Balloon dacryocystoplasty study in the management of adult epiphora

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CLINICAL STUDY

Abstract

Purpose **To determine the efficacy of dacryocystoplasty with balloon dilation in the treatment of acquired obstruction of the nasolacrimal system in adults.**
Methods **Balloon dacryocystoplasty was performed in 52 eyes of 42 patients under general anaesthetic. A Teflon-coated guidewire was introduced through the canaliculus and manipulated through the nasolacrimal system and out of the nasal aperture. A 4 mm wide 3 cm coronary angioplasty balloon catheter was threaded over the guidewire in a retrograde fashion and dilated at the site of obstruction.**
Results **There was complete obstruction in 30% of cases and partial obstruction in 70%. The most common site of obstruction was the nasolacrimal duct. The procedure was technically successful in 94% of cases. The overall re-obstruction rate was 29% within 1 year of the procedure. There was an anatomical failure rate of 17% for partial obstruction and 69% for complete obstruction within 1 year.**
Conclusions **Balloon dacryocystoplasty has a high recurrence rate. There may be a limited role for this procedure in partial obstructions. Further refinements of the procedure are necessary before it can be offered as a comparable alternative to a standard surgical dacryocystorhinostomy.**

Key words Balloon dacryocystoplasty, Dacryocystogram, Epiphora, Lacrimal obstruction

Lacrimal obstruction is a common ophthalmic problem and accounts for 3% of clinic visits.[1,2] It is secondary to idiopathic chronic inflammation of the lacrimal system in adults leading to stenosis and fibrous obliteration. Treatment options include a surgical dacryocystorhinostomy (DCR), silicon intubation, endonasal endoscopic dacryocystorhinostomy and balloon dacryocystoplasty (DCP). A surgical DCR is the gold standard of treatment with reported success ratess of 89–95%.[3,4] Reported success rates for balloon DCP are widely variable, ranging from 23% to 90%.[5,6]

The aim of this study was to determine the efficacy of DCP with balloon dilation in the treatment of acquired obstruction of the nasolacrimal system in adults in our unit.

Materials and methods

This was a retrospective study between January 1997 and December 1999. The procedure was performed in 52 eyes of 42 patients, i.e. 10 patients had a bilateral procedure simultaneously. There were 32 women and 10 men. The mean age was 58 years (range 18–95 years). The mean duration of symptoms prior to DCP was 30 months with a range of 6 to 120 months. The mean follow-up was 18 months (range 6–34 months).

Patients were asked to grade their epiphora pre- and post-operatively on a scale of 0 to 5 based on Munk's scale:[7] grade 0, no epiphora; grade 1, requires dabbing less than twice a day; grade 2, requires drying 2–4 times a day; grade 3 requires drying 5–10 times a day; grade 4, requires drying more than 10 times a day; grade 5, constant watering. All patients had constant watering, i.e. grade 5 epiphora, pre-operatively. Each patient had an ophthalmic examination, syringing and probing and a dacrocystogram (DCG) prior to the procedure to determine the site and type of obstruction. There was complete obstruction in 29% of eyes (15/52) and partial obstruction in 71% (37/52) of eyes (Table 1). The most common site of obstruction was in the nasolacrimal duct ($n = 37$). Other sites of obstruction included the junction of the canaliculi ($n = 4$) and the common canaliculus ($n = 2$), and there were multiple stenoses in 9 patients.

DCP was performed under general anaesthetic with a laryngeal mask. A 20-gauge plastic arterial sheath was inserted through the upper or lower punctum into the canaliculus as a guiding cannula for the wire. A 0.018 inch Teflon-coated stainless steel guidewire was then introduced through the canaliculus and gently manipulated down through the lacrimal sac and

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Table 1. *Sites and type of obstruction by dacryocystogram*

Sites of obstruction	Type of obstruction	Failures/Re-obstructions
Nasolacrimal duct (n = 37)	Partial (n = 28)	4
	Complete (n = 9)	8
Junction of the canaliculi (n = 4)	Partial (n = 1)	0
	Complete (n = 3)	2
Common canaliculus (n = 2)	Partial (n = 1)	0
	Complete (n = 1)	1
Multiple sites of stenosis (n = 9)	Partial (n = 6)	2
	Complete (n = 3)	0
Total (n = 52)		(n = 17)

nasolacrimal duct until the tip of the wire emerged under the inferior turbinate and was then retrieved through the nasal aperture. A 4 mm wide 3 cm long deflated angioplasty balloon catheter was then threaded, under fluoroscopic control, over the guidewire in a retrograde fashion into the nasolacrimal apparatus to lie within the site of the obstruction. A radiograph during inflation confirmed correct positioning of the balloon. The balloon was inflated at the site of the obstruction up to 8–13 atmospheres of pressure for 1–2 min and then repeated. A DCG using non-ionic Omnipaque 300 was performed to confirm free passage of contrast through the nasolacrimal system. The balloon catheter was removed inferiorly and the wire superiorly. If there was a canalicular obstruction a smaller 3 mm wide 1 cm long coronary angioplasty catheter was used. Topical antibiotics or steroids were not used routinely post-operatively. Patients were discharged on the same day and followed up in the outpatient department.

Results

The results of the study were viewed in terms of its technical success and its subjective clinical success. A technical success was defined as patency of the nasolacrimal system on a DCG at the end of the procedure. Technically the procedure was successful in 49 of 52 (94%) procedures. There were 3 technical failures. In 1 procedure a false passage was created at the level of the common canaliculus. The other 2 failures had complete obstruction of the nasolacrimal duct preventing advancement of the guidewire and the procedures were abandoned. A surgical DCR was performed on these 3 patients later.

A clinical success was defined as a patient who was symptom free or had less than grade 2 epiphora on Munk's scale 6 months post-operatively. Thirty-five of 49 procedures (71%) were clinically successful.

There were 14 failures (29%). These patients returned within 1 year of the procedure with symptomatic epiphora and required a second procedure. Of these, 5 had a repeat balloon DCP, 3 of whom were functional failures. The remaining 9 patients had a surgical DCR an average of 9 months after the initial DCP. A permanent metallic stent was placed in the nasolacrimal ducts of 2 patients who had a repeat DCP to try to improve long-term patency. Follow-up in this group is of 6 months duration and to date shows clinical success.

Treatment of epiphora by balloon dilation was more successful for partial obstruction than for complete obstruction. Of the 17 failures in total, 11 occurred in association with a complete obstruction and 6 in association with a partial obstruction (Table 1).

The subjective clinical success of this procedure was assessed by a telephone questionnaire to all patients who had one DCP. Patients were asked to grade their epiphora post-operatively using Munk's scale and to say whether the procedure was a success subjectively. Twenty-three of 35 procedures were reported as successful and the remaining 12 were reported as failures.

Discussion

Becker and Berry first reported dacryocystoplasty in 1989.[8] Different authors report varying results of DCP. Some of the early reports have small numbers of patients and limited follow-up. In 1990 Munk *et al.* reported an improvement in symptoms in 13 of 16 patients with a functional obstruction (80%) who had DCP with a maximum follow-up of 6 months.[7] Kumar[9] reported a clinical improvement in 26 of 31 patients (83%) with a similar follow-up of 6 months.

Other studies have larger numbers of patients and longer follow-up. Janssen *et al.*[10] reported a long-term patency rate of 70% in 100 eyes of 80 patients with obstruction at or below the level of lacrimal sac with a mean follow-up of 21 months. Song *et al.*[11] reported a success rate of 56% in 22 of 39 eyes but a recurrence rate of 45% after 2 months in patients with complete obstruction of the nasolacrimal system.

Lee reported a patency rate of only 23% after 2 years with partial or complete obstruction in 81 eyes.[5] We report a series of 52 procedures in 42 patients with partial or complete obstruction. There was an anatomical failure in 17 of 52 (32%) procedures within 1 year. There was an additional 12 of 52 (23%) functional failures on the basis of a telephone questionnaire. This was an overall failure rate of only 55% with a mean follow-up of 14 months.

Differences in results of various series may be attributed to patient selection. Selection of patients with partial obstruction below the lacrimal sac may improve success rates. There was a higher failure rate in patients who had complete obstruction compared with those with partial obstruction in the nasolacrimal system. In our series 11 of 16 procedures (69%) with complete

obstruction failed. The results of DCP for partial obstruction were better. Six of 36 procedures (17%) for partial obstruction failed. An additional 12 procedures were reported as functional failures after the telephone questionnaire giving an overall failure rate of 18 of 36 (50%) for partial obstruction.

Although DCP resolves the obstruction initially, it does not remedy the primary inflammatory process so recurrence of the fibrotic obstruction is likely. This explains the high recurrence rate within the first year in this series. Balloon DCP with subsequent silicon intubation or stent placement should ensure long-term patency and improve success rates. Song *et al.*[12,13] treated patients with recurrent obstruction with stents and reported moderate success with recurrence rates between 15% and 64%. Steinkogler *et al.*[14] performed monocanalicular silicon intubation after DCP to ensure permeability of the system and reported success in 6 patients followed for an average of 22 months.

Lee *et al.*[5] reported recurrence rates of 45–80% 2 years after DCP and suggested primary stent placement for lacrimal duct obstruction. However, stents can create problems. Stent occlusions may occur due to incrustation of mucoid material or overgrowth of the proximal end of a stent with granulation tissue.[13] Stents are also expensive. Perry *et al.*[15] performed balloon catheter dilation in 15 nasolacrimal duct obstructions using an antegrade insertion technique and performed immediate subsequent silicon intubation. They reported a clinical success rate of 60% at 6 months follow-up.

Our procedure was performed under general anaesthesia with a laryngeal mask. As an alternative other authors have used local infiltration of the medial canthus and infratrochlear block with 2% lignocaine, topical benoxinate 0.4% into the conjunctival fornix, 5% cocaine spray to the nose and 2–4 mg medazolam for sedation.[16] Each procedure took 30–40 min and required costly disposables such as angioplasty catheters and guidewires. Because of these factors it offers no great advantage over a standard DCR.

The high re-stenosis rate is the major limitation of this technique. We report an anatomical failure rate of 17% for partial obstruction and 69% for complete obstruction within 1 year of the procedure. There may be a limited role for DCP in partial obstruction of the nasolacrimal system.

In conclusion, the results of balloon dacryocystoplasty in this series are disappointing. The high recurrence rate means that further refinements of this procedure are necessary before it can be offered as a comparable alternative to a standard surgical DCR.

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