The Journal of Laryngology & Otology
August 2004, Vol. **118,** pp. 628–632

Endoscopic dacrocystorhinostomy: long-term results and evolution of surgical technique

V. S. P. Durvasula, D. J. Gatland

Abstract

This study evaluated the long-term results of endoscopic dacrocystorhinostomy (DCR) performed as a day-case procedure under local anaesthesia. It assessed the patient satisfaction with the procedure by retrospective review and a questionnaire survey.

Seventy patients were referred for endoscopic DCR to the senior author between 1997 and 2000. A success rate of 92 per cent was achieved at three months and it was possible to perform 85 per cent of cases under local anaesthetic; 91 per cent were discharged on the same day. Long-term follow up by postal survey revealed that the watering eye had improved following surgery in 83 per cent (follow up range = eight to 66 months; mean = 28.6 months). Eighty-eight per cent were satisfied with the tolerability of the procedure under local anaesthesia.

The authors describe changes in technique, which evolved with their experience of the procedure. Endoscopic dacrocystorhinostomy can be performed safely and successfully as a day-case procedure under local anaesthesia with excellent results and with great satisfaction to the patients.

Key words: Lacrimal Apparatus Diseases; Surgical Procedures, Operative; Endoscopes; Treatment Outcome

Introduction

McDonogh and Meiring[1] first described endoscopic transnasal dacrocystorhinostomy (DCR) in 1989. Various modifications have since been described using various lasers or drills to remove the bony covering of the lacrimal sac and duct. Although most series are reported as having been performed under general anaesthesia more recently, good results have been reported under local anaesthesia.[2,3]

In this study the efficacy of this procedure as a day case and feasibility of performing it under local anaesthesia using a modification of the procedure used in this Department were assessed. The authors also describe how the technique has evolved with experience.

Materials and methods

This paper is a retrospective study of 70 patients who underwent endoscopic DCR between April 1997 and December 2000. Their ages ranged from 38 to 92 years, with a mean of 68.6 years.

All the patients had been assessed by the Department of Ophthalmology as having distal obstruction of the nasolacrimal sac or duct and had been referred for endoscopic DCR. Lacrimal obstruction had been confirmed by syringing via the lacrimal puncta, supplemented by dacrocystography where the site of obstruction was not clear. Other causes of watering eye were excluded. No attempt was made by ENT surgeons to assess the patients as requiring endoscopic DCR. Otorhinolaryngological assessment included endoscopy of the nose to clarify that the maxillary line was accessible and that the lateral wall of the nose was normal. Any patient taking Aspirin was asked to discontinue medication 10 days prior to surgery. The senior author carried out all operations.

The intention was to carry out the surgery as a day-case procedure; the patients were offered local anaesthesia with the option of a general anaesthetic if they preferred.

Surgical procedure

Prior to local anaesthesia the patients were sedated with 1–3 mg of midazolam, and monitoring of electrocardiogram, blood pressure, pulse rate, and pulse oximetry was performed throughout the procedure. The conjunctiva was anaesthetized with amethocaine drops and local infiltration of the medial canthal area using 2 per cent lignocaine with

From the Department of ENT Surgery, Southend Hospital, Essex, UK.
Accepted for publication: 27 May 2004.
https://doi.org/10.1258/0022215041917835 Published online by Cambridge University Press

1 in 80 000 adrenalin was performed. The nasal cavity was prepared with neuropatties soaked in 10 per cent cocaine solution. The maxillary line demarcating the junction of the frontal process of the maxilla and the lacrimal bone was identified and the mucosa infiltrated with the same lignocaine/adrenalin solution.

A 30-degree Hopkins' rod endoscope was used for the procedure. In earlier series the site of the lacrimal sac had been demarcated by the use of a light pipe inserted by the ophthalmologist through one of the lacrimal canaliculi. It became clear to the authors, however, that this shows the thin lacrimal bone which overlies the posterior aspect of the lacrimal sac, with the risk of opening the orbit as the fat is illuminated, and also that there may be inadequate removal of the thick frontal process of the maxilla which does not show with the light pipe, resulting in a limited exposure of the sac with increased risk of post-operative stenosis of the stoma. The anatomy of the area was therefore exposed by dissection, and with experience it was found that there was no need for a light pipe. A disposable ophthalmic keratome was found to be the sharpest and best-angled instrument for incising soft tissues in the lateral wall. Using this keratome an incision is made anterior to the maxillary line in front of the anterior end of the middle turbinate. A mucosal flap is elevated and trimmed and the frontal process of the maxilla and lacrimal bone are identified. Using the Kerrison bony rongeur the frontal process of the maxilla is punched out from behind and the lacrimal bone is removed using a periosteal elevator. This exposes the lacrimal sac and duct, which are incised with the keratome and the redundant medial wall excised using through-cutting forceps. The residual medial wall of the sac was then laid out over the adjacent bare bone to abut the mucosal resection, thus minimizing bare bone, with less granulation formation. With experience it was found that the medial wall could be preserved by using a stellate incision and laying out the resulting mucosal flaps over the bone. Initially the referring ophthalmologist attended to insert the O'Donoghue tubes, however it was difficult for a busy consultant ophthalmologist to set aside a list to do this so the senior author learned this procedure under guidance from an ophthalmologist and subsequently undertook the tube insertions without an ophthalmologist in attendance. The operating microscope with 250 mm lens is used to visualize the lacrimal puncta, which are then dilated using a Nettleship dilator, and straight O'Donoghue tubes are passed into the lacrimal sac through the lacrimal canaliculi. It is important to keep the canaliculi on the stretch using a swab or eyelid forceps to reduce the chances of making a false passage. The sight of both tubes emerging from the common canaliculus confirms the avoidance of a false passage. The tubes are tied together high within the lacrimal sac to reduce the chance of the tubes making their way up into the conjunctival sac. Long 'tails' are left to facilitate removal of the tubes, which is carried out at three months.

The dacrocystostome is then packed open with Merogel (Xomed). This was found to 'glue' the sac mucosal flaps open, which it was felt would reduce the risk of post-operative stomal stenosis. The patient is observed for two to three hours and discharged if there is no evidence of bleeding. The patients were given Betnesol N eye drops and Mometasone nose sprays to reduce granulation around the lacrimal window. Follow up three months later involved removal of the O'Donaghue tubes and endoscopic visualization of the stoma and objective evidence of tear drainage while blinking. No further routine follow up is arranged at this stage if the operation is found to be successful, with a healed stoma. The patients were advised to return if there were any problems or recurrent symptoms but were not brought back routinely. Follow-up data were obtained by telephone and postal questionnaire.

Collection of data

Data were collected from the case notes regarding the clinical presentation and operative technique, together with any post-operative complications and results.

All patients were contacted by post or telephone where they were requested to fill out a postal questionnaire and the data were collected with regards to symptoms and also whether or not the patients could tolerate the procedure easily.

Clinical findings

Seventy patients underwent the procedure, of whom 23 were male and 47 were female. Their ages ranged from 38 to 92 years, with a mean age of 68.6 years. Five patients underwent bilateral surgery. One patient had revision surgery for a failed primary endoscopic DCR performed elsewhere (successfully on this occasion).

Twelve patients had a history of dacrocystitis and 14 patients had a mucocele. Co-existent nasal pathology was found in only four patients: two had allergic rhinitis and two had nasal polyposis. Two patients required septoplasty to gain access to the area of the lacrimal sac and duct.

Sixty patients were operated under local anaesthesia. While six patients opted for general anaesthetic, two patients requiring septoplasty and one patient with Downs syndrome had general anaesthesia. One patient who had raised blood pressure during the procedure required conversion to general anaesthesia due to inadequate local anaesthesia with difficult operative conditions.

Sixty-four patients (92 per cent) were discharged on the same day. Two patients required nasal packing due to reactionary haemorrhage, and four patients who had general anaesthesia were observed overnight in view of their advanced age or medical problems.

Complications

Premature stent extrusion (due to fracture of the tube) was noted in six patients, post-operative dacrocystitis requiring treatment with antibiotics was

https://doi.org/10.1258/0022215041917835 Published online by Cambridge University Press

TABLE I

COMPLICATIONS ENCOUNTERED

Complication	Total number	Successful result	Failure*
Premature extrusion of stent	6	3	3
Post-operative dacrocystitis	4	3	1
Secondary haemorrhage	2	2	0
Post-operative punctal stenosis	2	0	2

*Failures encountered in this series were all associated with complications
Total number of patients n = 70

noted in four patients and two patients had secondary haemorrhage, which was severe enough in one patient to require packing (Table I).

Results

At three months follow up there was symptomatic cure in 64 patients (92 per cent), all of whom reported a dry, comfortable eye (Table II). The procedure was unsuccessful in six patients. In three of these premature stent extrusion due to fracture of the tube had occurred, while in two patients post-operative lacrimal punctal stenosis resulting in recurrent watery eye was noted. One patient who developed dacrocystitis post-operatively (requiring treatment with antibiotics and stent removal) also failed to show symptomatic improvement.

Using a telephone and postal questionnaire survey it was possible to contact 62 patients. Eighty-eight

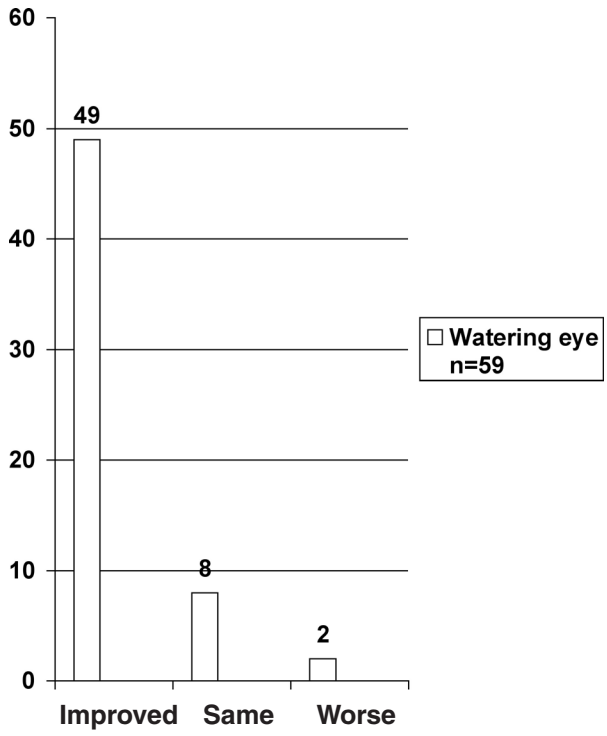

FIG. 1

Long-term outcome in the 59 questionnaire responses. Mean follow up of 28.6 months (range = 8–66 months).

TABLE II

SUCCESS RATE

At 3 months follow up	64/70 (92%)
At long-term follow up* by Questionnaire	49/59 (83%)**

*Long-term follow up mean = 28.6 months, range = 8-66 months
**62 patients could be contacted, out of which three were too old and confused

per cent were happy that the procedure was tolerable (Figure 1) and 83 per cent felt the eye watering improved after it. (Figure 2) (Table III). The mean follow up was 28.6 months (range eight to 66 months, median follow up 24 months).

Discussion

A 92 per cent success rate was recorded in this series when the patients were reviewed three months after the procedure. Review of the literature shows a 75–99 per cent success rate with external DCR.[4] Success rates are reported as 82–95 per cent with endoscopic DCR without the use of a laser and a slightly lower success rate using the laser, 77–83 per cent.[5]

The success rates depend upon providing a wide intranasal stoma with removal of adequate bone around the stomal area reducing the chances of post-operative stenosis and adhesions. A septoplasty may sometimes be required to gain access. Inadequate bone removal is the commonest cause of post-operative stomal stenosis.[6] In this series a bony rongeur was used to remove the frontal process of the maxilla. Use of drills and lasers is known to increase fibrosis and scarring.[2] The authors suspect that the laser induces granulations due to bare bone and thermal damage.

Whittet *et al.*[7] used pre-operative computed

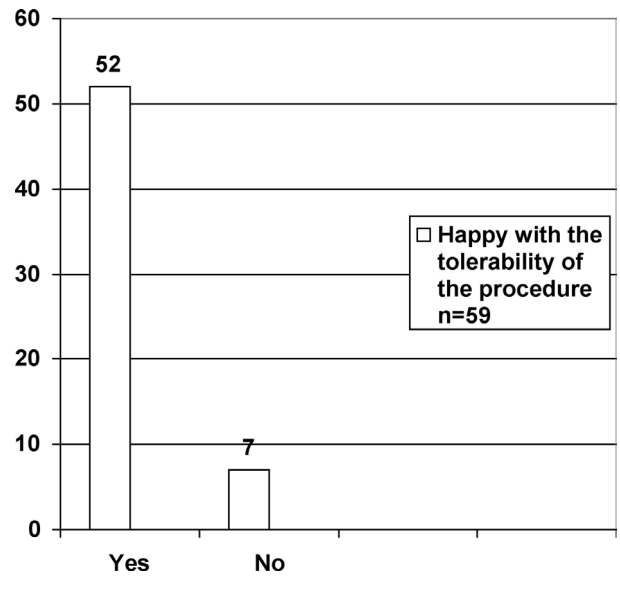

FIG. 2

Patient response to the question whether or not they are happy with the tolerability of the procedure performed under local anaesthesia in a day-case set up.

https://doi.org/10.1258/0022215041917835 Published online by Cambridge University Press

TABLE III
RESULTS OF QUESTIONNAIRE SURVEY

Improvement of	49 (83%) (Improved)	8 (13%) (Same)	2 (4%) (Worse)
Watering eye			
Satisfied with tolerability of procedure	52 (88%) (Yes)	7 (12%) (No)	

n = 59, follow-up range 8–66 months, mean 28.6 months

tomography (CT) scans and dacrocystograms to evaluate the paranasal sinuses and lacrimal apparatus and thought their use mandatory. This was not, however, felt necessary for diagnosis by our ophthalmological colleagues, who find that lacrimal syringing with dacrocystography, when required, is adequate for showing whether the obstruction is within the sac or duct rather than the puncta or common canaliculus. Scans were not necessary from an ENT point of view where nasendoscopy provided all the necessary information.

- **This is a retrospective review and questionnaire survey of a series of 70 patients referred for endoscopic dacrocystorhinostomy over a three-year period**
- **It describes evolution of the surgical technique by the senior author**
- **The three-month and long-term results are comparable to other reports and support the effectiveness of endoscopic dacrocystorhinostomy**
- **The report also emphasizes the patient acceptability of the surgical procedure performed under local anaesthetic and as a day-case procedure**

Silicone stenting has been thought to cause failures due to granuloma formation, synechiae and punctal erosions.[8] The authors routinely used silicone stenting in their patients (O'Donoghue tubes). Granuloma was seen in only one patient and punctal stenosis in two patients. Routine crust removal and clearing of granulations was not carried out in the present cases as the authors believe that these can only increase local trauma. Premature stent extrusion was the commonest complication; this was seen in six patients, of whom three were eventually unsuccessful. Bousch[9] observed a strong relationship between stent retention and success rate. The authors suggest the use of stents for three months. The steroid spray and steroid eye drops used post-operatively may help in preventing granulations.

Long-term follow up by postal survey revealed an 83 per cent success rate with a mean follow up of 28.6 months. Mantynen *et al.*[5] suggested a higher failure rate over a longer follow-up period. Watters *et al.*[10] in a series of 40 patients reported a success rate of 86 per cent with a mean follow up of 18 months (range one to 46 months) following endoscopic DCR using a questionnaire survey. In the present series patients were assessed both subjectively and objectively at three months and a subjective outcome measure was used on a long-term basis. Evaluation of post-operative results involves subjective improvement of epiphora.[11,12] Some authors have, however, used objective methods to monitor patients.[13–16] The authors have found no need to assess the patients objectively on a long-term basis once the patency of the stoma was observed at three months.

Good functional results of endoscopic DCR can be explained by the fact that the pump action of the orbicularis oculi muscle remains intact. Kamel *et al.*[17] have noted that pump mechanism is better maintained with an endoscopic procedure as compared with external DCR where the muscle is divided.

The advent of endoscopes has made endoscopic DCR a preferred method. A good knowledge of the anatomy and variations in the lateral nasal wall is essential. As with any surgical procedure, a learning curve is involved and the outcome can be expected to improve with time.

It was possible to operate under local anaesthesia in most of the authors' cases. The mean age of the patients is high (68.5 years) and avoidance of general anaesthesia is an advantage.[18] Yung[2] in a series of 81 cases reported no problems in operating under local anaesthesia.

The procedure can be performed as a day case with good results. In this postal survey 88 per cent were happy with the tolerability of the procedure as performed under local anaesthetic as a day case. Eighty-six per cent of patients recommended the procedure under local anaesthetic in a recent study.[18] This series shows that the patients can be discharged the same day unless adjunctive surgery is required or complication supervenes, both of which are not common. The results in a postal survey also suggest patient satisfaction with the outcome.

Conclusion

Endoscopic DCR can be performed with excellent results under local anaesthesia as a day-case procedure. The immediate and long-term results are excellent, with success rates of 92 per cent at three months and 83 per cent in the long-term (mean follow up of 28.6 months). Patient satisfaction with regards to tolerability of the procedure under local anaesthesia as a day case is also high, as shown by the present questionnaire.

References

1 McDonogh M, Meiring JH. Endoscopic transnasal dacrocystorhinostomy. *J Laryngol Otol* 1989;**100**:585–7
2 Yung MW, Hardman-Lea S. Endoscopic inferior dacrocystorhinostomy. *Clin Otolaryngol* 1998;**23**: 152–7
3 Tripathi A, Lesser J, O'Donnell NP, White S. Local anaesthetic endonasal endoscopic dacrocystorhinostomy: analysis of patients' acceptability and various factors affecting the success of the procedure. *Eye* 2002;**16**:146–9

https://doi.org/10.1258/0022215041917835 Published online by Cambridge University Press

4 Allen K, Berlin AJ. Results of endoscopic KTP Laser assisted dacrocystorhinostomy. *Ophthalmol Plast Reconstr Surg* 1989;**20**:486–9
5 Mantynen J, Yoshitsugu M, Rautiainen M. Results of dacrocystorhinostomy in 96 patients. *Acta Otolaryngol Suppl (Stockholm)* 1997;**529**:187–9
6 Welham RA. Management of unsuccessful lacrimal surgery. *Br J Ophthalmol* 1987;**71**:152–7
7 Whittet HB, Shun-Shin GA, Awdry P. Functional endoscopic transnasal dacrocystorhinostomy. *Eye* 1993;**7**: 545–9
8 Anderson RL, Edwards JJ. Indications, complications and results with silicone stents. *Ophthalmology* 1979;**86**: 1474–87
9 Bousch GA, Bradley NL, Dortzbach RK. Results of endonasal laser assisted dacrocystorhinostomy. *Ophthalmology* 1994;**101**:955–9
10 Watters GWR, Whittet HB, Shun-shin GA, Milford CA. Endoscopic transnasal dacrocystorhinostomy- long-term results. *Min Invas Ther Allied Technol* 1996;**5**:505–10
11 Eloy P, Bertrand B, Martinez M, Hoebeke M, Watelet JB, Jamart J. Endonasal dacrocystorhinostomy: Indications, technique, and results. *Rhinology* 1995;**33**:229–33
12 Spreckelsen MB, Barberan MT. Surgical technique and results. *Laryngoscope* 1996;**106**:187–9
13 Metson R. The endoscopic approach for revision dacrocystorhinostomy. *Laryngoscope* 1990:**100**:1344–7
14 Pearlman SJ, Michalos P, Leib ML, Moazed KT. Translacrimal transnasal laser-assisted dacrocystorhinostomy. *Laryngoscope* 1997:**107**:1362–5
15 Ezra E, Restori M, Mannor GE, Rose GE. Ultrasonic assessment of rhinostomy size following external dacrocystorhinostomy. *Br J Ophthalmol* 1998:**82**:786–9
16 Mauriello JA, Vahedra V, Fleckner M, Shah C. Correlation of orbital computed tomography findings with office probing and irrigation in 17 patients after successful and failed dacrocystorhinostomy. *Ophthal Plast Reconstr Surg* 1999:**15**:116–20
17 Kamel R, Gamal El-Deen H, Salah El-Deen Y, El-Hamshary M, Assal A, Farid M, et al. Manometric measurement of lacrimal sac pressure after endoscopic and external dacrocystorhinostomy. *Acta Otolaryngol* 2003:**123**:325–9
18 Kratky V, Hurwitz JJ, Ananthanarayan C, Avram DR. Dacrocystorhinostomy in elderly patients: Regional anesthesia without cocaine. *Can J Ophthalmol* 1994:**29**: 13–6

Address for correspondence:
Mr D. J. Gatland,
Consultant Otolaryngologist,
Department of ENT Surgery,
Southend Hospital,
Prittlewell Chase,
Westcliff on Sea,
Essex SS0 0RY, UK.

E-mail: davidgatland@btopenworld.co.uk

Mr D. J. Gatland takes responsibility for the integrity of the content of of the paper.
Conflicting interests: None declared