

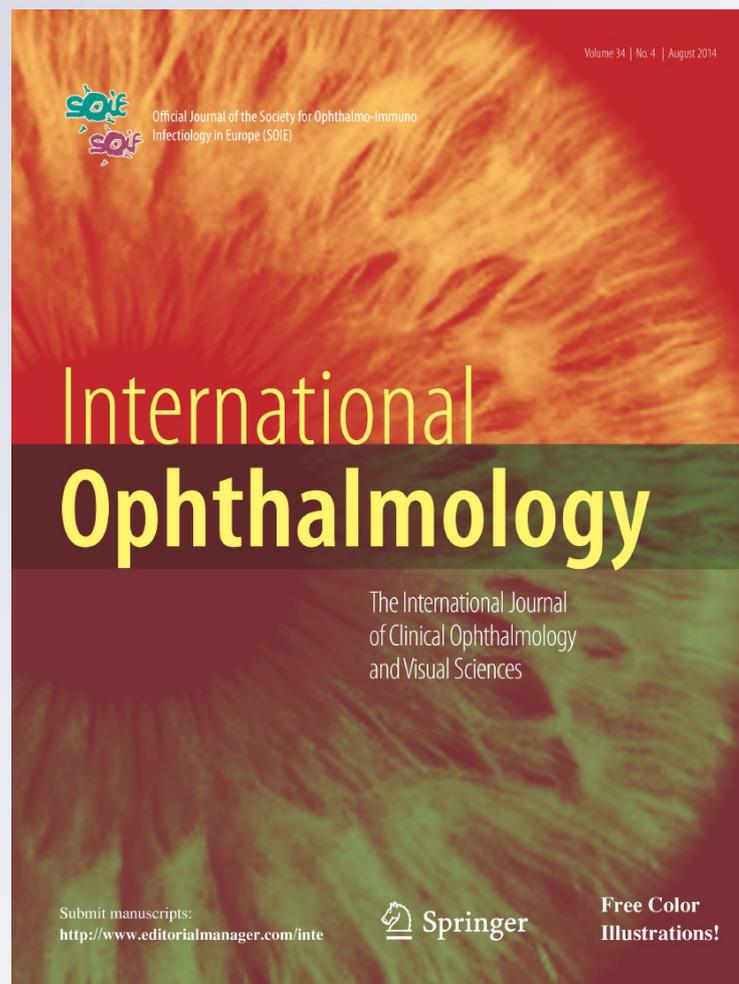
Cannula dacryocystorhinostomy: a simple, innovative and cost-effective method of lacrimal surgery

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Cannula dacryocystorhinostomy: a simple, innovative and cost-effective method of lacrimal surgery

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Abstract To compare our innovative, cost-effective method of lacrimal surgery with other methods. A prospective cohort study. The study included 80 eyes of 80 consecutive patients who presented to our clinic between January 2009 and December 2011. The patients underwent surgery using a new technique with a specially designed cannula and were followed according to our protocol. Patency on irrigation. Of the 80 cases enrolled, the procedure was successful in 52.5 % with a mean follow-up of 247.2 days. The success rate was significantly affected by the preoperative conditions ($p = 0.001$) and follow-up duration ($p = 0.006$). This simple innovative technique was cost-effective and the results were comparable with those of other techniques.

Keywords Cannula DCR · Dacryocystorhinostomy · Lacrimal by pass · Lacrimal fistula · Mucocele

Introduction

Epiphora is a relatively common problem in ophthalmology and is the most common presenting symptom of nasolacrimal sac obstruction following acute or chronic inflammation, trauma, tumors, or congenital malformations. It can be associated with purulent secretions and swelling of the sac region. The most common sign of this condition is the release of purulent material upon compression of the sac.

Although medical treatment, including antibiotic therapy, can address the symptoms, the definitive management of nasolacrimal sac obstruction involves surgery to restore the patency of the lacrimal system. Dacryocystorhinostomy (DCR) is the standard procedure used, in which the lacrimal sac is connected directly to the nose by removing the layer of bone and mucosa that separate these two structures. This allows tears to drain freely into the nose, with the sac mucosa forming part of the lateral nasal wall.

DCR can be performed via external or endoscopic routes. The traditional approach since 1890 has been external DCR. The effectiveness of various types of DCR surgery is controversial, with reported success rates of 80–99 % [1, 2]; however, this falls to 65–80 % with laser DCR [3–6], which contrasts with success rates reaching 95 % for external DCR in the hands of experts [7, 8]. However, newer techniques in lacrimal surgery continue to be developed to optimize the treatment of lacrimal disorders. These techniques must be evaluated and compared using criteria such as the

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long-term success rate, complication rate, patient satisfaction, and efficiency of health care delivery.

The objective of this study was to evaluate an innovative cost-effective method of lacrimal surgery and to compare its success rate with those of other methods. Conventional DCR is considered the gold standard, but this method requires more time and expertise. Transcanalicular (TCL) DCR has reported success rates of 80–90 %, but is expensive, while balloon DCR has higher recurring costs.

Materials and methods

This prospective cohort study enrolled consecutive patients with epiphora requiring surgery seen at the Drashti Netralaya outpatient department between March 2010 and June 2011. The hospital research committee approved this study. All patients with nasolacrimal duct obstruction, patent canaliculi, and normal eyelid function without any lacrimal sac pathology were enrolled. Patients with <4 weeks of follow-up, previous lacrimal surgery, functional nasolacrimal duct obstruction, and canalicular obstruction were excluded.

The demographic details of the patients were documented and a careful history taken. An ocular examination was performed according to a standard protocol, with examination of the lids and skin for scars, erythema and crusting, malposition of lids, lashes, functional assessment of lids, e.g., lid laxity, and orbicularis function. The puncta were assessed for size (normal or stenosed) and apposition. The sac area was examined for redness, swelling, tenderness, fistula, and release of contents on pressure. A slit-lamp examination of the tear strip level and anterior segment was performed. The nose was examined for deviation of the nasal septum and polyps. The patency of the lacrimal system was examined by syringing. In addition, all patients underwent a systemic pre-anesthetic evaluation.

The patients were operated on under local anesthesia with 1 ml of 2 % xylocaine with 1:2,000,000 adrenaline over the incision site (skin and subcutaneous tissue and anterior to the anterior lacrimal crest). General anesthesia was used in patients <14 years of age or if the patient preferred general anesthesia. No patients were sedated for the procedure.



Fig. 1 21-Gauge cannula with irrigation side port



Fig. 2 Cannula entering into middle meatus of the nose



Fig. 3 Nasal endoscope

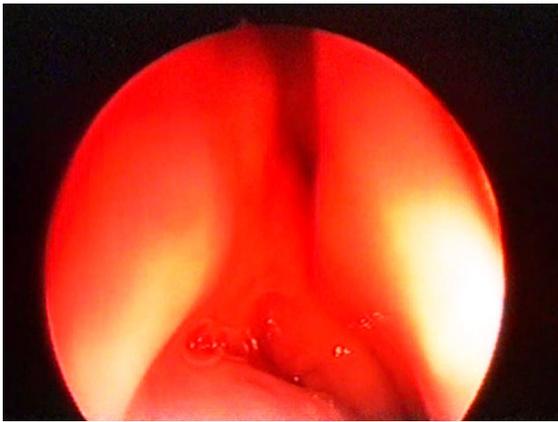


Fig. 4 Irrigation through aperture

Surgical procedure

The puncta were dilated with a punctum dilator. The upper and lower canaliculi were probed to confirm that there was no canalicular or common canalicular block. A specially designed 21-gauge cannula with a blunt tip and side port (Fig. 1) was introduced through the lower canaliculus at 45° to the lower lid margin, taking care not to raise the hand above the eyebrow. The cannula was pushed through the sac wall, lacrimal bone, and nasal mucosa into the middle meatus (Fig. 2); this was observed using torchlight or a nasal endoscope for each case (Fig. 3). The passage was syringed and patency confirmed which was also observed by nasal endoscope (Fig. 4). The cannula was then withdrawn and pushed in again, feeling the edge of the hole; in this way, the hole is manually expanded to 2–3 mm.

The patients were given oral antibiotics and analgesics for 5 days postoperatively, antibiotic eye drops, and a nasal decongestant. Postoperatively, the patients were followed weekly for 2 weeks, every 2 weeks for 1 month, every 4 weeks for 2 months, monthly for 5 months, and then every 3 months. At every follow-up, syringing was performed with a similar cannula. All patients were questioned regarding pain, watering, and discharge to assess functional success. We defined 'symptom free' as a successfully cured patient.

The surgical and postoperative data were analyzed using SPSS ver. 17, and tabulated to identify significant differences compared with other techniques.

Pre-tested postoperative follow-up data form

	OD	OS
Postoperative days		
Surgical technique		
Symptoms		
Pain		
Watering		
Occasional		
Continuous		
Discharge		
Mucopurulent		
Purulent		
Mucoid		
Clear		
Other complaints		
Signs		
Watering		
Discharge		
Mucocele		
Sutures		
Implants		
Other signs		
Syringing		
Cannula		
Regurgitation of fluid		
Site		
Time		
Type of discharge		
Final diagnosis		
Follow-up		

Results

This study included 80 patients (69 female, 86.3 %; 11 male, 13.7 %) with a mean age of 53.4 years (range 20–80) (Table 1). The overall success rate was 52.5 %, with a mean follow-up of 247.1 ± 296.2 days. At the last follow-up, 65 (81 %) patients had no obstruction on syringing which is significant when compared with preoperative syringing status; however, only 52.5 % of patients were symptom free giving a success rate of 52.5 %. Only one patient (1.25 %) was operated on under general anesthesia and none of the patients were sedated.

Preoperatively, 59 (73.8 %) patients had chronic dacryocystitis, 18 (22.5 %) had mucoceles, two

Table 1 Age and sex distribution

Age group (years)	Sex				Total	%
	F	%	M	%		
11–20	0		1	1.25	1	1.25
31–30	4	5	0	0	4	5
31–40	8	10	0	0	8	10
41–50	18	22.5	4	5	22	27.5
51–60	28	35	3	3.75	31	38.75
61–70	11	13.75	2	2.5	13	16.25
71–80	0	0	1	1.25	1	1.25
Total	69	86.3	11	13.7	80	100

Table 2 Comparison of success according to preoperative status

Status at final visit	Preoperative_status				Total
	Acute dacryocystitis	Chronic dacryocystitis	Mucocele	Lacrimal fistula	
Patent	1	54	9	1	65
block	0	5	9	1	15
Total	1	59	18	2	80

$p = 0.001$

Table 3 Comparison of success according to follow-up period

Follow-up days	Total	Failures	% Failures
1 0–50	37	4	10.8
2 51–100	10	3	30.0
3 >100	33	8	24.2
Total	80	15	18.75

$p = 0.006$

(3.5 %) had lacrimal fistulas, and one (1.3 %) had acute dacryocystitis (Table 2). Of the 80 patients, 77 (96.3 %) underwent one operation, two (2.5 %) underwent two operations, and one (1.3 %) underwent three operations. There was a significant ($p = 0.001$) difference between the preoperative condition and final result (Table 2). The success rate decreased significantly ($p = 0.006$) with follow-up duration (Table 3). We managed failed cases using various modalities. Comparing patients with or without a mucocele or fistula, the success rate was significantly ($p = 0.000$, 91 %) higher in those without (Tables 4, 5).

We questioned the patients regarding symptoms such as pain, watering and discharge. We found at the

Table 4 Further management of failed cases

	Frequency	%
Antibiotic	3	3.8
Follow-up	67	83.8
Intracystic implant	3	3.9
TCL DCR	7	8.8
Total	80	100.0

TCL DCR transcanalicular dacryocystorhinitis

Table 5 Comparative study of cases with and without a mucocele or fistula

Final status	Without mucocele or fistula		With mucocele or fistula		Total
	n	%	n	%	
Patent	55	91.6	10	50	65
Block	5	8.4	10	50	15
Total	60	100	20	100	80

$p = 0.000$

last follow-up that 47.5 % of patients had watering and, of these, 28.9 % had pain and 55.2 % had discharge.

Discussion

In our series of 80 patients, the overall success rate was 52.5 % after a mean follow-up of 247.1 ± 296.2 days. Dolman reported a success rate of 90.2 % with conventional DCR with a mean follow-up of 1 year [9]. The reported success rate of external DCR ranges from 85 to 99 % [7–16]. Ben Simon reported a success rate of 70 %. Cakmak [5], Uysal [13], and Drnovsek-Olup also reported success rates of TCL DCR of 82–85 % with a mean follow-up of 6–20 months. Pawar and Sutaria [17] reported a success rate of 98 % with silicone implant DCR with a mean follow-up of 1 year. With endoscopic DCR, Dolman [9] reported a success rate of 89.1 % with a follow-up of 1 year and Ben Simon et al. [18] reported an 84 % success rate.

The literature includes two clinical trials comparing endonasal and external DCR with a 1-year follow-up. The success rate was 91 % for the external DCR group

in both reports and 83 and 75 % for the endonasal DCR groups, defined by patency on irrigation [5].

The significant difference according to preoperative status and 50 % success rate in cases with a mucocele or lacrimal fistula probably resulted in early healing of the aperture due to scarring from recurrent inflammation. The significant difference according to follow-up duration might be due to increased scarring causing failure.

This study was limited by the small number of patients and the need for minor intervention during follow-up visits. Patients should be followed for longer periods. The strengths of the study were the simple cost-effective technique, with a success rate comparable to gold standard techniques. We might increase success rates by using a stent with this procedure.

This procedure might be performed for chronic dacryocystitis without a mucocele or fistula to obtain a higher success rate, as it can be performed in an office setting and does not require large capital investment or incur high costs. The learning curve may also be shallow.

Conflict of interest None.

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