RCS ADVANCING SURGICAL STANDARDS

ENT

Ann R Coll Surg Engl 2013; **95**: 196–199
doi 10.1308/003588413X13511609957939

Long-term results of endonasal dacryocystorhinostomy with and without stenting

SH Mohamad[1], I Khan[2], M Shakeel[1], V Nandapalan[3]

[1]NHS Tayside, UK
[2]Nottingham University Hospitals NHS Trust, UK
[3]Aintree University Hospitals NHS Foundation Trust, UK

ABSTRACT

INTRODUCTION This study aimed to evaluate the short and long-term results of endoscopic dacryocystorhinostomy (DCR) with and without silicone stenting in chronic dacrocystorhinitis due to postsaccal blockage.

METHODS The study involved a case series of consecutive 89 patients (128 eyes) who underwent endoscopic DCR. All patients were operated on by the senior author. The stent group comprised 63 eyes (44 patients), for which the DCR was performed between September 2002 and September 2005. The non-stent group with 65 eyes (45 patients) underwent the DCR between October 2005 and December 2006. The follow-up duration was up to 33 months after surgery. The statistical significance (*p*-value) was calculated using the chi-squared test.

RESULTS The short-term success rate at six months' follow-up was 70% in the stent group and 97% in the non-stent group (p=0.0005) while the long-term success rate at 33 months was only 57% in stent group compared with 89% in the non-stent group (p=0.0003).

CONCLUSIONS In this study, the non-stent group showed a higher success rate than the stent group on both short and long-term follow-up. Our study suggests that postoperative stents are not necessary for primary DCR and may be associated with a worse outcome.

KEYWORDS

Dacryocystorhinostomy – Endoscopic – Silicone stent – Epiphora

Accepted 11 November 2012

CORRESPONDENCE TO

Shwan Mohamad, ENT Specialist Registrar, Ninewells Hospital, Dundee DD1 9SY, UK
E: shwanbashoory@yahoo.co.uk

Epiphora is defined as the overflow of tears. The degree of epiphora can range from the occasionally bothersome trickle to the chronically irritating overflow, which could be a source of social embarrassment. Acquired nasolacrimal duct (NLD) obstruction can be classified into primary and secondary. Primary NLD obstruction is caused by inflammation and fibrosis without any precipitating cause.[1] Secondary NLD obstruction can be due to infections, inflammatory reactions, neoplastic, traumatic or mechanical obstruction. Primary NLD obstruction is more common in middle-aged and elderly women. It has been demonstrated that women have significantly smaller dimensions in the lower nasolacrimal fossa and middle NLD.[2]

Dacryocystorhinostomy (DCR) is an effective and safe method for the treatment of NLD obstruction.[3] DCR for the treatment of NLD obstruction was first described via an external approach by Toti in 1904.[4] The perceived disadvantages of the external approach DCR include the risk of cutaneous scar and lengthy surgery with significant blood loss.[5–7] These potential problems have increased the popularity of minimally invasive endonasal approaches.

Endoscopic endonasal DCR has evolved from functional endoscopic sinus surgery. The first intranasal DCR was described by Caldwell in 1893.[5] In 1989 McDonogh and Meiring described the endoscopic transnasal DCR.[8] The advantages of endonasal DCR in comparison with external DCR include no visible scar, minimal blood loss and quicker surgery. Since this description, a number of modifications using laser have also been described as a useful tool in endoscopic DCR. Modifications have been reported using the holmium yttrium aluminium garnet (YAG), argon, carbon dioxide and potassium titanyl phosphate laser.[9–11] A transcanalicular approach with the neodymium doped YAG laser has also been described.[12]

DCR with or without stenting has been used widely in the treatment of NLD obstruction. There is some controversy regarding stenting for DCR. Allen and Berlin reported a higher failure rate when using silicone tubing[13] while Vishwakarma *et al* found a high success rate with stenting.[14] There have been many modifications to the surgical techniques in the treatment of epiphora due to NLD obstruction in the hope of improving surgical outcomes and

reducing patient morbidity. This study aimed to evaluate the short and long-term outcomes of DCR surgery with and without silicone stenting.

Methods

This retrospective case series included consecutive 89 patients (128 eyes). The data were collected from patient medical notes and a structured questionnaire. All surgery was carried out by the same surgeon (the senior author). This included 63 DCRs with stents (44 patients) between September 2002 and September 2005, using BD Visitec® (Beaver-Visitec, Abingdon, UK) DCR O'Donoghue stents (90cm x 4.5cm), and 65 DCRs without a stent (45 patients) between October 2005 and December 2006, using the same surgical technique. The mean age for the stent group was 73.2 years (range: 44–87 years) and for the non-stent group it was 75.5 years (range: 45–89 years). The patients were followed up and assessed at two weeks, six weeks, three months, six months and then annually.

The postsaccal block was assessed by ophthalmologists with sac washout, probing and dacrocystography. The exclusion criteria involved patients who had a previous DCR, concurrent sinonasal disease, eyelid anomaly, male patients (10 patients) and failed follow-up (11 patients).

Surgical technique

All procedures were performed by the same surgeon under general anaesthesia using 0º and 45º rigid endoscopes (Karl Storz, Tuttlingen, Germany). The nose was prepared using Moffat's solution (cocaine hydrochloride 10% 4ml, sodium bicarbonate 1% 4ml, adrenaline 1:1,000 2ml) and local infiltration of lignocaine with 1:80,000 adrenaline 2ml. The incision was made into the nasal mucosa on the lateral wall, about 5–10mm anterior to the attachment of the middle turbinate. An inferiorly-based mucosal flap over the maxillary and lacrimal bone was elevated. The thin lacrimal bone and the thick maxillary bone were identified. The thick bone from the frontal process of the maxilla was removed using straight and curved Smith-Kerrison punch forceps. The lacrimal sac was opened making a linear incision using a sickle knife. The mucosal flap was repositioned in the opening of the sac.

In the stent group, a bicanalicular O'Donoghue tube was inserted and the free ends were tied using 4/0 silk sutures. Tubes were removed at three months after the surgery. Postoperatively, all patients were prescribed betamethasone drops for two weeks for the operated eyes and saltwater nasal douches. All patients were assessed at two weeks, six weeks, three months, six months and one year. All cases were performed as day case surgery.

Results

The outcome measures included both subjective and objective assessments. The surgical success was defined by resolution of sign and symptoms (functional success) and a patent rhinostomy opening (anatomical success). A modified five-point Likert scale was used for subjective assessment.[15] Successful outcomes included either a complete resolution or significant improvement in symptoms with a score of 1–2 on the Likert scale. Unsuccessful outcomes included either slight improvement with minimal disability, no improvement or worsening of symptoms with a score of 3–5 on the Likert scale. The objective assessment was carried out by the operating surgeon endoscopically to assess the patency of the rhinostomy opening during the follow-up appointment in the outpatient clinic. In successful outcomes, further assessment was conducted by sac washout and dacrocystography.

Successful outcome

For the 89 patients who were included in the study overall, the functional success was 70% in the stent group and 97% in the non-stent group at 6 months' follow-up (p=0.0005) (Table 1). However, the success rate decreased to 57% for the stent group and 89% for the non-stent group at 33 months' follow-up (p=0.0003) (Table 2).

The anatomical success rate was 80% in the stent group and 100% in the non-stent group at 6 months' follow-up (p=0.0001) (Table 3). At 33 months' follow-up, there was a reduction in the success rate to 67% for the stent group and 93% for the non-stent group (p=0.0003) (Table 4).

Unsuccessful operations

Six eyes in the stent group and two eyes in the non-stent group did not show physical obstruction. Four eyes in the stent group later developed presaccal block and eight eyes were reoperated with a stent, with five of these showing improvement. However, there were no major intraoperative or postoperative complications.

Discussion

Endoscopic DCR has been performed commonly as an effective surgery to relieve epiphora due to NLD obstruction. The endoscopic approach not only avoids an external incision but also enhances the surgeon's ability to identify and correct common intranasal causes of DCR failure, including adhesions, an enlarged middle turbinate and ethmoid sinus disease.[16]

Endocanalicular stenting is believed to maintain the patency of the ostium during the postoperative period and healing process but its role remains to be determined. On the other hand, some studies indicate that the silicone stent itself is a reason for surgical failure due to granulation tissue formation and punctual erosion.[17,18] DCR without a stent has the advantage of a shortened operative time as well as avoidance of the complications associated with stents and the inconvenience to the patient of having the stents removed.[19] There continues to be controversy regarding the use of stents for DCR.

The present study aimed to compare the results of endoscopic DCR with and without stenting. Complete relief of symptoms was seen in 70% of the stent group and in 97% of the non-stent group at six months after the operation. This fell to 57% in patients with a stent and 89% in patients without a stent at 33 months' follow-up. Success rates of the

Table 1 Subjective (functional) results of endoscopic dacryocystorhinostomy at 6 months

Modified Likert score	With stent	Without stent	*p*-value
1 (No symptoms)	40	55	
2 (Significant improvement)	4	8	
3 (Slight improvement)	4	0	
4 (No improvement)	15	2	
5 (Worsening of symptoms)	0	0	
Results	44/63 (70%)	63/65 (97%)	**0.0005**

Table 2 Subjective (functional) results of endoscopic dacryocystorhinostomy at 36 months

Modified Likert score	With stent	Without stent	*p*-value
1 (No symptoms)	36	55	
2 (Significant improvement)	0	3	
3 (Slight improvement)	4	2	
4 (No improvement)	23	5	
5 (Worsening of symptoms)	0	0	
Results	36/63 (57%)	58/65 (89%)	**0.0003**

Table 3 Objective (anatomical) results of dacryocystorhinostomy at 6 months

	With stent	Without stent	*p*-value
Rhinostomy open	50	65	
Rhinostomy closed	13	0	
Results	50/63 (80%)	65/65 (100%)	**0.0001**

Table 4 Total anatomical results of dacryocystorhinostomy at 36 months

	With stent	Without stent	*p*-value
Rhinostomy open	42	60	
Rhinostomy closed	21	5	
Results	42/63 (67%)	60/65 (93%)	**0.0003**

endoscopic technique have been reported as 82–95%, with stents being removed from 4–24 weeks postoperatively.[20,21]

Jin *et al* reported a primary success rate of 83% for endoscopic DCR with a stent and in 17% of cases, the rhinostomy opening was found to be obstructed by granulations or synechia formation.[22] Singh *et al* reported a success rate of 92.6% for endoscopic DCR without a stent, with no major complication reported.[25] The use of stents in our study was found to be associated with eye irritation, displacement of the tube at the medial canthus, nasal crusting, granulation formation at the rhinostomy orifice and displacement of the tube in the middle meatus.

In this study, there were only few male patients among those who had DCR surgery. Male patients were therefore excluded to enable a comparison between a homogenous group of patients and a uniform analysis. Interestingly, in 4 patients (6 eyes) in the stent group and 2 patients (2 eyes) in the non-stent group, there was no physical obstruction and the patients were still symptomatic postoperatively despite of the presence of a patent rhinostomy opening. These patients appeared to have a functional problem in the lacrimal drainage system.

There are certain limitations to this study. The patients were not randomised and observers were not blinded. Despite the extensive experience of the operating surgeon in this field, a learning curve cannot be ruled out completely. However, having a relatively big sample size with a long follow-up duration (33 months) does add value to this

study because the outcome tends to fall with time: Mäntynen *et al* suggested a higher failure rate over a longer follow-up period.[24]

Conclusions

In our study, endoscopic DCRs without the use of silicone stenting showed higher success rates for both short and long-term periods compared with the DCRs with stenting. This suggests that stents are not necessary for primary DCRs and may be associated with a worse outcome.

Acknowledgement

This material from this paper was presented at the 1st Congress of the Confederation of European Otolaryngology – Head and Neck Surgery held in Barcelona, Spain, July 2011.

References

1. Linberg JV, McCormick SA. Primary acquired nasolacrimal duct obstruction. A clinicopathologic report and biopsy technique. *Ophthalmology* 1986; **93**: 1,055–1,063.
2. Groessl SA, Sires BS, Lemke BN. An anatomical basis for primary acquired nasolacrimal duct obstruction. *Arch Ophthalmol* 1997; **115**: 71–74.
3. Leong SC, MacEwen CJ, White PS. A systematic review of outcomes after dacryocystorhinostomy in adults. *Am J Rhinol Allergy* 2010; **24**: 81–90.
4. Griffiths JD. Nasal catheter use in dacryocystorhinostomy. *Ophthal Plast Reconstr Surg* 1991; **7**: 177–186.
5. Caldwell GW. Two new operations for obstruction of the nasal duct with preservation of the canaliculi and an incidental description of a new lacrimal probe. *NY Med J* 1893; **57**: 581.
6. Welham RA, Henderson PH. Results of dacryocystorhinostomy: analysis of causes for failure. *Trans Ophthalmol Soc UK* 1973; **93**: 601–609.
7. Welham RA. Investigations for patients undergoing lacrimal surgery. *Eye* 1998; **12**: 334–336.
8. McDonogh M, Meiring JH. Endoscopic transnasal dacryocystorhinostomy. *J Laryngol Otol* 1989; **103**: 585–587.
9. Metson R, Woog JJ, Puliafito CA. Endoscopic laser dacryocystorhinostomy. *Laryngoscope* 1994; **104**: 269–274.
10. Massaro BM, Gonnering RS, Harris GJ. Endonasal laser dacryocystorhinostomy. *Arch Ophthalmol* 1990; **108**: 1,172–1,176.
11. Gonnering RS, Lyon DB, Fisher JC. Endoscopic laser-assisted lacrimal surgery. *Am J Ophthalmol* 1991; **111**: 152–157.
12. Patel BC, Phillips B, McLeish WM *et al*. Transcanalicular neodymium: YAG laser for revision of dacryocystorhinostomy. *Ophthalmology* 1997; **104**: 1,191–1,197.
13. Allen K, Berlin AJ. Dacryocystorhinostomy failure: association with nasolacrimal silicone intubation. *Ophthalmic Surg* 1989; **20**: 486–489.
14. Vishwakarma R, Singh N, Ghosh R. A study of 272 cases of endoscopic dacryocystorhinostomy. *Indian J Otolaryngol Head Neck Surg* 2004; **56**: 259–261.
15. Likert R. A technique for the measurement of attitudes. *Arch Psychol* 1932; **140**: 1–55.
16. Metson R. Dacryocystorhinostomy. In: Kennedy DW, Zinreich SJ, Bolger WE. *Diseases of the Sinuses*. Hamilton: BC Decker; 2001. pp317–324.
17. Sharma BR. Non endoscopic endonasal dacryocystorhinostomy versus external dacryocystorhinostomy. *Kathmandu Univ Med J* 2008; **6**: 437–442.
18. Zílelíoğlu G, Tekeli O, Uğurba SH *et al*. Results of endoscopic endonasal non-laser dacryocystorhinostomy. *Doc Ophthalmol* 2002; **105**: 57–62.
19. Anderson RL, Edwards JJ. Indications, complications and results with silicone stents. *Ophthalmology* 1979; **86**: 1,474–1,487.
20. Mahapankar JB, Bradoo RA, Joshi A *et al*. Endoscopic dacryocystorhinostomy: an analysis of 16 patients. *Bombay Hosp J* 2002; **44**.
21. Sprekelsen MB, Barberán MT. Endoscopic dacryocystorhinostomy: surgical technique and results. *Laryngoscope* 1996; **106**: 187–189.
22. Jin HR, Yeon JY, Choi MY. Endoscopic dacryocystorhinostomy: creation of a large marsupialized lacrimal sac. *J Korean Med Sci* 2006; **21**: 719–723
23. Singh M, Jain V, Gupta SC, Singh SP. Intranasal endoscopic DCR (End-DCR) in cases of dacrocystitis. *Indian J Otolaryngol Head Neck Surg* 2004; **56**: 177–183.
24. Mäntynen J, Yoshitsugu M, Rautiainen M. Results of dacryocystorhinostomy in 96 patients. *Acta Otolaryngol Suppl* 1997; **529**: 187–189.