Endoscopic Versus External Approach Dacryocystorhinostomy: Iraqi Study

Imran Mousa Jawad Al-Marashdi

Babel Teaching Hospital
Dr.omran67@gmail.com

ARTICLE INFO
Submission date : 20/8//2018
Acceptance date: 24 /9/ 2018
Publication date: 14/1/2019

Abstract

Background

Dacryocystorhinostomy (DCR) is a process which includes creating a drainage in the lacrimal pathway to the nasal cavity and its purpose is to facilitate the drainage of the lacrimal system.

Aim

To ensure and register the results and advantages of both : endonasal endoscopic and external DCR include the patency rate, complication and patient compliance.

Materials and Methods

The study was performed at Al-Hilla teaching hospital in Iraq lasted for about sixteen months with various patients, 50 case of them is endoscopic and 30 cases of them are external. DCR follow up previously obstructed lacrimal system might be at least 6 months. By using χ^2 test , the surgical outcome and complications were evaluated and compared.

Results

Seventy-two patients were been included in this study with 6 having bilateral involvement, 20 patients were male and 52 were female. The age for endoscopic and external DCR was about 33 years for male and 46 years for a female in the mean. The right eye (64%) was more commonly involved as compared with the left eye (36%). Regarding the commonest presenting symptom was epiphora in percentage (63.7%). The duration of surgery was longer in the external (mean 120 minutes) than the endoscopic (mean 49 minutes) DCR. Regarding the most common immediate complication postoperatively was bleeding which has seen in 33 % and 10 % in external and endoscopic DCR cases. Regarding the success rate of surgery was 90 % and 96.6% for endoscopic and external DCR, respectively (P=0.045). In the endoscopic DCR group, 4 patients had been under went the revision surgery leading to a total successful surgical rate of 97% in 3rd month of follow up. The success rate was 92% regarding the endoscopic DCR while 93.3 % regarding the external DCR. The difference wasn't greatly significant (P =0.60).

Conclusion

The procedure of the intranasal endoscopic DCR regards as a safe, simple, daycare procedure, minimally invasive and had comparable result with conventional external DCR.

Keywords: Dacryocystorhinostomy (DCR), endonasal endoscopic, Iraqi study

Introduction

Dacryocystorhinostomy (DCR) is an operation that creates a drainage in the lacrimal pathway into the nasal cavity to facilitate drainage of the lacrimal pathway. This operation is indicated for nasolacrimal duct obstruction. The causes regarding obstruction of nasolacrimal duct include: iatrogenic, congenital, traumatic, lithiasis, infection and may be unknown. The external approach is done through skin incision to get access to the lacrimal sac. Due to its efficacy and relatively low complication rates, the procedure acquired its popularity. Endoscopic DCR has acquired momentum with the direct visualization under endoscopic guidance.

Regarding the suspicion of obstruction might be confirmed by syringing, Jone test and dacryocystorhinography (DCG).

Classically, DCR been performed by using an external approach. This was first described by Addeo in 1904.[1] Alternative pathway of DCR by intranasal route was described by Caldwell in as early as 1893.[2] It was modified by West in 1910.[3] Later on, the existence of rigid nasal endoscopes enabled an endoscopic approach. McDonog and Meiring, first described endoscopic intranasal DCR in 1989.[4] Wormald PJ described powering endoscopic DCR with primary mucosal anastomosis with sac exposure in 2002.[5]

Although the external DCR is still represented as a gold standard, the endoscopic DCR evolved as an equally efficient alternative in the recent.[6] Various studies have showen that success rate for both which range from 62% to 96%.[7],[8]. The high rate of success rate may be due to the following :surgical variety, patient demographic and lack of standard outcome measures.[6] With this background, the present study was done with the purpose to compare the results and advantage of external and endoscopic DCR including the patency rate, compliance of the patients and intraoperative and postoperative complications.

Materials and Methods

This was a prospective, non-randomized study, conducted in the Ophthalmology department of, in conjunction of Otorhinolaryngology department of at Al-Hilla teaching hospital, Iraq for the duration of 16 months from January 2017 to April 2018. Before starting the study, institutional ethical committee clearance was obtained. A total 80 eyes were included for 72 patients. External DCR was done in 30 eyes whereas endoscopic DCR was done in 50 eyes. All patients were evaluated and followed up to a minimum of six months at 1 month, 3 months and six months interval.

Regarding the patency of the stoma, it was checked by a sac syringing for external DCR and by both sac syringing and endoscopic inspection of the stoma for endoscopic DCR. The criteria for selection of cases were included in Table 1. In all cases, medical and ocular history was taken. The preoperative diagnosis for blockage level was depended on the syringing test and fluorescein infusion in the conjunctiva of lacrimal canaliculus (Jones test) with the observation of the stained nasal drainage and the patients whom were suspected to have canalicular obstruction were further evaluated and investigated by dacryocystography to confirm this.

Table- 1: Inclusion and exclusion criteria for external and endoscopic DCR

Inclusion criteria	Exclusion criteria
External DCR	
Middle aged with acquired primary chronic dacryocystitis with canalicular and nasolacrimal sac or duct obstruction	Acute dacryocystitis
	Lacrimal sac tumours
	H/O chronic hypertension
Mucopurulent material reflux	Prolonged BT, CT, PT
Evidence of obstruction on probing and irrigation	Children with H/O chronic dacryocystitis
Endoscopic DCR	
Young patient with acute or chronic Dacryocystitis	Deviated nasal septum
	Compromised access to middle meatus
Lacrimal abscess	Nasal polyps, tumours
Hypertensive patient with uncontrolled blood pressure	Atrophic rhinitis, paranasal suppuration
Good intranasal anatomy	
Failed external DCR	

DCR – Dacryocystorhinostomy; H/O – History of; BT – Bleeding time; CT – Clotting time; PT – Prothrombin time

All external DCR operations were done under local anaesthesia whereas all endoscopic DCR operations except in children, uncooperative patients and acute cases are done under local anaesthesia. In the latter, general anaesthesia was used. External DCR operations were performed by different ophthalmologists while all the endoscopic DCR operations were performed by a single otorhinolaryngologist.

The outcome and result regarding external and endoscopic DCR were categorized into a full cure or no improve depending on the degree of symptomatic improvement after the operation.

Revision surgeries were performed after the first-month follow-up in failed cases of endoscopic DCR. Results of these revision surgeries were included in the 6th month outcome.

Data of the surgical results and complications were being evaluated and compared by using χ^2 test. The outcomes were considered statistically significant at $P < 0.05$.

Results

In this study, 80 eyes of 72 patients were included. Fifty out of total 80 eyes had undergone endoscopic DCR and 30 had external DCR. Out of the total 50 in endoscopic DCR group, 25 underwent conventional endoscopic surgery, 13 eyes had powered endoscopic surgery and 12 underwent endoscopic DCR with silastic sheet. Silastic sheets were used only in cases of a narrow nasal cavity to prevent damage of septal mucosa and consequent synechia formation.

Most of the patients in the endoscopic group were in 31-40 year (34.1%), whereas in the external DCR group the majority of cases were in 41-50 years age group (27.3%). The mean age in endoscopic DCR group was 33.5 years. Regarding the mean age group in external DCR was much higher i.e., 46 years [Table 2]. The age distribution between

the groups was statistically significant. In both groups of patients, female preponderance was seen. Male constitute 20 cases (27.8%) while female constitutes 52 (72.2%) of cases. The male-female ratio in endoscopic group is 1:2.6 and external DCR group is 1:2.5. This difference was not statistically significant.

Table 2 Age distribution of cases according to a type of surgery done

Parameters	Age (in yrs)	
	Endoscopic DCR	External DCR
Mean	33.6	46.0
Standard deviation	±12.02	±13.03
Minimum	14.0	28.0
Maximum	56.0	75.0
P value	<0.0001 (S)	

DCR – Dacryocystorhinostomy

Overall, the eyes operated in different age groups showed preponderance of right eye. The percentage of right eye involvement was 63.8% and left eye involvement was 36.2%. This result was not statistically significant with respect to the side of the eyes between the groups.

The commonest indication for DCR was epiphora. Fifty-one eyes (63.7%) out of 80 presented with symptoms of lacrimation, 14 eyes (17.5%) had mucocele at the time of presentation along with epiphora and five patients were diagnosed as having acute dacryocystitis preoperatively on the basis of symptoms and treated medically before the operation.

The mean duration regarding symptoms of an endoscopic group was ,1.5 ± 0.698 years and in external DCR group was 1.46 ± 0.74 years (P = 0.837). There is no statistical importance between the groups with respect to the duration of symptoms.

The average duration of endoscopic DCR surgery was 49 minutes and 119.6 minutes for external DCR (P< 0.001). The minimum time taken for endoscopic surgery in all groups was 30 minutes and the maximum was 60 minutes. The minimum and maximum time for external DCR was 90 minutes and 150 minutes, respectively. The difference in duration of surgery between the groups was statistically significant.

Complications rate was lower in both surgery types. Complication included excessive intraoperative bleeding which was seen in 10 and five cases of external and endoscopic DCR respectively. Four patients had lacrimal sac flap loss during separation of sac from lacrimal fossa and loss of nasal mucosa during cutting occurs in two patients in external DCR. There were no such complications noted in endoscopic DCR surgery.

Massive to minimum intraoperative bleeding compared in two groups [Table 3]. Massive intraoperative bleeding was noted in 10 (33.3%) cases and moderate bleeding

in 14 (46.7%) cases in external DCR. In endoscopic DCR surgery, massive bleeding occurred only in 10% of cases and in most (56%) of the cases the minimum amount of bleeding noted. The difference was highly significant. All these complications were managed conservatively.

Table 3 Intraoperative bleeding associated with endoscopic and external DCR

Intraoperative bleeding	Endoscopic DCR		External DCR	
	No.	Percentage	No.	Percentage
Massive	5	10.0	10	33.3
Moderate	17	34.0	14	46.7
Minimum	28	56.0	6	20.0
Total	50	100.0	30	100.0

χ^2=14.01, *P*=0.001, DCR – Dacryocystorhinostomy

The average follows up period was 6.1 months. In an endoscopic DCR group, out of 50 cases, 45 cases (90%) demonstrated a primary surgical success, which is defined as a patent lacrimal system in the 1st month of the follow-up period. Twenty-nine (96.7%) out of 30 cases had a patent lacrimal passage and one presented with functional block after 1 month in external DCR group. The difference was great (*P*=0.046) [Table 4].

Table 4 Follow up at 1st and 6th months

Result of syringing	1st month				6th month			
	Endoscopic DCR		External DCR		Endoscopic DCR		External DCR	
	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
Patent	45	90	29	96.7	46	92	28	93.3
Partially blocked	0	0	1	3.3	0	0	0	0
Blocked	5	10	0	0	4	8	2	6.5
Total	50	100	30	100	50	100	30	100

In an endoscopic DCR group, all five (10%) of the patients having persistent neo-ostium obstruction subsequently undergo revision procedures. All except one patient who undergoes revision become free of epiphora and eventually had adequate and patent ostium. During follow-up period at 3 months, patency of lacrimal passage maintained in external DCR groups was the same as 1st month but in an endoscopic group, patency was increased after revision surgery (98%). However, at 6 months of follow-up, 46 (92%) out of 50 cases ultimately had a successful surgical outcome in endoscopic DCR compared to external DCR which showed a successful outcome in 28 (93.3%) out of 30 cases. Regarding difference wasn't statistically significant

(*P* =0.609). The failure rate in endoscopic and conventional dacryocystorhinostomy was 8% and 6.7%, respectively.

Discussion

External DCR surgery was been regarded as the gold standard in treatment for nasolacrimal duct obstruction.[9] The procedure has advantages of direct visualization regarding anatomical structures around lacrimal sac as compared to endoscopic DCR.[6] Disadvantages of this procedure includes skin scar and injury to canthal structures, CSF rhinorrhoea and functionally it interferes with the physiological action of lacrimal pumping system.[10]

However, endoscopic DCR is becoming popular among patients because of equally good results and especially due to lack of external scar.[6] Endoscopic DCR allow a direct inspection of lacrimal sac for underlying pathology and regarding the assessment of failure also can be noticed endoscopically, so immediately the mistakes can be corrected and fixed. Again it can be converted to external DCR in more difficult cases or patient with lacrimal sac tumours.[11]

Our study was a prospective, non-randomized study done on 80 eyes of 72 patients presented with epiphora or chronic dacryocystitis. In our study, female to male ratio was 2.69:1. This shows that the nasolacrimal sac and duct obstruction is more commonly occurrence in females than male. This result corroborates with previous studies.[12],[13],[14].

The mean age of the patients who those underwent endoscopic DCR was 33.6 year compared to external DCR group, which was 46 years. This indicates that acquired nasolacrimal duct obstruction is more common in the middle age group. There is a decrease towards extremes of age because of the fact that the amount of lacrimal secretion had less amount in the extremes of ages. Similar data were found by many previous workers.[6],[14],[15],[16] However, few workers found that the mean age group is slightly more than our findings.[5],[9],[13],[17].

In the present study, 63.7% of the cases presented with a disease on right side. This does not correlate with previous studies.[14],[18] However Nichlani *et al*., found right eye involvement more than left eye, which corroborates with our study.[19] In our study, the exact cause of right eye involvement in dacryocystitis was not known.

In our study, epiphora was the commonest symptom which found in the similar study.[9],[19],[20] Lacrimal irrigation and Jone's dye test were done in patients presented with epiphora to determine the level of obstruction. Eighty percent eyes presented as epiphora and mucocele whom these patients had the lacrimal sac and nasolacrimal duct obstruction; and other patients had a canalicular obstruction.

In a study in Bangladesh, duration of surgery in the endoscopic DCR was 59.7 ± 8.8 minutes which was greatly higher than for external DCR group which was 54.3 ± 5.6 minutes.[6] Muscatello *et al*., showed that mean time for endonasal endoscopic

DCR was thirty minutes, range from fifteen to one hundred and one minute and time progressively decreased with increasing surgical experience.[21] Hartikainen *et al*., concluded that average duration for endoscopic DCR was 38 minutes and 78 minutes for external DCR.[22] We found that average time required for endoscopic DCR was 49 minutes as compared to external DCR was 119.6 minutes. In our study in Iraq , we found that surgical times that required are in great relation to the experience of the surgeon and intraoperative bleeding. As most of the surgery in our study was done by residents who lack surgical experience, time taken was more.

The complication rate of surgery was low in both types of surgery. Complication of excessive intraoperative bleeding occurred in external and endoscopic DCR was 10 (33.3%) and five (10%) cases, respectively. This finding corroborates with a study done by Moras *et al*.[14] Again, in a study of seventy-nine external DCRs, fourteen patients had postoperative haemorrhage compared to zero from 51 patients in the endoscopic DCR group.[23] However, some studies show that bleeding is more common in endoscopic DCR surgeries. In the study by Khan *et al*., they found that there was moderate bleeding in 13.3% cases of external DCR and 20% cases of endoscopic DCR.[6] Karim *et al*., found no serious complication in their study, except only three patients (one in external DCR group and two in endoscopic DCR group) with postoperative haemorrhage requiring conservative treatment.[9] Other complications included lacrimal sac flap loss during separation of sac from lacrimal fossa and loss of nasal mucosa during cutting in external DCR. There were no such complications noted in endoscopic DCR surgery. However, there were no episodes of orbital hematoma, diplopia and cerebrospinal fluid (CSF) leakage in both groups in our study.

The average period of follow up was six month in our study. The primary surgical success rate in the endoscopic DCR was 90% and 96.7% in external DCR group after 1st month of follow–up period. In an endoscopic DCR group, all five (10%) of patients with persistent neo-ostium obstruction of subsequent revision procedures. At 6 month of follow-up, 46 (92%) out of 50 cases had a successful surgical outcome in endoscopic DCR compared to external DCR which showed 28 (93.3%) out of 30 cases a successful result. This difference was not greatly significant (P =0.609).

The success rates regarding endoscopic DCR appear as it compared to the "gold standard" external approach, with success rate ranging from 77% to 96%.[24],[25] Our success rate in both group is comparable to various studies. Khan *et al*., revealed that the success rate was 73.2 % with the endoscopic approach and 80 % with an external approach.[6] Karim *et al*., has found similar success rate in both approaches (endoscopic DCR 82.3 % versus external DCR 81.6 %; P =0.89).[9]

Our study had some limitations. Our study was a hospital-based study, which caused some bias in patient selection. The study period is also short. As younger patients preferred endoscopic DCR, there is a difference in the age group between the patients of endoscopic and external DCR. This may affect the surgical outcome which is a limitation of our study. Again as the endoscopic and external DCR procedures were

performed by different surgeons, which may also affect the surgical outcome. This is also a limitation of our study.

Conclusion

DCR is been regarded as the treatment of choice for nasolacrimal duct obstruction. It can be done by the external or endoscopic approach. Both these approaches have minimal complications and comparable surgical outcome. This indicates that the both DCR technique is acceptable and good alternatives. So it can be deduced that endoscopic DCR is safe procedure, minimally invasive effective day care technique with a good aesthetic result and the choice of surgery should depend on patient preference,also the availability of resources and surgeon's experience.

CONFLICT OF INTERESTS
There are no conflicts of interest.

References

1. Hughes SM. The history of lacrimal surgery. Adv Ophthalmic Plast Reconstr Surg. 5:139–68.[PubMed] 1986.
2. Caldwell GW. Two new operations for obstruction of the nasal duct, with preservation of the canaliculi, and with an incidental description of a new lacrimal probe. Am J Ophthalmol. 10:189–93. 1893.
3. West J. A window resection of the nasal duct in cases of stenosis. Trans Am Ophthalmol Soc. 12:654–8. [PMC free article] [PubMed] 1910.
4. McDonogh M, Meiring H. Endoscopic transnasal dacryocystorhinostomy. J Laryngol Otol. 103:585–7. [PubMed] 1989.
5. Wormald PJ. Powered endoscopic dacryocystorhinostomy. Laryngoscope.112:69–72. [PubMed] 2002.
6. Khan MK, Hossain MA, Hossain MJ, Al-Masud A, Rahman MZ. Comparative study of external and endoscopic endonasal dacryocystorhinostomy for the treatment of chronic dacryocystitis. JAFMC Bangladesh. 7:15–7. 2011.
7. Tarbet KJ, Custer PL. External dacryocystorhinostomy. Surgical success, patient satisfaction, and economic cost. Ophthalmology. 102:1065–70. [PubMed] 1995.
8. Durvasula V, Gatland DJ. Endoscopic dacryocystorhinostomy: Long-term results and evolution of surgical technique. J Laryngol Otol. 118:628–32. [PubMed] 2004.
9. Karim R, Ghabrial R, Lynch TF, Tang B. A comparison of external and endoscopic endonasal dacryocystorhinostomy for acquired nasolacrimal duct obstruction. Clin Ophthalmol. 5:979–89.[PMC free article] [PubMed] 2011.
10. Shun-Shin GA, Thurairajan G. External dacryocystorhinostomy-an end of an era? Br J Ophthalmol. 81:716–7. [PMC free article] [PubMed] 1997.
11. Zhou W, Zhou M, Li Z, Wang T. Endoscopic intranasal dacryocystorhinostomy in forty-five patients. Chin Med J (Engl) .109:747–8. [PubMed] 1996.
12. Hurwitz JJ, Rutherford S. Computerized survey of lacrimal surgery patients. Ophthalmology. 93:14–9. [PubMed] 1986.
13. Tan NC, Rajapaksa SP, Gaynor J, Nair SB. Mechanical endonasal dacryocystorhinostomy-a reproducible technique. Rhinology. 47:310–5. [PubMed] 2009.

14. Moras K, Bhat M, Shreyas CS, Mendonca N, Pinto G. External dacryocystorhinostomy versus endoscopic dacryocystorhinostomy: A comparison. J Clin Diagn Res. 5:182–6. 2011.
15. Gupta S, Goyal R, Thakur AS, Singh H. Conventional dacryocystorhinostomy versus endonasal dacryo-cystorhinostomy - a comparative study. Peoples J Sci Res. 1:1–4. 2008.
16. Küpper DS, Demarco RC, Resend R, Anselmo-Lima WT, Valera FC, Moribe I. Endoscopic nasal dacryocystorhinostomy: Results and advantages over the external approach. Braz J Otorhinolaryngol. 71:356–60. [PubMed] 2005.
17. Ben Simon GJ, Joseph J, Lee S, Schwarcz RM, McCann JD, Goldberg RA. External versus endoscopic dacryocystorhinostomy for acquired nasolacrimal duct obstruction in a tertiary referral center. Ophthalmology. 112:1463–8. [PubMed] 2005.
18. Vishwakarma R, Singh N, Ghosh R. A study of 272 cases of endoscopic dacryocystorhinostomy. Indian J Otolaryngol Head Neck Surg. 56:259–61. [PMC free article] [PubMed] 2004.
19. Nichlani SS, Jagade MV, Ganeshan A. A comparative study between endoscopic and external approach dacryocystorhinostomy. Bombay Hosp J. ;52:189–96. 2010.
20. Aslam S, Awan AH, Tayyab M. Endoscopic dacryocystorhinostomy: A Pakistani experience. Pak J Ophthalmol. 26:2–6. 2010.
21. Muscatello L, Giudice M, Spriano G, Tondini L. Endoscopic dacryocystorhinostomy: Personal experience. Acta Otorhinolaryngol Ital. 25:209–13. [PMC free article] [PubMed] 2005.
22. Hartikainen J, Antila J, Varpula M, Puukka P, Sepp H, Grénman R. Prospective randomized comparison of endonasal endoscopic dacryocystorhinostomy and external dacryocystorhinostomy. Laryngoscope. 108:1861–6. [PubMed]. 1998.
23. Cokkeser Y, Evereklioglu C, Er H. Comparative external versus endoscopic dacryocystorhinostomy: Result in 115 patients (130 eyes) Otolaryngol Head Neck Surg. 123:488–91. [PubMed] 2000.
24. Smith W, Merkonidis C, Draper M, Yung M. Endoscopic dacryocystorhinostomy in warfarinized patients. Am J Otolaryngol. 27:327–9. [PubMed] 2006.
25. Jin HR, Yeon JY, Choi MY. Endoscopic dacryocystorhinostomy: Creation of a large marsupialized lacrimal sac. J Korean Med Sci. 21:719–23. [PMC free article] [PubMed] 2006.

الخلاصة

المقدمة

عملية تصنيع المجرى الدمعي تتضمن تكوين مسار دمعي الى القناة الانفية لتسهيل تصريف الدمع عبر مسار دائمي في القناة المسدودة مسبقا.

الغرض

لعمل وتسجيل مقارنة بين اجراء العملية بالطريقة التقليدية او بالتنظير من حيث النتائج والمنافع والاضرار وهذا ما يخص المضاعفات والتزامات المرضى ومعدل النجاح المتعلقة بالعملية.

طريقة العمل

اجريت الدراسة في مستشفى الحلة الجراحي التعليمي في العراق وقد استغرقت لمدة ستة عشر شهرا وتم اجراؤها على مختلف المرضى, خمسون مريضا منهم كان بعملية التنظير و ثلاثون مريضا كان بالطريقة التقليدية وبعد العملية تمت متابعة المرضى لمدة ستة اشهر وكذلك تم تقييم ومقارنة النتائج باستخدام معادلات خاصة.

النتائج

تضمنت الدراسة اثنان وسبعون مريضا بينهم ستة تمت عمليتهم بكلتا العينين وعشرون مريضا ذكرا واثنان وخمسون انثى حيث كان معدل اعمار المرضى ثلاث وثلاثون سنة للذكور وست واربعون للإناث. العين اليمنى كانت اكثر تأثرا بنسبة 64% بينما العين اليسرى 36% . ان اكثر المضاعفات التي تم رصدها كانت افراز الدمع المفرط بنسبة 63.7% وفترة اجراء العملية كان بالطريقة التقليدية 120 دقيقة اطول من طريقة التنظير اما اكثر المضاعفات التي تم مشاهدتها مباشرة بعد العملية هو النزف بنسبة 30% بالطريقة التقليدية و10% بطريقة التنظير اما يتعلق بنسبة النجاح فقد كانت 70% و75% لطريقة التنظير والطريقة التقليدية تعاقبا.

الاستنتاج

عملية تصنيع المجرى الدمعي بطريقة التنظير تعتبر بسيطة وامنة واقل تداخل جراحي ونتائج يمكن ان تقارن بنتائج الطريقة التقليدية.