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CLINICAL STUDY

Anatomical and subjective success rates of endonasal dacryocystorhinostomy over a seven-year period

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Abstract

Purpose **Endonasal dacryocystorhinostomy (END-DCR) is a relatively novel approach that has recently been shown in some studies to provide similar success rates to the more traditional external approach for the treatment of nasolacrimal duct obstruction (NLDO). However, a range of success rates using this approach are reported within the literature and the majority of oculoplastic surgeons are still favouring the external approach. The purpose of this study was to review the anatomical and subjective success rates of END-DCRs performed over a 7-year period.**

Patients and methods **We provide a review of the success rates of 288 END-DCRs for the treatment of acquired NLDO performed over a 7-year period by a single oculoplastic surgeon in Sydney, Australia. We describe the operative technique used and define anatomical success as demonstrated patency of the nasolacrimal drainage system at 10 weeks postoperatively while subjective success is defined as complete resolution or significant improvement of symptoms as reported by patients at the same time point.**

Results **In our study, we were able to demonstrate that out of 288 END-DCRs, an average anatomical success rate of 89.6% and an average subjective success rate of 81.3% were achievable.**

Conclusions **We conclude that the success rates using our endonasal approach remain similar to those obtained using the external approach, as reported within the literature, and may be considered as a primary treatment option for acquired NLDO.**

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Introduction

Over the last two decades, endonasal dacryocystorhinostomy (END-DCR) has received much attention as a novel treatment of choice for acquired nasolacrimal duct obstruction (NLDO). The main benefits of END-DCR over the traditional external dacryocystorhinostomy (EXT-DCR) approach are well documented, including the absence of a visible scar, questionable preservation of the orbicularis oculi lacrimal pump mechanism, and less postoperative recovery time.[1] Furthermore, most patients undergoing END-DCR report an improvement in quality of life.[2]

Interestingly, however, a survey in 2013 conducted on members of the American Society of Ophthalmic, Plastic and Reconstructive Surgery revealed that only 62% of responders offered the endonasal approach, in contrast to 94% who offered the external approach.[3] The reasons for this are unclear, but are most likely due to the steep learning curve associated with this procedure.

Perhaps one additional reason for this discrepancy is an inconsistency in the reported success rates of END-DCR found within the literature. Some studies have reported success rates as low as 57%, while others have reported success rates of 100%.[4–6] A recent retrospective review of 1083 END-DCRs performed by a single surgeon reported a success rate of 92.7%.[7] The reasons for this variation are unclear but probably include differences in patient selection, exact surgical approach, surgeon experience, time to follow-up, and definition of 'success'.[8–11]

A meta-analysis conducted in 2014 comparing the success rates of END-DCR with EXT-DCR, where success was defined as, 'resolution of symptoms and/or anatomical patency', concluded that the overall success rate of END-DCR (excluding laser-assisted approaches) was 87%, which was the same as that of EXT-DCR.[12] The authors point out that this is less than the

'oft-quoted 90–95% from case series and is likely to reflect the bias in such lower level evidence'.

In light of this, we sought to publish our experience over a 7-year period of the success rate of END-DCR as a treatment for acquired NLDO. The details of our approach, including preoperative, intraoperative, and postoperative procedures, are included.

Materials and methods

The records of adult patients who underwent END-DCR over the last 7 years (January 2008–December 2014) by a single experienced oculoplastic surgeon in Sydney, Australia were reviewed. Patients had the following preoperative, intraoperative, and postoperative procedures.

Preoperative

A preoperative check consisted of a full history, including general medical history, ocular history, medications list, and any previous surgical history. Examination included slit-lamp examination, nasendoscopy to assess access and any pre-existing pathology that may point to the cause of the NLDO. Focused tests such as probing and syringing the nasolacrimal system and fluorescein dye disappearance (FDD) test were routinely performed on all patients. In addition, some patients underwent dacryoscintigraphy (DSR) to assess functional status of the nasolacrimal system while others underwent computed tomography (CT) imaging if considered appropriate by the surgeon.

Patients presenting with epiphora or dacryocystitis who were either anatomically obstructed (as demonstrated via probing and syringing) or functionally obstructed (as demonstrated on a nuclear medicine scan in conjunction with the FDD test) were included in this study. Exclusion criteria included lid malposition, previous DCR (either endonasal or external) on the affected side, and age less than 18 years.

Intraoperative

The following steps were performed intraoperatively:

- Local anaesthetic (2–4ml of 1% lignocaine with 1:100 000 adrenaline) was injected at the root of the middle turbinate while the patient is sedated with IV midazolam/propofol and fentanyl.
- An incision is made into the lateral nasal wall, just anterior to the middle turbinate and a flap is reflected posteriorly.
- The mucosal flap is excised, the bone is removed using a non-powered approach with Kerrison rongeurs.
- A bicanalicular silicone stent (Crawford tube) is inserted, the lacrimal sac is incised, and the ends of the tube are tied within the nasal cavity.
- Of note, adjunctive procedures such as septoplasty and polypectomy were not performed and we did not use antimetabolites such as mitomycin-C (MMC).

Postoperative

- The patient is discharged on the same day with a 1-month course of Chorsig (chloramphenicol) and Prednefrin forte (prednisolone and phenylephrine) eye drops (one drop q.i.d.) and a 5-day course of oral antibiotics (cephalexin 250 mg q.i.d.).
- The patient was seen at 1, 6, and 10 weeks postoperatively.
- At each visit the patient is asked about their symptoms.
- Nasendoscopy and FDD tests were performed at each visit.
- At the 6-week follow-up appointment, the silicone stent is removed. A blue filter disc is used in conjunction with nasendoscopy to assess passive and active egress of fluorescein instilled within the palpebral fissure from the newly created ostium.[13]
- The patient is finally seen at 10 weeks to assess the patency of the system.

Definition of success

Any patient who reported 'no epiphora' or 'much improved' at the 10-week follow-up visit and who also had a patent system on syringing was defined as an anatomical and subjective success. Patients who had a demonstrably patent system but who were not satisfied with the state of their symptoms were defined as an anatomical success but a subjective failure.

Results

A total of 288 END-DCRs were performed and followed up at 1, 6, and 10 weeks postoperatively between January 2008 and December 2014. This comprised a total of 262 patients, with 26 patients undergoing bilateral DCR within that 7-year period. The mean age of patients was 64 (range 18–91) with a female to male ratio of 2.4:1 (185 female patients; 77 male patients). Of the 288 DCRs, exactly 144 were performed on the left and 144 were performed on the right.

There were 54 failed DCRs, comprising 30 cases that were both anatomical and subjective failures while 24 were subjective failures only (anatomically successful).

There were no instances in which there was anatomical failure and subjective success. This translates to an anatomical success rate of 89.6% and a subjective success rate of 81.3%. The results by year are shown in Table 1 and Figure 1 and demonstrate that in our study there was no obvious learning curve across the 7-year period.

Discussion

If success is defined as 'resolution of symptoms and/or anatomical patency', our study is comparable to the findings of the recent meta-analysis conducted by Huang *et al*, with a success rate of 89.5%, similar to their figure of 87%.[12]

No adjunctive procedures such as septoplasty or polypectomy were performed on any of our patients. In our opinion, if such procedures are deemed necessary they should only be performed by an otolaryngologist, as recommended by Kim *et al*.[14] While some studies have demonstrated that such procedures improve success rates of END-DCR by improving access to the surgical site,[15] we have not found access to be difficult with decongestion of the lateral wall of the nose, after reflection and removal of the nasal mucosa.

Although several studies have advocated marsupialisation of the mucosal flap to reduce the formation of granulation tissue,[16] not all studies have shown that doing so improves success rates[17] and we have abandoned this approach some 10 years ago. In our approach, the nasal mucosa overlying the bony ostium is removed in total. In addition, we did not apply MMC intraoperatively, in keeping with a recent meta-analysis showing that MMC does not provide significant benefit in primary END-DCR with silicone intubation.[18]

Preoperative imaging studies such as CT scan or DSR were only performed on selected patients where deemed appropriate. This is in contrast to other studies where all included patients underwent formal preoperative imaging.[19]

Our study was limited by a relatively short follow-up period. However, a number of studies have shown that changes within the newly created ostium following END-DCR are minimal beyond 4 weeks postoperatively and that late failure is relatively uncommon.[20–23]

Conclusion

The literature contains studies that publish a large range of success rates for END-DCR in the treatment of acquired NLDO. This is likely related to several factors, not the least of which is varying inclusion/exclusion criteria, pre-operative, intraoperative, and postoperative procedures, and definitions of success.

We present a non-powered method of performing END-DCR under local anaesthetic with intravenous sedation that offers a success rate similar to the results of a recent meta-analysis comparing surgical success of EXT-DCR with END-DCR. We advocate the use of END-DCR as treatment for acquired NLDO but highlight factors that may lead to varying rates of success.

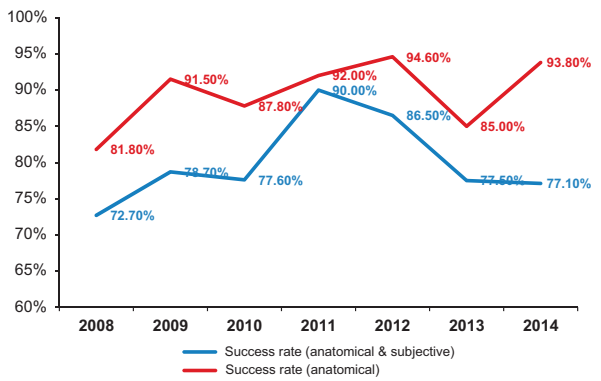

Figure 1 Trends in anatomical and subjective success rates of END-DCRs performed during the period 2008–2014.

Table 1 Yearly anatomical and subjective success rates of END-DCR performed during a 7-year period from 2008 to 2014

Year	*Total END-DCRs*	*Anatomical and subjective failures*	*Subjective failures only*	*Success rate (anatomical and subjective) (%)*	*Success rate (anatomical) (%)*
2008	33	6	3	72.70	81.80
2009	47	4	6	78.70	91.50
2010	49	6	5	77.60	87.80
2011	50	4	1	90.00	92.00
2012	37	2	3	86.50	94.60
2013	40	6	3	77.50	85.00
2014	32	2	3	77.10	93.80
Total	288	30	24	81.30	89.60

Summary

What was known before

- The success rates of endonasal dacryocystorhinostomy for the treatment of nasolacrimal duct obstruction varies within the literature.
- This variation is most likely related to several factors, including exact surgical approach, surgeon experience, patient selection, and definitions of success.
- Many oculoplastic surgeons do not offer the endonasal approach as a treatment option for nasolacrimal duct obstruction, despite the clear advantages to this approach.

What this study adds

- This study describes in detail the surgical approach used by one experienced oculoplastic surgeon when performing endonansal dacryocystorhinostomy as a primary treatment for acquired nasolacrimal duct obstruction.
- The study was able to show that the success rate of this surgical approach is similar to that of the external approach as described within a recent meta-analysis.
- The endonasal approach has distinct advantages over the external approach and as such should be considered as an alternative treatment option.

Conflict of interest

The authors declare no conflict of interest.

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