External Versus Endoscopic Dacryocystorhinostomy for Recurrent Dacryocystitis after Endoscopic Dacryocystorhinostomy

Haitao Zhang
Guangdong Pharmaceutical University
Shuhao Shen
Guangdong Pharmaceutical University
Jiajun Yang
Guangdong Pharmaceutical University
Zhe Xu (oculistxuzhe@163.com)
Guangdong Pharmaceutical University https://orcid.org/0000-0001-7915-4755

Research article

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Abstract

Purpose

The aim of this study was to retrospectively compare the clinical effects of external dacryocystorhinostomy (EX-DCR) and endoscopic dacryocystorhinostomy (EN-DCR) on recurrent dacryocystitis after EN-DCR.

Methods

Thirty cases involving thirty eyes with post-EN-DCR recurrent dacryocystitis in our hospital between January 2015 and December 2018 were analyzed retrospectively. All of the patients underwent routine preoperative examination, including probing and irrigation of the lacrimal passage, nasal endoscopy, and maxilla-facial computed tomography scanning. Patients with nasal adhesions, nasal tumors and severe deviation of the nasal septum were excluded. Under general anesthesia, twelve patients underwent EN-DCR, and eighteen patients experienced EX-DCR under general anesthesia. Anti-inflammatory treatment was carried out after surgery for one week. The medical records of all the patients were tracked for one year.

Results

At the third month, all of the EN-DCR patients achieved good results with unobstructed lacrimal irrigation after removal of the bicanalicular tube stents. Sixteen EX-DCR patients had patency of the lacrimal passage, while two other patients exhibited obstructed lacrimal passage. However, at the twelfth month, ten EN-DCR patients had an obstructed lacrimal passage again, and there were only two patients remaining patency in lacrimal duct with a (success rate of 16.7%). In contrast, among the eighteen EX-DCR patients, fifteen cases achieved success with smooth irrigation of the lacrimal passage with a (success rate of 83.3%). There was a statistically significant difference between the two groups in the success rate for the longer follow-up period. No major intra- or post -treatment complications occurred.

Conclusions

EX-DCR is effective and safe with a higher success rate for the treatment of recurrent dacryocystitis after EN-DCR and might be considered as a primary compensate therapy for EN-DCR.

Introduction

EX-DCR is a commonly performed operation in which a fistula tract is created between the lacrimal sac and the nasal cavity to eliminate symptoms of epiphora caused by nasolacrimal duct obstruction. EX-DCR has disadvantages, including facial scarring and great injury, but it remains the golden standard for

patients with nasolacrimal duct obstruction. In recent years, EN-DCR has been widely used to treat obstruction of the lacrimal drainage system. EN-DCR has many advantages over EX- DCR, and has remained the preferred surgical method for dacryocystitis[1–5]. However, EN-DCR has a short history of use, recommendations or guidelines for failed EN-DCR have yet to be established. There are only a few of reports on the management of failed EN-DCR, with different success rate[6,7]. Here we compared two surgical methods (EN-DCR and EX-DCR) on recurrent dacryocystitis after first EN-DCR.

Material And Methods

This retrospective study included 30 patients who suffered from recurrent dacryocystitis after EN-DCR. The re-surgery was performed from 2015 to 2018 in the First Affiliated Hospital of Guangdong Pharmaceutical University. This study was conducted in accordance with the tenets of the Declaration of Helsinki. Institutional review board approval was not required for this retrospective study.

All of the patients had a clear diagnosis of recurrent dacryocystitis after EN-DCR based on lacrimal probing and irrigation. Nasal endoscopy and maxilla-facial computed tomography (CT) scans assessing the nasal anatomy. Patients with intranasal adhesions, or canalicular obstructions were excluded from the study. All of the patients underwent re-surgery (EN-DCR or EX-DCR) by the same surgeon.

The medical records of all of the patients were retrospectively reviewed. All of the patients were divided into two groups according to the form of re-surgery: EN-DCR versus EX-DCR.

Surgical procedure

EX-DCR

The procedure was initiated by filling the middle nasal passage of the operative side with gauze strips soaked with 1% tetracaine and one billion epinephrine and 1% ephedrine. First, an incision was made along the skin lines on the nasal side of the medial canthus, the subcutaneous tissue and muscle layer were separated, the periosteum of the anterior lacrimal crest was exposed, the periosteum was cut and the lacrimal sac and periosteum were peeled off to leave the lacrimal sac fossa. Crushed the thin bone plate of the inferior medial wall of the lacrimal sac fossa with the tip of a closed small blood vessel forceps, and enlarged the bone foramen to a size of 15mm×10mm in the direction of the lacrimal sac fossa. And then inserted the probe of the lacrimal passage into the lacrimal sac from the lacrimal punctum, cut the medial wall of the lacrimal sac and the nasal mucosa, cut off the posterior pages of the nasal mucosa and the lacrimal sac, and anastomosed the nasal mucosa and the anterior page of the lacrimal sac, finally sutured the skin incision.

EN-DCR

The procedure was initiated by filling the middle nasal passage of the operative side with a cotton piece soaked with epinephrine (concentration is 1: 10,000).Then, removed the original scar mucosa in an arc

below the axilla of the middle turbinate, enlarged the bone window by Kerrison's bone rongeur, cut the lacrimal sac in a "C" shape to make an inverted lacrimal sac flap, that could be anastomosed with the nasal mucosa, placed a silicon stent, and finally stuffed the expansion sponge to fix the anastomosis.

All of the patients received post-operative oral antibiotics and antibiotic-steroid eye drops for 7 days. Nasal cavity Spray with budesonide and irrigations with saline until the rhinostomy was entirely healed.

The medical records of all patients at one day, one week, three months and twelve months post-operation were reviewed retrospectively. All of the clinical evaluations included lacrimal pathway irrigation and endoscopy to assess the patency of the rhinostomy.

The bicanalicular tube stent was remained for three months. Anatomical success was described when a smooth ostium was achieved with irrigation.

Statistical analyses

Data were analyzed using SPSS software (version 24.0, SPSS, Inc., Chicago, IL, USA). Chi square test and Student's t-test were used to compare categorical data and numerical data between the two groups, respectively.

Results

To reduce errors in operation and to increase comparability, we enrolled patients with EN-DCR or EX-DCR who were performed by the same ophthalmologist.

A total of thirty patients were included in this study, three males (10%) and twenty seven females (90%). The mean age of the subjects was 55.8 ± 6.2 years in the EN-DCR group, and 51.4 ± 7.4 years in the EX-DCR group. Twelve eyes were included in the EN-DCR group, and eighteen eyes were included in the EX-DCR group. There were no significant differences in sex, age, laterality, and hypertension between the two groups. Baseline characteristics of patients are shown in Table 1. The overall success rate was 16.7% in the EN-DCR group and 83.3% in the EX-DCR group, with a statistically significant difference between the two groups (P□0.001, Fisher's exact test, Table 2). Compared to the EN-DCR group, the operation times were longer (54.4 ± 5.1 min vs. 26.2 ± 6.4 min, $P < 0.001$) in the EX-DCR group. The intraoperative blood loss was less in the EN-DCR group relative to the EX-DCR group(11.3 ± 3.1 ml vs. 31.1 ± 8.3 ml, $P < 0.001$).

Discussion

The application of EN-DCR has increased in recent years with a general development of endoscopic operations particularly sinus operations. EN-DCR is now considered by ophthalmologists and otolaryngologists as the modern gold standard for naso-lacrimal duct obstruction management[8,9]. Earlier reports showed that EN-DCR had a comparable success rates to those of EX-DCR[5,10–12], but with limitations of a comparatively small sample size and short-term follow-up. There were some reports

about long-term outcomes for EN-DCR[5,13,14], however, measures for recurrent dacryocystitis after EN-DCR have not been established.

The most common reason for recurrent dacryocystitis after EN-DCR was the formation of a membranous scar[15,16].The causes of a membranous scar were mainly related to a small lacrimal sac, excessive injury of the nasal mucosa, excessive bone exposure, septal deviation, allergic rhinitis, sinusitis or nasal polyps, the scar physique, and systemic diseases, such as sarcoidosis or Wegener's granuloma. In recurrent dacryocystitis after EN-DCR, the anatomical changes in the lacrimal sac were seen with endoscopy during surgery; that is, the cicatricial scar and shrinkage of lacrimal sac.

In this study, at the third month, review of post-operation, all of the EN-DCR patients obtained good results with unobstructed lacrimal irrigation after removal of the silicone stents. However, at the twelfth month, ten EN-DCR patients had obstructed lacrimal passage again and only two patients that remained patency in the lacrimal duct, achieving a (success rate of 16.7% which was lower than that in) previous reports[6,7,17]. The possible explanations are as follows. First, the previous endoscopic surgery left a cicatricial scar filling the center of the ostium. Although the scar mucosa was removed, thus new scars easily formed in the part of the ostium when revision surgery was performed. Second, duo to the obvious shrinkage of lacrimal sac after primary EN-DCR, it was difficult to make a larger ostium through revised EN-DCR. Therefore, the new ostium was very small and was easily closed again with time.

Although stenting is controversial because of the possible induction of granulation[18–20], it can help avoid obliteration and restenosis of the ostium, especially in patients requiring re-surgery. The patients in this study had a silicon stent for three months and exhibited no tube-related complications or granulomas in the ostium sites.

In this study, among eighteen EX-DCR patients, fifteen patients got success with a smooth irrigation of the lacrimal passage, achieving a (success rate of 83.3%). There was a statistically significant difference regarding success rate for the longer review period between the two groups. No major intra- or post treatment complications occurred. Thus EX-DCR is an effective and safe procedure with a higher success rate as a remedy for a failed primary EN-DCR and might be considered a preferred surgical method.

As illustrated in Fig. 1, the lacrimal opening of EX-DCR is different from that of EN-DCR. The lacrimal opening of EN-DCR is located in the middle and lower part of the lacrimal sac, while the lacrimal opening of EX-DCR is located in the middle and upper part of the lacrimal sac (as indicated by the arrow). For recurrent dacryocystitis after EN-DCR, the inner inferior part of the lacrimal sac was a cicatricial scar, therefore it was not suitable for another EN-DCR procedure. On the contrary, because the inner and upper part of the lacrimal sac was intact, it was suitable for EX-DCR. This explains why there was a higher success rate in the EX-DCR group compared with the EN-DCR group in remedy for a failed primary EN-DCR.

EX-DCR is considered the classic technology and is not out of date. It is very important to master EX-DCR. The advantages of an EX-DCR operation include a wide field of vision, full exposure of the operation area,

and a large bone window, making the ostium between lacrimal sac and nasal mucosa more accurately and stably. EX-DCR does not rely on advanced equipment and instrumentation, with a high long-term success rate, a stable operation effect and a high cost-effectiveness ratio. The main disadvantage is that skin scar affected appearance and the tear pump. The potential complications of EX-DCR included bleeding, infection, and lacrimal punctum valgus. However, for experienced doctors, the incidence of these complications was very low.

To sum up, as compared with EN-DCR, EX-DCR has a higher success rate in treating recurrent dacryocystitis after a first EN-DCR, which is worthy of recommendation. However, a multicenter, randomized, controlled study with a large sample is still needed.

Abbreviations

EX-DCR
external dacryocystorhinostomy
EN-DCR
endoscopic dacryocystorhinostomy

Declarations

Ethics approval and consent to participate

Approved by Ethics Committee of the First Affiliated Hospital of Guangdong Pharmaceutical University is not required for this retrospective study. All patients understood and signed informed consent form before surgery. This was recorded in the manuscript in Methods section.

Consent for publication

All participants have been given written consent for their personal details along with images to be published in this study . A copy of the written consent is available for review by the Editor of this journal.

Availability of data and material

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

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Author Contributions

Zhe Xu designed research; Haitao Zhang conducted research; Shu hao Shen and Jia jun Yang analyzed data; Haitao Zhang wrote the first draft of manuscript; Zhe Xu had primary responsibility for final content. All authors read and approved the final manuscript.

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Tables

Table 1

Comparisons of baseline characteristics between the two groups.

	EN-DCR	EX-DCR	P value
Sex			
Male/Female	1/11	2/16	0.804
Age (y), mean±SD	55.8±6.2	51.4±7.4	0.097
Laterality			
Right/Left	9/3	13/3	0.866
Hypertension	1/11	2/16	0.084

EX-DCR: external dacryocystorhinostomy; EN-DCR: endoscopic dacryocystorhinostomy.

Table 2

Comparisons of success rates, operation times and intraoperative blood loss between the two groups

	EN-DCR	EX-DCR	P value
Success rate(%)	16.7	83.3	<0.001
Operation time(min)	26.2±6.4	54.4±5.1	<0.001
Intraoperative blood loss(mL)	11.3±3.1	31.1±8.3	<0.001

EX-DCR: external dacryocystorhinostomy; EN-DCR: endoscopic dacryocystorhinostomy; min: minute; ml: milliliter.

Figures

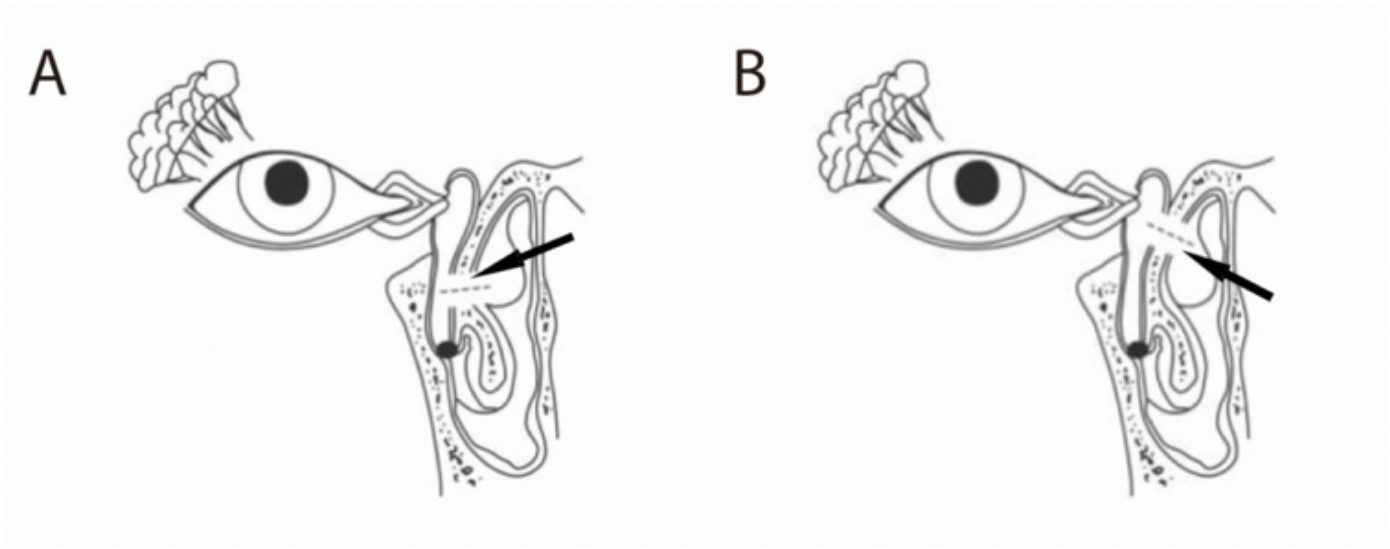

Figure 1

A. The lacrimal opening of EN-DCR is located in the middle and lower part of the lacrimal sac; B. the lacrimal opening of EX-DCR is located in the middle and upper part of the lacrimal sac (as indicated by the arrow).