to an assessment of the relevant literature. Due to the continual production of granulation tissue, this occurs[16]. To avoid the development of granulation tissue and synechia, patients must consistently utilize saline sprays and thoroughly clean the granulation tissue at follow-up appointments. Using silicone tubes for three months should help prevent the premature closure of the nasolacrimal sac and the formation of synechia[11].

Welch *et al*.[17] shown the effectiveness of endoscopic DCR in the treatment of chronic dacryocystitis, although with a slightly greater success rate than external DCR. In this context, they have shown that endoscopic DCR may shorten therapy and hospitalization times. In the event of significant post-operative inflammation, they recommended alkaline nasal irrigation and nasal debridement, which boosted the success rate of endoscopic dacryocystectomy.

CONCLUSION

The endoscopic trans nasal technique for DCR not only avoids an external incision and scar, but also increases the surgeon's ability to diagnose and treat frequent intranasal reasons of DCR failure, including as adhesions, an enlarged middle turbinate, nasal septal deviation, and paranasal sinus disorders. Endoscopic DCR is a safe, effective method, minimally invasive, with favorable outcomes and increased patient satisfaction, particularly in situations of deviated nasal septum, concha bollus, and turbinate hypertrophy. The choice of surgery should rely on the patient's desire, the surgeon's skill, and the availability of resources.

CONFLICT OF INTEREST

There are no conflicts of interest.

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