NATIONAL INSTITUTE FOR CLINICAL EXCELLENCE

INTERVENTIONAL PROCEDURES PROGRAMME

Interventional procedure overview of Endoscopic Dacryocystorhinostomy

Introduction

This overview has been prepared to assist members of IPAC advise on the safety and efficacy of an interventional procedure previously reviewed by SERNIP. It is based on a rapid survey of published literature, review of the procedure by specialist advisors and review of the content of the SERNIP file. It should not be regarded as a definitive assessment of the procedure.

Procedure name

Endoscopic Dacryocystorhinostomy

Specialty societies

- *British Association of Oral and Maxillofacial Surgeons*
- *Royal College of Ophthalmology*

Indication(s)

Endoscopic Dacryocystorhinostomy (DCR) is indicated for patients diagnosed with lacrimal sac or nasolacrimal duct obstruction (NLDO).[1] This can be caused by chronic stenosis (postsaccal) of the nasolacrimal duct and can be congenital or acquired.[2] NLDO is common[2] but is not a serious condition.[3] Presenting symptoms include excessive epiphora (tearing) and dacryocystitis (infection).[3] Usually, cases have been refractory to conventional treatment such as warm compresses, massage and probing the nasal passage.[4] If NLDO is left untreated, these symptoms persist and may cause embarrassment for the patient.[5]

There seems to be a greater prevalence in elderly women than men. Sprekelsen *at al* [2] hypothesised that long term use of cosmetics may be an important factor.[2]

Endoscopic DCR is one of several techniques used to unblock nasolacrimal duct. The standard approach to DCR is by open surgery.

Summary of procedure

Endoscopic DCR is a minimally invasive procedure used to bypass the nasolacrimal duct. It can be performed using either surgical instruments or a laser.

The patient is positioned in a supine position with the head turned slightly to the right side.[3] A decongestant is administered to clear the nasal passage[9] first and then gauze, soaked with anaesthesia that numbs the area and constricts blood vessels,[1,2,4,10] is endonasally inserted to the medial eyelid, lacrimal fossa and nasal mucosa for ten minutes to maintain haemostasis and anaesthesia intraoperatively. [7]

A 20 degree fibreoptic light probe[10], 0 degree or 30 degree 4 mm Hopkins rigid endoscope, is inserted into the nasal cavity to the lacrimal sac via the lacrimal duct[7] to explore and confirm the nature of the obstruction.[11] The nasal mucous membrane is incised and removed, to allow for the creation of a window on the lacrimal sac and upper nasolacrimal duct. A portion of the lacrimal and maxilla bone is removed and an incision made in the lacrimal sac and nasolacrimal duct. Silicone tubes can be inserted to assist long-term patency.[7]

Endoscopic DCR has the following potential advantages over the standard external DCR approach.

- The main advantage is that of avoiding facial cosmetic scars between the eye and nose by approaching into the nasal cavity [1-3,5,6,10-15]
- Local anaesthetic usually used in compliant patients[15]
- Accessing the rhinostomy directly limits tissue damage, surgical trauma and angular vein damage, preserving the canthal anatomy[1,2,5,6,10-15]
- Diagnosis and management of predisposing or concomitant nasal and paranasal disorders that may contribute to nasolacrimal obstruction - simultaneous treatment in one sitting[2,3,6,10,12]
- Bilateral cases are performed simultaneously[10,14]
- Immediate mistakes revised at surgery[1]
- The possibility of failures being endoscopically investigated[1]
- Active dacryocystitis (nasal infection) is not a contraindication as with external approach[2,6]
- Reduced operating time[10,11,15]
- Reduced intraoperative bleeding[10,11,12]
- Reduced morbidity[4,10]
- Performed as an outpatient, day surgery basis[11]
- Improved cost-effectiveness.[11]

Literature review

A systematic search of MEDLINE, PREMEDLINE, EMBASE, Current Contents, PubMed, Cochrane Library and Science Citation Index using Boolean search terms was conducted, from the inception of the databases until October 2002. The York Centre for Reviews and Dissemination, Clinicaltrials.gov, National Research Register, SIGLE, Grey Literature Reports (2002), relevant online journals and the Internet were also searched in October 2002. Searches were conducted without language restriction.

Articles were obtained on the basis of the abstract containing safety and efficacy data on Endoscopic Dacryoscytorhinostomy in the form of randomised controlled trials (RCTs), other controlled or comparative studies, case series and case reports. Foreign language papers were included if they contained safety and efficacy data and were considered to add substantively to the English language evidence base.

There was one RCT, and four non-randomised comparative studies found in this literature search and subsequently included. Case series and case reports were included based on safety data not reported in the RCT or non-randomised comparative studies. The case report was included because it reported on an infant. The majority of cases report on adults.

List of studies found

Total number of studies: 13

- Randomised controlled trials 1
- Systematic reviews 0
- Non-randomised comparative studies 4
- Case series 7
- Case reports 1

- Studies identified but not recovered 1[16]

Summary of key efficacy and safety findings

See following tables;

Abbreviations:

DCR	dacryocystorhinostomy
EESC-DCR	endoscopic dacryocystorhinostomy
EEL-DCR	endoscopic laser dacryocystorhinostomy
EXT-DCR	external dacryocystorhinostomy
FEDT	functional endoscopic dye test
NLD	nasolacrimal duct

Authors, date, location, number of patients, length of follow-up, selection criteria	Key efficacy findings	Key safety findings	Appraisal/Comments
Randomised controlled trials			
Hartikainen *et al.*[6] 1998 FINLAND 64 cases in 60 patients; January 1994 to April 1995, 12 month follow-up. *Comparison:-* **Group 1-** 32 cases, endoscopic DCR (EESC-DCR); **Group 2-** 32 cases, external DCR (EXT-DCR) *Selection criteria:* Primary acquired nasolacrimal sac or duct obstruction with a duration of symptoms longer than 1 year	Operative time: ❑ *EESC-DCR*- 38 mins (SD [13]; 19-79 mins); ❑ *EXT-DCR*- 78 mins (SD [13]; 60-115 mins) ❑ statistically significant ($P < 0.001$) No conversions from EESC-DCR to EXT-DCR. Cosmetics and cutaneous scar: ❑ *EXT-DCR*- 31/32 (97%) no complaints; 1/32 (3%) complained of colour difference. Simultaneous operations: ❑ *EESC-DCR*- 10/32 (31%) resection of anterior part of middle turbinate; 6/32 (19%) had ethmoid sinuses incorporated within osteotomy; ❑ *EXT-DCR*- 7/32 (21%) ethmoid sinuses incorporated within osteotomy Success rates: ❑ *EESC-DCR*- primary 75% (24/32), secondary 97% (31/32) ❑ *EXT-DCR*- primary 91% (29/32), secondary 97% (31/32).	Complications: ❑ *EESC-DCR*- 2/32 (6.25%) required anterior nasal tamponage, 1 after the anterior resection of the middle turbinate, and 1 after postoperative nasal bleeding (required hospitalisation for 3 days); ❑ *EXT-DCR*- 1/32 (3%) required anterior nasal tamponage and hospitalisation for 3 days after postoperative nasal bleeding	*Potential for bias*: There was no preoperative selection based on the results of anterior rhinoscopy or dacryocystography. All patients were randomised into two groups based on symptoms - Group A- simple epiphora with no discharge; and Group B - chronic dacryocystitis with purulent discharge; however exact method of allocation is unclear *Outcome measures and their validity*: success defined as patent nasolacrimal system through irrigation and dacryoscintigraphy. *Other comments:* Primary DCR- DCR (endoscopic or external) not performed on patient previously; Secondary DCR- endoscopic DCR performed on a patient post unsuccessful external DCR or as an endoscopic revision. Four patients had DCR on bilateral eyes, explaining the 64 cases in 60 patients.

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Hartikainen et al [6] continued	Symptoms at 12 months: *EESC-DCR-* ❑ asymptomatic 59% (19/32) and patent to irrigation 100% (19/19); ❑ watering indoors 22% (7/32) and patent to irrigation 14% (1/7); ❑ watering outdoors 41% (13/32) and patent to irrigation 38% (5/13); ❑ discharge 13% (4/32) and patent to irrigation 0% (0/4) *EXT-DCR-* ❑ asymptomatic 84% (27/32) and patent to irrigation 93% (25/27); ❑ watering indoors 6% (2/32) and patent to irrigation 50% (1/2); ❑ watering outdoors 16% (5/32) and patent to irrigation 80% (4/5); ❑ discharge 3% (1/32) and patent to irrigation 0% (0/1).	*Other comments:* Watering eyes means eye tearing. Indoors means not exposed to wind and other environmental elements; Outdoors means exposed to wind and other environmental elements.

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Non-randomised comparative studies			
Moore *et al.*[7] 2002 UK 69 patients (adults), 73 operations (eyes). Follow-up- minimum of 6 months, full data available for 62/69 (90%) patients representing 66 operations. *Comparison-* **Group 1**: 36 patients, 27 operations by endoscopic DCR without laser (EESC-DCR); **Group 2**: 33 patients, 36 operations by endoscopic DCR with laser (EEL-DCR) *Selection criteria:* Consecutive adults with epiphora resulting from primary acquired nasolacrimal duct obstruction. Included functional (narrowing) and complete obstruction with or without mucocoele or previous dacryocystitis; partial distal (membranous) common canalicular block identified on probing.	Success rates: ❑ *EESC-DCR*- 83% (29/35); ❑ *EEL-DCR*- 71% (22/31). ❑ not statistically significant Resolution of canalicular obstruction- ❑ *EESC-DCR*- 9/16 (56%); ❑ *EEL-DCR*- 7/16 (44%) Subjective success: *EESC-DCR*- ❑ asymptomatic 19/35 (54%), ❑ very much improved 10/35 (29%), unchanged 6/34 (17%), ❑ worse 0/34 (0%), ❑ request for repeat DCR 4/35 (11%) *EEL-DCR*- ❑ asymptomatic 13/31 (42%), ❑ very much improved 9/31 (29%), unchanged 9/31 (29%), ❑ worse 0/34 (0%), ❑ request for repeat DCR 5/31 (16%) Objective success: *EESC-DCR*- ❑ Irrigation- patent 27/34 (79%); blocked 7/34 (21%) ❑ FEDT- function positive 22/32 (69%); negative 10/32 (31%) *EEL-DCR*- ❑ Irrigation- patent 22/29 (76%); blocked 7/29 (24%) ❑ FEDT- function positive 18/26 (69%); negative 8/26 (31%)	Complications: o 2 patients (3 procedures- 1 EESC-DCR and 2 EEL-DCR) new canalicular obstruction with persistent epiphora. EESC-DCR alternative drainage found via upper canaliculus.	*Potential for bias*: Consecutive adult case series. External DCR was available to the patients who preferred it and endonasal DCR was decided by availability of instrumentation and costs of rental rather than at random. Losses to follow-up – 1 died (unrelated to DCR), 2 lost to follow-up, and 3 who did not return their questionnaires. Full data sets at 6 months were used for analysis. *Outcome measures and their validity*: subjective success based on symptoms of epiphora- reported as asymptomatic (cured), significantly improved (80-90% better), unchanged (no real change from preoperative period), worse, using a questionnaire; functional endoscopic dye test (FEDT) and irrigation for patency.

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Unlu *et al.*[9] 2002, TURKEY 25 patients, 30 cases, November 1995 to December 1999 (initially 37 patients) Follow-up- mean 15 months (4 to 47 months); 25/37 (37.6%) patients followed up for more than 4 months- full data set. *Comparison-* **Group 1**- 14/30 (46.75%) with silicone intubation; **Group 2**- 16/30 (53.3%) without silicone intubation *Selection criteria:* Diagnosis of nasolacrimal sac or duct obstruction with no previous presaccal stenosis, lacrimal surgery, trauma or suspicion of malignancy.	Success rate: *Group 1-* ❑ primary surgery 12/14 (85.7%) successful, 1 of 2 patients revised improved; ❑ overall success 92.9%. *Group 2-* ❑ primary surgery 13/16 (81.3%), 1/3 successfully revised; ❑ overall success 14/16 (87.5%). Subjective evaluation: *Group 1-* ❑ symptom free 9/14 (64.3%), ❑ significant improvement 2/16 (14.3%) ❑ slight improvement 1/16 (7%), ❑ same 1/16 (7%), ❑ worse 1/16 (7%); *Group 2-* ❑ symptom free 10/14 (62.5%), ❑ significant improvement 3/14 (18.8%), ❑ slight improvement 0/14 (0%), ❑ same 3/14 (18.8%), ❑ worse 0/14 (0%); Discomfort from tube: only in silicone tube- 4/14 (28.6%) Costs: silicone intubation increases costs	Complications: o 2 (14.3%) ecchymosis around medial canthal area; 1/14 (7.1%) prolapsed intubation. Granulation tissue: o *Group 1-* 6/14 (42.9%) at rhinostomy opening o *Group 2-* 1/16 (6.3%) o statistically significant p=0.025	*Potential for bias*: Consecutive adult patients. Only patients with postsaccal stenosis with normal or dilated lacrimal sacs had the operation. Silicone tubing was allocated to the time period of operation- operations between November 1995 and April 1998 did not receive silicone tubing and operations between May 1998 and December 1999 received silicone tubing. Data sets of patients with follow-up of more than 4 months were included (25 patients, 30 cases (eyes) – i.e. 12 patients lost to follow-up. *Outcome measures and their validity*: Evaluation included subjective and objective tools. Subjective evaluation was performed using a 5 point scale- symptom free, significant improvement, slight improvement, same or worse. No description on validity of this tool. Objective tools- endoscopic viewing and irrigation tests for patency; *Other comments:* Five patients had bilateral surgery

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Cokkeser *et al.*[10] 2000, TURKEY 115 patients and 130 eyes, December 1994 to December 1998 follow-up: mean 25 months (6 to 48 months) *Comparison-* **Group 1:** 79 patients (79 eyes), unilateral; operation- external DCR (EXT-DCR), different surgeons including residents in training; **Group 2:** 36 patients (51 eyes), 21/36 unilateral, 15/36 bilateral; operation- endoscopic DCR (EESC-DCR), all performed by the same surgeon (previously experienced in endoscopic paranasal surgery). *Selection criteria*: Diagnosed with lacrimal obstruction distal to the common canaliculus.	Operation time: ❑ *EXT-DCR*- mean 65 mins (50- 120 mins) ❑ *EESC-DCR*- mean 33 mins (15-105 mins. Success rate: ❑ *EXT-DCR*- 71/79 eyes (89.8%) ❑ *EESC-DCR*- 45/51 eyes (88.2%); 1/51 (2%) patent but not adequate lacrimal system (epiphora in wind and cold). Simultaneous operations: ❑ *EESC-DCR*- 17/36 (47%) patients correction of significant septal deviation with endoscopic limited septoplasty; ❑ 4/36 (11%) correction of sinusitis and NLD obstruction with limited endoscopic ethmoidectomy and middle meatus antrostomy.	Complications: *EXT-DCR-* ❑ 12/79 eyes (15%) intraoperative bleeding; ❑ 2/79 (2.5%) postoperative bleeding at the incision site, ❑ 8/79 (10%) post removal of extraphore; ❑ poor wound healing demonstrated by 2/79 (2.5%) pseudoepicanthal folds and 3/79 (3.7%) keloids; ❑ 4/79 (5%) infection at incision site. *EESC-DCR-* ❑ 8/51 (16%) mild mucosal bleeding; ❑ 3/51 (6%) little synechiae.	*Potential for bias*: Possible units of analysis issues with almost half of the EESC group having bilateral DCR and no bilateral DCR in the EXT group. *Outcome measures and their validity*: success defined as the resolution of the epiphora and chronic dacryocystitis, could be subjective.

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Onerci *et al.*[1] 2000, TURKEY 158 patients, Follow-up- October 1992 to January 1999; mean 49 months (4 to 61 months) *Comparison:* **Group 1**- 108 patients experienced surgeons operated; **Group 2**- 50 patients inexperienced surgeons operated *Selection criteria:* diagnosis of lacrimal sac or nasolacrimal duct obstruction. Endoscopic DCR	Success rates: *Group 1*- ❑ 102/108 (94.5%) successful ❑ 6/108 (5.5%) failed *Group 2*- ❑ 29/50 (58%) successful ❑ 21/50 (42%) failed	Failures: *Group 1*- 11 complications ❑ 4/108 (3.7%) granulation tissue around silicone tube, ❑ 1/108 (0.9%) persistence of bone in nasal cavity, ❑ 1/108 (0.9%) atonic sac. ❑ 5/108 (4.6%) revisions successful except atonic sac case. *Group 2*- 21 complications ❑ 2/50 (4%) granulation tissue, ❑ 6/50 (12%) fenestration to the duct instead of sac, ❑ 5/50 (10%) bony spicules causing obstruction, ❑ 2/50 (4%) synechiae, ❑ 2/50 (4%) fenestration done anterior to lacrimal sac, ❑ 4/50 (8%) no reason.	*Potential for bias*: Method of allocation was not documented. *Outcome measures and their validity*: success defined as relief from subjective symptoms and lacrimal irrigation confirmed nasolacrimal patency. *Other comments:* Revision successes were not documented.

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Case series			
Fayet *et al.*[12] 2002, FRANCE 100 patients, July 1997 to October 1999 Follow-up- mean 18.7 +- 7.1 months *Selection criteria:* Age 18 and over, chronic symptomatic nasolacrimal stenosis	❑ Symptom free: 86/100 (86%) ❑ Patent nasolacrimal shunt: 84/86 (98%) ❑ Intermittent tearing from wind and cold exposure: 3/100 (3%) ❑ Recurrent or permanent epiphora: 11/100 (11%)	Complications: *Intraoperative Bleeding:* ❑ 62% Grade 1 ❑ 32% Grade 2.	*Potential for bias*: Concurrent consecutive adults with chronic symptomatic nasolacrimal stenosis. *Outcome measures and their validity*: irrigation postoperatively tested for patency.
Wormald *et al.*[13] 2002, AUSTRALIA 36 patients, 47 cases Jan 1998 to June 2000 *Selection criteria:* All patients presenting with epiphora and obstruction of the drainage of the nasolacrimal system undergoing primary or revision powered endoscopic DCR.	Success rate: ❑ 46/47 (95.7%) anatomic patency; ❑ 2/46 have occasional symptoms although patent eg. Sleep apnoea, floppy eye syndrome, recurrent conjunctivitis, episodes of mucous film over eye.	Complication: ❑ 1/47 (2%) obliteration of sac and ostium (history- previous 2 DCRs and no identifiable sac lumen).	*Potential for bias*: Historical consecutive adult patients included. All operations were performed by the same surgeon. *Outcome measures and their validity*: All objective measures- endoscopic visualisation, fluorescein.
Yung *et al.*[14] 2002, UK 170 patients, 191 epiphora, 96 cases reviewed. 1994 to 1999 *Selection criteria* Diagnosis of lacrimal blockage at any level, presenting with epiphora	Success rates: *Complete relief at 6 months*- 89%. ❑ lacrimal sac/duct obstruction 95%; ❑ common cannicular obstruction 86%; ❑ cannicular obstruction 57%. ❑ Maintained at 12 months- 96/152 (62%)	No complications stated	*Potential for bias*: Concurrent consecutive adult patients operated on by the same team of surgeons. *Outcome measures and their validity*: complete cure, partial or no improvement according to degree of symptoms postoperatively. *Other comments:*

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Zilelioglu *et al.*[15] 2002, NETHERLANDS 93 patients, 64 eyes 1994 to 1998 *Selection criteria* Epiphora or chronic dacryocystitis undergoing endoscopic DCR.	Success rate*:* ❑ 51/64 (79.6%) completely successful (primary and revision). ❑ Primary DCR- 27/34 (79.4%) ❑ Endoscopic revision successful in 24/30 (80%)	Complications: *Intraoperative-* ❑ 2/64 (3.1%) lacerations of puncta due to probing and bicanalicular silicone intubation; *Postoperative-* ❑ 1/64 (1.6%) periorbital oedema, ❑ 1/64(1.6%) eyelid ecchymosis; *Tube complications-* ❑ 2/64 (3.1%) cyst of punctum, ❑ 1/64 (1.6%) punctum granuloma, ❑ 1/64 (1.6%) adhesion between superior and inferior punctum, ❑ 3/64 (4.7%) tube dislocations, ❑ 5/64 (7.8%) premature loss of tube, 11/64 granulation around tubing at internal ostium (17%), ❑ 6/64 (9%) intranasal synechiae.	*Potential for bias*: Concurrent consecutive adult patients. *Outcome measures and their validity*: success defined as patency of lacrimal system on testing with irrigation, relief of symptoms at last follow up visit.
Sprekelsen *et al.* [2] 1996, SPAIN 133 patients, 152 cases Jan 1990 to Dec 1993 *Selection criteria* Diagnosis of nasolacrimal obstruction, for primary or revision endoscopic DCR	Success rates: ❑ "*very good*" 130/152 (85.5%); ❑ "*good"* 16/152 (10.5%) ❑ "*no change*" 6/152 (4%).	Complications: *Intraoperative-* ❑ none but orbital fat tissue was found in 16/152 cases (10.5%); ❑ 1/152 (0.6%) troublesome bleeding from anterior ethmoidal artery (cauterised); *Immediate postoperative-* ❑ 67/152 (44.1%) minor cheek haematoma; ❑ 14/152 (9.2%) subcutaneous emphysema; 4/152 (2.6%) orbital emphysema. Purulent drainage and middle meatus inflammation observed-	*Potential for bias*: Historical consecutive adult patients operated on by the same surgeon. *Outcome measures and their validity*: Objective measures- endoscopy, fluorescein eye drops; both are valid tools. Subjective measures- patient satisfaction; validity not described.

given antibiotics.

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Cunningham *et al.*[17] 1998, Location not stated 4 patients, all children; 10 to 24 months follow-up *Selection criteria* Diagnosis- congenital and acquired disorders of the nasolacrimal system.	Success rate: ❑ 4/4 (100%) successful	Complications: ❑ 2/4 (50%) nasal vestible skin abrasions secondary to rotation of the drill shaft.	*Potential for bias*: Historical case series- selection details not stated in abstract. *Outcome measures and their validity*: not stated
Case reports			
Mladina *et al.*[4] 2001, CROATIA One 4 month old girl *Selection criteria* Huge recurrent abscess in left medial canthal region, huge epiphora, refractory to conventional treatment and probing.	Success rate: ❑ Relief of dacryocystocoele and dacryocystitis	No complications stated.	*Other comments:* During use of Richard's otological drill for bone removal, difficulty in concomitant endoscopic visualisation and potential damage to nasal mucosa from rotation of drill shaft.

Specialist advisor's opinion / advisors' opinions
Specialist advice was sought from the British Association of Oral and Maxillofacial Surgeons, and the Royal College of Opthalmologists

The Specialist Advisors stated that endoscopic DCR is now established practice and that endoscopic DCR with the use of the laser is less efficacious than endoscopic DCR without a laser. They listed the potential adverse events as infection and damage to adjacent eye structures.

Formal education and teaching courses need to be established and published and this will aid in the progression of the procedure. The use of lasers needs to be regulated to avoid iatrogenic damage. As yet, there are no registries or major trials on this procedure.

Issues for consideration by IPAC
Endoscopic dacryocystorhinostomy is an alternative to external dacryocystorhinostomy with several advantages. However, it is not without risk and the studies have provided examples of complications which are supported by specialist comments mentioned above. Successful outcomes are dependent on preoperative assessment, surgeon experience and postoperative follow-up.

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