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Research Article

Outcome of External Dacryocystorhinostomy with Excision of Both the Anterior Lacrimal Sac and Nasal Mucosal Flaps and Preservation of the Posterior Flaps

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Abstract

Purpose: An external dacryocystorhinostomy (Ex-DCR) is a surgical procedure wherein a fistula is created between the lacrimal sac and nasal mucosa. Although the conventional approach to an Ex-DCR procedure is time-consuming and may result in complications, it is considered the gold-standard technique for the management of nasolacrimal duct obstruction (NLDO). This study aimed to evaluate the outcomes of a modified Ex-DCR approach with intubation and in which both the anterior lacrimal sac and nasal mucosal flaps were excised while the posterior flap was left hanging free.

Methods: A retrospective chart review study, included all consecutive adult patients with primary NLDO who underwent modified Ex-DCR procedures. Data were collected from electronic patient records, including oculoplastic and orbital surgical notes. All patients underwent a minimum of 12 months of follow-up. Success was defined according to lacrimal patency and symptomatic relief.

Results: A total of 45 patients underwent modified Ex-DCR procedures with intubation and excision of both the anterior lacrimal sac and nasal mucosal flaps. During the 12-month follow-up period, 43 (95.6%) demonstrated a patent lacrimal drainage system and were symptom-free. Two patients (4.4%) developed secondary obstruction with persistent epiphora.

Conclusion: The excision of both the anterior lacrimal sac and nasal mucosal flaps during a modified Ex-DCR procedure resulted in a high success rate comparable to that reported in the international literature with standard techniques. In addition, this procedure might shorten the surgical time required. However, further studies are required to determine if such modifications hold a statistical advantage over conventional techniques.

Keywords: External Dacryocystorhinostomy; Nasolacrimal Duct Obstruction; Epiphora; Lacrimal Sac; Nasal Mucosa

Introduction

Primary or secondary nasolacrimal duct obstruction (NLDO) blocks normal lacrimal drainage, thereby causing an accumulation of tears [1]. A dacryocystorhinostomy (DCR) is a surgical procedure to bypass the site of the obstruction, eliminate fluid and mucus retention and increase tear drainage, thereby relieving epiphora [2]. During the procedure, an anastomosis is created between the lacrimal sac and lateral nasal mucosa via a bony ostium [3]. Various surgical approaches exist, including external (Ex) and endonasal laser-assisted or mechanical and transcanalicular laser-

assisted approaches [4]. Currently, an Ex-DCR is considered the gold standard of NLDO surgical treatment [5].

Depuy-Dutemps., *et al*. and Ohm first described the modern surgical method of performing an Ex-DCR procedure-in which both the posterior and anterior lacrimal sac and nasal mucosal flaps are sutured-with a success rate of 94% [6,7]. However, an Ex-DCR has the potential for primary failure and the procedure itself is often prolonged. Notably, the suturing of both the posterior and anterior flaps is often regarded as a particularly difficult and time-consuming step.[7] Therefore, a simple modification wherein the anterior flaps are excised while the posterior flaps are left hanging free might offer a shortened operating time.

Aim of the Study

This study aimed to examine the outcomes of this modified approach compared to other modified and conventional Ex-DCR techniques reported in the international literature. We hypothesized that this approach would simplify and speed up the procedure without adversely affecting patient outcomes. Although most modified Ex-DCR procedures involve excision of the posterior flaps [9,10] the anterior flaps were deemed to be a superior choice for excision in this study as they are more accessible and thus easier to remove.

Methods

This study was approved by the institutional medical research and ethical committee at Sultan Qaboos University. Written informed consent was obtained from all patients. The research adhered to the tenets of the Declaration of Helsinki as amended in 2008.

This retrospective chart review study assessed all consecutive adult patients who underwent an Ex-DCR with intubation and excision of both the anterior lacrimal sac and nasal mucosal flaps from January 2010 until December 2016. Data were obtained from electronic patient records as well as oculoplastic and orbital surgical notes. All patients underwent preoperative syringing of the lacrimal drainage system to confirm the exact level of obstruction. All patients had a minimum of 12 months of follow up. Success was defined objectively by the patency of the lacrimal passage upon irrigation and subjectively in terms of relief of symptoms.

The inclusion criteria included patients with primary acquired nasolacrimal duct obstruction (PANDO) and those with a history of previously failed lacrimal sac surgery. Patients with congenital nasolacrimal duct obstruction (CNLDO) who required initial probing or those with NLDO due to a secondary etiology (i.e. previous trauma with gross nasal deviation or a tumor) were excluded from the study.

All patients underwent Ex-DCR with intubation according to standard surgical techniques with minimal modification in that the anterior lacrimal sac and nasal mucosal flaps were excised. The procedures were done under general anesthesia and performed by one surgeon. The lateral wall of the nasal cavity above the inferior turbinate anterior to the middle turbinate was packed with neurosurgical cottonoids soaked with a solution of lignocaine with adrenaline (1:100,000) to minimize intraoperative bleeding and improve visibility.

At the level of the medial canthus, a 12-mm skin incision was made over the anterior lacrimal crest. Following the incision, a blunt dissection of the orbicularis muscle was performed to reach the periosteum. The anterior limb of the medial canthal tendon and the periosteum were then exposed. Following exposure, the periosteum was separated from the bone by elevating it laterally along the lacrimal sac in order to expose the lacrimal fossa. Once the lacrimal sac was exposed and elevated, the periosteum was excised.

The suture line between the thinner lacrimal bone and thicker maxilla was identified and a 10 x 10-mm ostium was created using both Hardy sella punch and Kerrison rongeurs. H-shaped flaps were fashioned in both the nasal mucosa and lacrimal sac; subsequently, the posterior flaps for both were left hanging free, while the anterior flaps were excised. A stent was then introduced into the ostium through the canaliculi and retrieved via the nose. Finally, both ends of the stent were tied in the nose and the skin was closed using 5.0 Vicryl® sutures (Ethicon Inc., Bridgewater, New Jersey, USA).

Postoperatively, all patients were prescribed a topical antibiotic ointment (Fucithalmic®, Amdipharm Ltd., Dublin, Ireland) to be applied twice daily on the wound for two weeks as well as topical antibiotic drops (Vigamox®, Alcon Laboratories Inc., Fort Worth, Texas, USA) to be applied four times daily into the operated side of the eye for one week.

Follow-up examinations were scheduled at one week, one month, three months, six months and one year after the surgery.

In all patients, the stent was removed after three months from the time of the surgery. During the follow-up examinations, lacrimal patency by irrigation and relief of the patient's symptoms was evaluated. The surgery was considered successful if the patient demonstrated no or minimal tearing and the nasolacrimal passage was patent upon syringing at the date of their last follow-up visit, whereas the surgery was considered to have failed if there was no symptomatic relief and the lacrimal passage was non-patent upon syringing. Data were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 23.

Results

A total of 45 adult patients were included in the study, comprising 32 females (71.1%) and 13 males (28.9%). All patients met the inclusion and exclusion criteria designed for this study. The patients ranged from 18 to 86 years of age with a mean preoperative age of 49.6 years. All patients underwent an Ex-DCR procedure with intubation and excision of both the anterior lacrimal sac and nasal mucosal flaps. The average procedure time was 35 minutes (range: 25 - 55 minutes). Intraoperatively, the patency of the lacrimal system was confirmed in all patients by assessing the passage of free fluid from the canalicular system into the nasal cavity. The success of the procedure was based on the patency of nasolacrimal passage upon irrigation and improvement of the patient's symptoms at the last follow-up visit.

The average number of postoperative follow-up visits was three. After 12 months of follow-up, 43 (95.6%) demonstrated a patent lacrimal drainage system and were symptom-free. Two patients (4.4%) developed a secondary obstruction with persistent epiphora which has been dealt with a repeated Ex-DCR.

Discussion

Overall, an Ex-DCR is considered the most reliable surgical technique in the management of NLDO [5,7]. However, the conventional procedure is technically difficult and often requires considerable experience on the part of the surgeon. In addition, complications and difficulties can arise while suturing the posterior and anterior flaps, as well as significant bleeding from angular vessels. As a result, various surgical modifications have been proposed in recent years. These include changes in incision placement, elevation of the medial canthal tendon, the use of instruments such as chisels, rongeurs and bone trephines and the placement of stenting materials [7].

Various authors have reported success utilizing a modified Ex-DCR approach wherein the anastomosis is created by suturing the anterior lacrimal and nasal mucosal flaps after excising the posterior flaps [8-10]. The procedure described in the present study serves as a logical extension of such research. In the current study, the anterior lacrimal sac and nasal mucosal flaps were excised while the posterior flaps were left hanging free. According to outcome measures of lacrimal patency and symptomatic relief, successful outcomes were reported in 95.6% of cases. This is comparable to success rates reported using conventional Ex-DCR techniques which range from 85 - 95% [5].

In a prospective study, Sharma., *et al*. reported successful outcomes in 92.9% of cases using a modified Ex-DCR procedure involving suturing of the anterior flaps and excision of the posterior flaps [8]. Similarly, Kacaniku., *et al*. compared two groups in which group A underwent a conventional Ex-DCR procedure while group B underwent a modified procedure with suturing of the anterior flaps and excision of the posterior flaps; success rates were 94.4% and 96.2%, respectively [11]. Using the same modifications, Dareshani., *et al*. and Nikose., *et al*. reported success rates of 95.45% and 90.60%, respectively [10,12].

Unfortunately, there is as yet no evidence to suggest that the choice of flap modifications during an Ex-DCR procedure results in a significant difference in outcome compared to the conventional technique [13]. According to a randomized clinical trial, there was no statistically significant difference in success rate between a procedure involving the suturing of both flaps and one in which the posterior flaps alone were excised [14]. Other researchers have reported a similarly high success rate (93%) with a modified procedure in which both the anterior and posterior flaps were removed; however, there was no statistically significant difference in success rate compared to those who underwent double flap anastomosis [15].

Nevertheless, existing research seems to indicate that modifications to the conventional Ex-DCR approach-like the one outlined in the present study-do not adversely affect patient outcomes, even if they do not have a clear statistical advantage [8-10,14,15]. Moreover, such modifications may have other benefits in terms of shortening operating time and reducing the technical difficulties associated with suturing the anterior lacrimal sac and nasal mucosal flaps [8,10,12]. Accordingly, the decision as to whether to remove

or retain the posterior and anterior flaps lies with the surgeon performing the procedure [13].

The average procedure time in our study was 35 minutes (range: 25 - 55 minutes), which was shorter compared to mean operative times for conventional Ex-DCR procedures. Nikose., *et al*. and Saha., *et al*. reported average operative times for conventional Ex-DCR procedures to be 84.66 and 119 minutes, respectively [10,16]. However, it may be argued that excision of the posterior flaps similarly shortens operating time. Sharma., *et al*. reported an average time of 36.48 minutes (range: 28 - 52 minutes) using a modified Ex-DCR procedure [8], Nikose., *et al*. reported a mean operative time of 60.47 minutes [10], while Baldeschi., *et al*. reported an average of 28 minutes (range: 23 - 44 minutes) [12], Hartikainen., *et al*. and Uludag., *et al*. reported mean operative times for modified Ex-DCR procedures to be 78 and 56.3 minutes, respectively [17,18].

Limitation of the Study

This study was limited by the low number of patients and the selection criteria, which included only patients with PANDO and those with a history of previously failed nasolacrimal surgeries. Moreover, due to the lack of a control group, statistical differences in patient outcomes and operating times between our modified Ex-DCR procedure and more conventional approaches could not be determined. As such, further studies with larger numbers of patients are needed.

Conclusion

In conclusion, the excision of the anterior lacrimal sac and nasal mucosal flaps during a modified Ex-DCR procedure resulted in a high success rate comparable to those reported in the international literature using standard Ex-DCR techniques. This procedure is easier to perform and might offer a shortened surgical time compared to a conventional approach. However, further randomized studies with larger numbers of patients are needed to compare the two techniques to determine if this modified approach holds a statistical advantage over conventional techniques.

Disclosure

We, the authors, declare that:

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2. We have no proprietary interests or any potential conflict of interests.

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