Endoscopic Endonasal Dacryocystorhinostomy Versus External Dacryocystorhinostomy

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ABSTRACT:

BACKGROUD:

Epiphora and recurrent dacryocystitis are common problems between adult patients consulting ophthalmic and ENT departments. They are occur mostly duo to obstruction of nasolacrimal duct for different causes. Surgical treatment is the only available way to treat them.

OBJECTIVE:

To study the clinical outcomes of a new endoscopic endonasal dacryocystorhinostomy (EENDCR) technique compared to the conventional external Dacryocystorhinostomy technique (Ext-DCR).

METHODS:

A retrospective, comparative cross sectional study on 105 cases with epiphora operated upon in 5 years (2004-2009), 60 consecutive EENDCRs and 45 Ext-DCRs. Patients with anatomic nasolacrimal duct obstruction were included in the study; previous lacrimal surgery, functional nasolacrimal, canalicular obstruction and nasal problems were excluded. Two surgeons performed the EENDCRs, using a standardized operative technique, which involved creation of a large bony ostium and mucosal flaps between the lacrimal sac mucosa and nasal mucosa. One surgeon performed all Ext-DCRs.

RESULTS:

53 patients (15 men, 38 women) underwent 60 EENDCRs. The average age of the patients was 40 years (range, 5 to 70 years). In the Ext-DCR group, 45 patients (14 men, 31 women) underwent 45 DCRs. The average age was 30.5 years (range, 6 to 49 years). The average follow-up time was 10 months for the EENDCR group and 12.2 months for the Ext-DCR group. Success was defined as relief of symptoms and by anatomic patency, which was assessed by history, fluorescein dye and syringing of lacrimal drainage system. The success rate was significantly higher in cases underwent Ext-DCRs {95.55% (43/45)} as compared to cases underwent EEDCRs {81.66% (49/60)}. ($P < 0.05$)

CONCLUSIONS:

Ext-DCR offers better symptom free outcomes (95.55%) than endoscopic DCR (81.66%). Patients who are more interested than others in cosmetic subject, their operations must be conducted with EENDR. A larger, randomized prospective trial is needed to fully assess the efficacy of this new technique.

KEYWORD: dacryocystorhinostomy, endoscopic, external.

INTRODUCTION:

Dacryocystorhinostomy (DCR) is a surgical procedure to create drainage between the lacrimal sac and nasal cavity. Dacryocystorhinostomy has been traditionally performed as an external procedure via an incision along the side of the nose to gain access into the lacrimal sac. Because endoscopic sinus surgery became popular in the 1990s, interest in endonasal endoscopic DCR has been growing.

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The aim of this retrospective study was to evaluate outcomes between non laser endoscopic and external DCR and to compare the results with previously published studies.

Since the introduction of EENDCR by McDonogh and Meiring in 1989,[1] there has been considerable controversy about its effectiveness compared with the more traditional Ext-DCR. Various success rates have been reported, with most in the region of 80% to 90%.[2-5] This success drops to the 65% to 80% range when laser DCR is performed.[6-9] This is in contrast to the success rate for external DCR, which in the hands of experts, reaches 95%.[10,11] One reason for this difference

may be the size of the ostium created at the time of surgery.[12]

MATERIALS AND METHODS:

A total of 98 consecutive patients underwent primary surgical DCR. The Ext-DCR surgeries were performed in medical city complex (specialized surgeries hospital) while all cases of EENDCR were performed in Al Hilla teaching hospital. A complete ophthalmologic examination to include visual acuity, slit lamp examination and metal probing and irrigation of the lacrimal drainage system allows confirmation of the diagnosis. A nasal examination was done for all patients to assess the feasibility of the surgery and rule out associated rhino-sinus pathology.

Seven patients only had bilateral EENDCR operations. The age range of the patients was from 5 to 70 years old, with a mean of 38 years.

Twenty eight (26.6%) of all cases had been subjected to recurrent dacryocystitis, and seventy seven (73.4%) were subject to intolerable epiphora ranging from 6 months to years. The operation of DCR is designed to affect the drainage of tears and infected secretion from the lacrimal sac into the middle meatus of the nose through a short circuit made in the lacrimal bone and nasal mucosa.

Ext- DCR Intra operative Details

Hypotensive general anesthesia has been employed and some degree of head-up tilt. The nose is packed with a solution containing 2 ml of 1:1000 epinephrine. The packing is left in the nose for most of the time of surgery till we need to incise the nasal mucosa. The head is fixed with the face turned away from the side of operation, and the patient is inclined by tilting the table, head up and feet down, about 15-20° so as to reduce venous congestion. The puncta are dilated and the lacrimal sac is irrigated with 0.9% normal saline through a lacrimal cannula passed along the upper canaliculus into the lacrimal sac. The curved incision, conforming to the anterior lacrimal crest, begins at the upper limit of the medial palpebral tendon, and below this it is deepened through the orbicularis muscle so that the whole of the anterior lacrimal crest is well exposed to view. Any bleeding points are clamped or sealed by bipolar cauterization. Traction sutures, inserted into each side of the incision, check the oozing of blood and facilitate undermining the orbicularis muscle on the temporal side and stripping this muscle from frontal process of the maxilla medial to the anterior lacrimal crest. The lacrimal fascia is incised 1 mm lateral to the anterior lacrimal crest and the bony attachment of the medial canthal ligament divided. With a blunt dissector, the sac is separated from the lacrimal fossa down to the opening of the nasolacrimal duct and, posteriorly, to the posterior lacrimal crests.

The ideal ostium is one which at least 1 cm in diameter. It is necessary to remove the anterior lacrimal crest down to the entrance of nasolacrimal duct. This is done with bone-nibbling forceps.

A probe passed through the upper canaliculus indicates the position of the common canaliculus and the related part of the medial sac wall. A vertical cut is made with knife or scissors through the medial lacrimal wall of the sac. A probe is passed into the lumen of the sac to verify its patency and to separate any intramural adhesions. After the removal of the probe, one blade of a pair of blunt-ended spring scissors is passed into the lumen of the sac, and the medial wall is slit horizontally near the fundus of the sac and below. Anterior and posterior panels of the lacrimal sac are thus fashioned.

The nasal mucosa is incised horizontally in the upper and then the lower limit of the ostium for its full diameter. These horizontal incisions are joined by a vertical incision which is made mid way between them.The posterior flaps or panels of the nasal mucosa and the lacrimal sac respectively are united by one suture of 6/0 vicryl.

Metal stents attached to silastic tubing at either end (O'Donoghue DCR set) are passed through the upper and lower canaliculi and recovered through the nose with. The metal stents are cut from the tubing, which is then stabilized to form a continuous loop around the canaliculi.

The anterior flaps of nasal mucosa and the lacrimal sac respectively are also united by interrupted sutures of 6/o vicryl.

The incision in the orbicularis muscle is closed with interrupted 5/0 absorbable sutures, and the skin incision is closed by interrupted sutures of 7/0 black braided silk. Debris is removed from the conjunctival sac and an antibiotic instilled. A layer of impregnated tulle or lubricant antibiotic ointment is placed over the incision, and a firm pressure dressing is applied.

EENDCR Intra operative Details

All operations were done under general anesthesia. The nose is packed with a solution containing 2 ml of 1:1000 epinephrine and 2 ml of 4% Xylocaine. The packing is left in the nose for 10 minutes. Using a 30° endoscope, 4 mm in diameter, the site of operation, in the area of the anterior attachment of the middle turbinate, is injected with 2% Xylocain and 1:100,000 epinephrine solution. Then

the sac area was denuded of mucosa using the cottle semi-sharp elevator. Partial middle turbinate reduction is not done as a routine. The intervening bone was removed using a spoon curette and thru-cutting forceps with appropriate caution, a portion of the uncinate process may also require removal to gain access and enlargement of the created window anteriorly and inferiorly usually done using Hajeck forceps. Probing with a metal probe allows tenting of the medial wall of the lacrimal sac. The lacrimal sac is opened with a 45° cutting forceps, and the opening is enlarged to approximately 0.5-1 cm, particularly in the inferior direction. No attempt is made at designing flaps. Metal stents attached to silastic tubing at either end (O'Donoghue DCR set) are passed through the upper and lower canaliculi and recovered through the nose with a Blakesley forceps. The metal stents are cut from the tubing, which is then stabilized to form a continuous loop around the canaliculi.

Follow-up:

The first dressing is done on the morning following operation and the gauze dressing for Ext-DCR is removed. On the fifth day, the skin stitches are removed for cases of Ext-DCR. Instruct the patient not to blow the nose strenuously for 2 weeks. Tobramycin eye drops are prescribed to be used 3 times daily for 10 days for all patients. The patient is reviewed 10 days postoperatively, and the nose is cleaned. Future reviews are planned as necessary. The tubing may be removed 4-6 months after surgery by cutting the exposed part at the medial canthus. The patient is then instructed to blow the nose strenuously into a paper tissue. The tubing remnants are then withdrawn through the nose with Killian nasal packing forceps. No attempt was made postoperatively to confirm the patient's subjective impression by using objective testing. However objective testing may include endoscopic visualization of the stoma during passive pressure on the sac externally or actively during blinking. Some authorities also advocate insertion of fluorescein dye eye drops and noting the site of drainage endoscopically. This was deemed unnecessary as objective positive findings in the absence of subjective results did not constitute success. The patients were followed up for at least 10-14 months postoperatively.

Statistical analysis

Z test for difference between two proportions was used and p-value <0.05 were considered statistically significant.

RESULTS:

Ninety eight patients were identified during the review period, of which 29 were males and 69 females. The average age of the patient at the time of surgery was 38 years (range, 5-70 years). Fifty three patients had endoscopic DCR and forty-five patients had Ext-DCR. Seven patients in the endoscopic DCR group had endoscopic surgery for the contralateral side during the review period. Hence, a total of 105 procedures were performed (45 external, 60 endoscopic). None of the patients in this study had revision surgery during the review period, nor did any patients have both types of DCR. The most common indication for surgery was epiphora (77/105,73.4%), followed by chronic dacryocystitis (28/105, 26.6%). All patients managed by endoscopic DCR were done by the Department of Otolaryngology had been previously assessed by the Department of Ophthalmology for site of obstruction and all patients managed by Ext-DCR were done by the department of ophthalmology assessed by department of Otolaryngology to exclude intranasal pathology. Patients with anatomic nasolacrimal duct obstruction were included in the study; previous lacrimal surgery, functional nasolacrimal and canalicular obstruction and nasal problems were exclusion criteria.

All procedures were performed under general anesthesia by the senior surgeons. O'Donoghue silastic stents were used in all cases. There were no conversions from endoscopic to external DCR. Most patients who had endoscopic DCR were either discharged on the same day of surgery (48/60, 80%) or the following day (12/60, 20%). All external DCR (45/45, 100%) patients were discharged on the following day. In addition to simple analgesics, all endoscopic DCR patients were discharged on saline nasal irrigation, and streptomycin eye drops, whereas those who had external DCR were discharged with streptomycin eye drops only. The average duration before stent removal was 20 (16 – 24) weeks for both methods. The average clinic follow-up duration for external DCR was 12.2 (range, 9 – 36) months compared with 10 (range, 7 - 24) months for endoscopic DCR.

Success was defined as completely resolved epiphora or partially improved epiphora at discharge or during reviewing period. Partially improved means, they are completely asymptomatic under normal condition and they had epiphora only when their eye was exposed to wind and other

environmental elements. Forty patients (66.6%) of those who had endoscopic DCR reported being asymptomatic, nine patients (15.0%) with partial improvement and only eleven patients (18.4%) with persistent symptoms. In comparison, Thirty five patients (77.7%) of external DCR patients reported being asymptomatic, whereas eight patients (17.7%) reported partial improvement and only two patients (4.6%) having persistent epiphora, as shown in table 1.

Table 1: Distribution of the patients by Type of surgery and its outcome

Type of surgery	Success			Persistent Epiphora	Total
	Asymptomatic	Partial Improvement	Total success		
EENDCR	40 (66.6%)	9 (15.0%)	49 (81.66%)	11 (18.34%)	60 (100.0%)
Ext-DCR	35 (77.7%)	8 (17.7%)	43 (95.55%)*	2(4.45%)	45(100.0%)
Total	75 (71.42%)	17 (16.19%)	92(87.62%)	13 (12.38%)	105 (100.0%)

* P-value = < 0.05

Table (1) shows that (81.66%) of the cases who underwent EENDCR had significant successful outcome, and (95.55%) of the cases who underwent Ext-DCR had also significant successful outcome. Statistical analysis shows that there was significant statistical association between the type of surgery and its outcome with a P-value of (< 0.05).

The postoperative complications in the EENDCR group was post operative bleeding at the site of opening in 3 cases which resolved with nasal packing and they did not need transfusion, and all of them were asymptomatic. There are 7 cases with occlusion of the new fenestrate, all of them end with persistent epiphora. In the Ext-DCR group, all patients had usual skin scar but 3 patients had increased scarring at the medial canthal area and they were unhappy with this appearance. Two females had severe bleeding during surgery, which resolved with nasal packing and they did not need transfusion. In one of them, we did only dacryocystectomy instead of DCR and she was one of two cases of persistent epiphora. All complications of both procedures are illustrated in (table 2).

Table 2:Distribution of the patients by Type of surgery and complication

Complications	EENDCR		Ext-DCR		Total	
	No.	%	No.	%	No.	%
Slipping of tube	1	1.65	0	0.00	1	0.95
Occlusion of lower puncta	1	1.65	0	0.00	1	0.95
Occlusion of the new fenestra	7	11.66	0	0.00	7	6.66
Acute dacryocystitis	2	3.33	1	2.22	3	2.85
Sever bleeding	3	5.0	2	4.44	5	4.76
Surgical emphysema	0	0.00	1	2.22	1	0.95
Conjunctivitis	0	0.00	1	2.22	1	0.95
Abnormal skin scar	0	0.00	3	6.67	3	2.85
Total	14	23.33*	8	17.77*	22	20.95

*P value > 0.05

In all procedures, 22 (20.95%) cases were found to have experienced of a wide varieties of complications after surgery. The endoscopic DCR group had 14 (23.33%) reported complications compared with 8 (17.77%) in the external DCR group. There was no significant statistical association between type of surgery and complications with a p-value > 0.05.

DISCUSSION:

The success rate in this study was 95.55% for external DCR compared with 81.66% for endoscopic DCR at the average clinic follow up period. These results were comparable with previously published data showing better outcome after external DCR (Table3).

Table 3: Comparison of outcomes between external and non-laser endoscopic DCR in the present study to other published studies.

Author	Country (y)	External DCR	Endoscopic DCR
Lester et al [13]	UK (2007)	46/49 (94%)	45/57 (79%)
Anari et al [14]	UK (2007)	46/49 (94%)	33/38 (87%)
Current study	IRAQ (2010)	43/45 (95.4%)	49/60 (81.6%)

One reason for this difference may be the size of the ostium created at the time of surgery.[12] The explanation for the relatively small ostium created in the endonasal technique is that endonasal surgeons have a poor understanding and orientation of the intranasal anatomy with the location of the lacrimal sac on the lateral wall of the nose.

However, there is some evidence that outcome for endoscopic DCR is comparable, if not superior to external DCR[15-18]. Various surgical methods have been described to minimize scarring, stenosis, and maintaining patency of the ostium. For example, Wormald [19] achieved more than 95% patency at an average of 11 months by fashioning a U-shaped flap over the ostial meatus, which purportedly led to primary intention healing without granulation.

The complication rate of endoscopic DCR in this study (21.6%) was nearly the same to previously published studies. Durvasula and Gatland [20] reported that 20% of their patients had complications. Lester et al [13] reported 19% complication rate, although only one case was regarded as significant epistaxis requiring nasal packing. The reported external DCR complications in this study (20%) were higher in comparison with other studies, some of which reported 2% to 3% [15,21,22].

The most important complication in our study is the permanent skin scar created by skin incision in all patients of Ext-DCR group. Although, it is insignificant in (42/45, 93.3%) but it is so significant and annoying in (3/45, 6.7%). Patients who are hesitated about skin scar in their face should be done by EENDCR.

The other advantage of this relatively new technique is can be done on a base of daily clinic when most patients were discharged on the same day of surgery (48/60, 80%) in comparison to (45/45,100%) patients were discharged on the following day for patients with Ext-DCR.

CONCLUSION:

In the present study, Ext-DCR offers better symptom free outcomes (95.55%) than endoscopic DCR (81.66%). Although endoscopic DCR was associated with fewer reported complications, the overall complication from DCR was mostly self-resolving. Patients who are more interested than others in cosmetic subject, their operations must be conducted with EENDR.

A postal questionnaire can be a good alternative method of assessing long term outcomes rather than relying solely on clinic follow up. Training to perform endonasal EENDCR has to be formalized to maintain current levels of service and continued improvement of surgical outcome in at least our teaching hospitals to make this type of surgery in more popular fashion.

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