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Main Article

Endoscopic 'cold steel' versus laser dacryocystorhinostomy: completing the audit cycle

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Abstract

Introduction: Dacryocystorhinostomy via an endonasal route has been adopted in our department. This audit study describes and compares our results for external, laser endonasal and 'cold steel' endonasal techniques. Success was defined as a subjective report of eye watering being 'better' or 'cured'. Data were obtained from a retrospective review of the medical records of all patients undergoing primary dacryocystorhinostomy in our department.

'Gold standard': External dacryocystorhinostomy performed by a consultant ophthalmologist was taken as our gold standard. In our study, the success rate for external dacryocystorhinostomy was 94 per cent.

First cycle – laser-assisted endonasal dacryocystorhinostomy: Our initial results for endonasal laser-assisted dacryocystorhinostomy produced a success rate of 64 per cent, which was significantly worse than that for external dacryocystorhinostomy. These results have been previously published.

Change in practice: Evidence suggested that cold steel endonasal dacryocystorhinostomy was more effective, and we adopted this as our technique of choice.

Second cycle – cold steel endonasal dacryocystorhinostomy: Over a four-year period, 57 cases completed a full nine months' follow up. 93 per cent were completed as day cases and 39 per cent were performed under local anaesthetic. The success rate was 79 per cent (45/57). There was no difference in success rates when this procedure was compared with external dacryocystorhinostomy ($p = 0.55$). The type of anaesthetic used (i.e. local *vs* general) made no difference to the success rate ($p = 0.93$).

Change in practice: Cold steel endonasal dacryocystorhinostomy was as effective as the gold standard, i.e. external dacryocystorhinostomy. Laser-assisted dacryocystorhinostomy was significantly less successful than external dacryocystorhinostomy. Due to the benefits of decreased operating time, lower morbidity and success under local anaesthetic, we recommend cold steel endonasal dacryocystorhinostomy as our procedure of choice for the treatment of epiphora.

Key words: Epiphora; Dacryocystorhinostomy; Endonasal

Introduction

Epiphora due to nasolacrimal duct obstruction (NLDO) is managed surgically by dacryocystorhinostomy (DCR). Initially, DCR was performed externally (i.e. as an open procedure), usually by an ophthalmologist. Dacryocystorhinostomy via the endoscopic transnasal route was described by McDonogh and Meiring in 1989.[1] The transnasal technique has several advantages over the established open technique: lower morbidity; shorter operating time, and the possibility of performing the procedure as a day case and under local anaesthetic.[2] It is also possible to perform bilateral operations under the same anaesthetic. The literature reports a success rate for external DCR of 90–100 per cent.[1,2]

Our department adopted the endonasal technique in 1997, using a Potassium titanyl phosphate (KTP) laser to ablate tissue and bone. We reported the results of the first 76 cases, and achieved a success rate of 64 per cent at 12 months for primary surgical procedures. Over the same time period, our ophthalmology department performed 49 external DCRs, with a success rate of 94 per cent.[3] The endonasal laser technique was reconsidered in the face of contemporary literature, and the primary surgeon decided to change to a 'cold steel' technique. The

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current study reviews the results of this change in policy, in order to complete the audit cycle.

Materials and methods

In our department, a single consultant surgeon performed all DCRs, together with one ophthalmologist. All patients with epiphora referred for DCR were assessed in an ophthalmology clinic jointly run with an ENT consultant. The patients underwent a full examination, including palpation of the lacrimal sac, probing and irrigation of the canaliculi and lacrimal sac, dye disappearance test, and nasendoscopy. Where the level of obstruction was not clearly defined, a macrodacryocystogram was performed. Patients with single or common canalicular obstruction were considered unsuitable for endoscopic DCR. Therefore, both patient series in this paper included only those patients considered to have distal NLDO. All patients undergoing primary endonasal DCR with a cold steel technique were identified, via a manual search of theatre record books, and considered for the study. All patient records were requested and searched by one reviewer. Only patients with a full, completed follow-up period of nine months were included. Patients undergoing revision surgery or a laser procedure were excluded. All other patients were included.

Following a full discussion and after obtaining informed consent, patients were selected for either a general or local anaesthetic. A local anaesthetic was more commonly reserved for patients with co-morbidities that made a general anaesthetic undesirable.

Pre-operatively, the nasal mucosa was sprayed with co-phenylcaine. In cases undergoing a local anaesthetic procedure, amethocaine eye drops were instilled topically. Xylocaine 2 per cent with adrenaline (1:80 000) was infiltrated into the medial canthus and the root of the middle turbinate. Patties soaked in 1:1000 adrenaline were placed medially, laterally and anteriorly to the middle turbinate to improve vasoconstriction. The canaliculi were dilated and a lacrimal probe was introduced. Endonasally, an inferiorly based flap was raised anterior to the axilla of the middle turbinate and the flap excised. The lacrimal crest was reduced from posterior to anterior with a Kerrison ronjeur(s) until the full extent of the sac was uncovered. The sac was opened antero-medially with an angled phaecoemulsification knife and the anterior and posterior flaps removed. A rhinostomy of at least 1 cm was created and left uncovered to heal by secondary intention. The canaliculi were cannulated with O'Donoghue tubes.

Post-operatively, the patients were instructed to use saline douches. Patients were assessed at three months and the stents removed in the combined epiphora clinic. After six months, the patients were seen in clinic again; fluorescein was instilled into the eye and clearance was assessed endonasally with a nasendoscope. The patients were reviewed again after at least 9 months and discharged if appropriate.

Outcome measures were defined in the first audit, and these terms were retained in order to enable comparison of techniques. 'Cured' was defined as complete resolution of the patient's symptoms and evidence of a patent rhinostomy, visualised by irrigation or fluorescein dye test. 'Better' was defined as the patient reporting an improvement of symptoms, with persistence of some degree of epiphora. 'Failed' was defined as little or no improvement in symptoms. The outcome was considered a success if the patient was either 'cured' or 'better'.

Results and analysis

Between January 2001 and December 2004, 75 primary DCRs were performed using the cold steel technique. Revision and laser DCRs were not included. Medical records pertaining to 74 of these procedures were retrieved and reviewed. Only 51 patients had completed the minimum nine months follow up with formal assessment of their epiphora. The reasons why other patients had not completed follow up included: non-attendance; death (due to unrelated causes); and, most commonly, referral to another ophthalmologist for treatment of cataracts. Six patients underwent bilateral procedures, five of these being under the same anaesthetic. Therefore, 57 procedures were available for audit. Patient demographics are shown in Table I, alongside data for laser DCRs and external DCRs (previously published).[3] Comparing cold steel with laser, the age range was greater for laser DCR but the mean age was similar (68 *vs* 60 years). Similar proportions were performed under local anaesthetic (39 *vs* 38 per cent) and similar proportions were performed as a day case (93 *vs* 87 per cent), respectively. In both series, there were cases that were followed up for less than nine months, as it was obvious from an early stage that the procedure had failed.

All the cold steel procedures were supervised by the consultant otolaryngologist. The success rate

TABLE I

SUMMARY OF RESULTS OF DCR TECHNIQUES

Parameter	Endoscopic 'cold steel' DCR	Endoscopic laser DCR[3]	External DCR[3]
Cases (*n*)	57	76	49
Patients (*n*)	51	72	49
Age range (mean; yrs)	31–91 (68)	12–88 (60)	1–82 (50)
Male:female (*n*)	16:41	36:40	23:26
Right:left (*n*)	30:27	37:39	25:24
GA:LA (*n*)	35:22	47:29	46:3
LA (%)	39	38	6
In-patients: day cases (*n*)	4:53	6:68	39:8
Day cases (%)	93	87	12
'Cured' (*n*)	42	38	41
'Better' (*n*)	3	11	5
'Failed' (*n*)	12	27	3
'Success' (*n*/*n* (%))	45/57 (79)	49/76 (64)	46/49 (94)
Follow up (mean; mths)	4–18 (11)	3–21 (12)	3–15 (9)

DCR = dacryocystorhinostomy; yrs = years; GA = general anaesthetic; LA = local anaesthetic; mths = months

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TABLE II

OUTCOMES IN ANAESTHETIC SUBGROUPS*

Outcome	Local	General
'Cured' (*n*)	17	25
'Better' (*n*)	1	2
'Failed' (*n*)	4	8
'Success' (*n*/*n* (%))	18/22 (82)	27/35 (77)

*For endoscopic, cold steel dacryocystorhinostomy.

for cold steel DCR was 79 per cent, compared with 64 per cent for laser DCR. This difference was not statistically significant (chi-square test, $p = 0.70$).

Dividing the cold steel procedures into subgroups based on the type of anaesthetic used (general *vs* local) gave success rates of 77 and 82 per cent, respectively (Table II). However, this difference was not statistically significant (chi-square test with Yates correction, $p = 0.93$).

Laser DCR was significantly less successful when compared with external DCR (as previously published).[3] The success rates for external and endoscopic cold steel DCRs did not differ significantly (chi-square test with Yates correction, $p = 0.055$).

There were complications in 11 (19 per cent) of the cold steel cases, although only one of these complications was serious. This case involved a man who developed epistaxis post-operatively, requiring nasal packing and admission; the bleeding settled with conservative treatment. The complications encountered are shown in Table III.

Discussion

External dacryocystorhinostomy (DCR) has long been recognised as the 'gold standard' procedure for NLDO, with success rates quoted at 90–100 per cent.[4] In 1997, our department changed to laser DCR, as this technique was seen to be quicker[5] and associated with less morbidity. However, as other departments also discovered,[5] success rates for laser DCR were lower than expected. Endoscopic DCR with a laser has been observed to be less efficacious than endoscopic DCR without a laser.[6–8] A randomised, controlled trial demonstrated that cold steel DCR was quicker than external DCR and had similar complication rates.[9]

TABLE III

COMPLICATIONS ENCOUNTERED

Complication	Cases (*n*)
Immediate	
Protrusion of orbital fat at rhinostomy	2
Epistaxis (minor)	1
Epistaxis (requiring admission)	1
Late	
Infected tubes removed early	1
Piece of tube retained	1
Tubes fell out early	2
Adhesions	3

Our previous study[3] demonstrated that endoscopic DCR with a laser was less effective than expected; therefore, practice was changed accordingly.

Endonasal DCR without laser (i.e. cold steel DCR) was seen as an acceptable alternative to external DCR, with no significant difference in patient satisfaction scores for the two procedures.[10] Our results demonstrate that the former procedure is easily tolerated under local anaesthetic, and many patients can be treated as day cases without any significant difference in success rates. This has great advantages in terms of theatre list utilisation and cost-effectiveness. Cold steel DCR is also a usable technique in older patients, in whom there is a high incidence of significant co-morbidity. Although the success rate is less than that for by external DCR, the technique is considered efficacious. The National Institute of Clinical Excellence (NICE) has quoted a success rate of 75 per cent for endonasal cold steel DCR, and our rates were above this.[6,7]

This audit study included all patients who had undergone primary endoscopic DCR for distal NLDO within our department over the study period, and who had completed the required follow-up period. The number included was not determined by a power calculation. We appreciate that a failure to demonstrate statistical significance in the measured outcomes may reflect a lack of power rather than a lack of effect. All new procedures demonstrate a 'learning curve', and this could have been a factor in the introduction into the department of both laser and cold steel techniques. In our previous publication, we noted the presence of such a learning curve for the introduction of the laser technique.[3]

Assessment of the reasons for the failure of rhinostomy has mainly centred on the rhinostomy and on methods of preventing stenosis. Mann and Wormald[11] prospectively examined the rhinostomy with an endoscope in 38 patients who had undergone endoscopic DCR. There was statistically significant shrinkage in the ostium over the first four weeks, but this stabilised after this period. These authors suggested approximating the nasal and lacrimal mucosae in order to allow primary intention healing and to prevent significant stenosis of the ostium.

- **Laser dacryocystorhinostomy (DCR) has been shown to be less effective than external DCR**
- **This study demonstrated that 'cold steel' endonasal DCR was as effective as external DCR**
- **The National Institute of Clinical Excellence recommends the use of cold steel endonasal DCR, due to its decreased morbidity and operating time, compared with external DCR**

The necessity of silicone stent placement for preservation of nasolacrimal duct patency has been questioned. Mortimore *et al.*[12] reported no significant

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difference in the success of the procedure or in the quality of endoscopic visualisation of the ostium when stents were omitted, compared with procedures in which they were used. In our department, however, silicone stenting was used.

Endonasal cold steel DCR continues to undergo revision and refinement. A recent study suggests that a free mucosal graft covering the exposed bone adjacent to the lacrimal window may improve primary intention healing, potentially decreasing scar formation.[13] Another suggested method of improving the size of the rhinostomy is to use a drill rather than ronjeurs. This idea was supported by Wormald and Tsirbas,[14] who used powered instruments for the rhinostomy, achieving a success rate of 97 per cent in patients with anatomical obstruction. These authors also suggested that full investigation should include pre-operative dacryocystography and lacrimal scintillography. This would increase costs but would assist the accurate identification of patients with functional obstruction, who have a poorer outcome. Further studies will be required to assess these refinements.

Conclusion

Following audit of our results, endoscopic cold steel DCR is now our treatment of choice as it provides a good balance of several factors, including: choice of anaesthetic; day case operating; and a high success rate. This choice has been borne out by NICE in their latest document on endoscopic DCR, which recognises the validity of this procedure.[6,7] By further auditing our surgical results, we will continue to strive for a high quality surgical service.

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