Polypropylene in Endoscopic Dacryocystorhinostomy: A Novel Stent

Binayak Baruah¹ · Mona Sarawgi¹ · Pritikanta Sahu¹ · Kailash Prasad Dubey¹ ·
Ajay Gupta¹ · Alok Kumar¹

Received: 1 August 2016 / Accepted: 22 February 2017 / Published online: 28 February 2017
© Association of Otolaryngologists of India 2017

Abstract Endoscopic dacryocystorhinostomy (DCR) is usually done in cases of lacrimal apparatus obstruction. The common causes of failure are that of obstruction in the common canaliculus and closure of the rhinostomy site. To overcome these problems we use stents. Stents most commonly used are that of silicon which are expensive and not readily available. As an alternative, polypropylene (Prolene; Ethicon) is used as a stent which is cheaper and readily available. This study is done to evaluate the clinical efficacy and results of stenting with polypropylene suture material in endoscopic dacryocystorhinostomy. Fifty one endoscopic DCR operations were performed between July 2013 to December 2014. After creating an aperture in the medial wall of the lacrimal sac, 3/0 prolene was inserted from lower punctum to neo ostium. The prolene was left in the lacrimal sac for 3 weeks. The patients were followed up for 3 months. In our study, most of the patients belonged to the age group of 41–60 years (47%). There was female preponderance as 64.7% were females. 47 patients (92.2%) showed very good results. Two patients (3.9%) developed granuloma for which revision surgery was done. We lost 2 patients during follow up. This modification enables an easy, safe, effective and low-cost form of DCR. Prolene is cheaper and readily available. It might be used successfully in endoscopic dacryocystorhinostomy and is promising alternative to silicone stent intubations, especially in settings with limited resources.

Keywords Endoscopic dacryocystorhinostomy · Stents · Prolene

Introduction

Chronic dacryocystitis is permanent nasolacrimal duct obstruction, with constant tearing, because of closed natural tear drainage route, found commonly at the junction between lacrimal sac and nasolacrimal duct [1].

Endoscopic DCR, first described in 1989, popularized due to rhino logical advances has a variable success rate from 70 to 95% [2, 3]. The most important prognostic factor is the obstruction level in lacrimal drainage. Failure mainly occurs because of neo-ostium closure by granulation tissue, scarring or synechiae [4].

The most common cause of failure of DCR operation is closure of the rhinostomy site due to post operative scarring or fibrosis. Thus it was suggested that intubation of the nasolacrimal system during DCR may prevent closure of the rhinostomy site and improve the success rate [5]. This led to the use of silicon as a stenting material [6]. However there were certain issues with silicon viz. it was expensive and not readily available. Many of the techniques described advocate the use of a silicone stent. Allen and Berlin, however, reported a higher failure rate when using silicone tubing [7]. A suggested reason for this was the presence of granulomatous inflammation in association with silicone intubation. Polypropylene (Prolene, Ethicon) is universally used in almost all surgical disciplines for suturing purposes. It is relatively cheaper and inert material and easily available as compared to bicanalicular silicon tube.

This prospective study attempts to estimate the effectiveness of stenting with polypropylene, that is a modification of previously reported endoscopic DCR techniques.

✉ Binayak Baruah
binayak_binit@rediffmail.com

¹ Department of E.N.T., Tata Main Hospital,
Bistupur, Jamshedpur, Jharkhand 831001, India

Materials and Methods

The main purpose of this study is to evaluate the clinical efficacy and results of stenting with polypropylene suture material in endoscopic DCR.

For the present study 51 cases of chronic dacryocystitis are selected and they underwent Endoscopic DCR with prolene stenting at our Institution from June 2013 to December 2014.

Inclusion Criteria

All patients presenting with recurrent epiphora or dacryocystitis and have been diagnosed to have nasolacrimal duct obstruction not fulfilling the exclusion criteria.

Exclusion Criteria

- (1) Watering due to causes other than nasolacrimal duct obstruction.
- (2) Patients with lacrimal trauma or lacrimal sac tumours.
- (3) Unwillingness for endoscopic surgery and those not fit for anaesthesia.
- (4) Revision cases and failed external DCR cases

Informed consent was obtained. Pre-operative evaluation consisted of a standard examination that included lacrimal irrigation and probing. Thorough clinical evaluation of the nose and paranasal sinuses was done to rule out any nasal or paranasal causes of the duct obstruction. Investigations like Routine blood, Random blood sugar, Serum creatinine, Xray Paranasal sinuses, diagnostic nasal endoscopy were done.

Operative Technique

DCR was performed under general anesthesia. After inserting a gauze pack soaked in a mixture of 1:80,000 epinephrine and 4% lidocaine for topical anesthesia and vasoconstriction, the axilla of the middle turbinate and the mucosa surrounding the lacrimal sac was infiltrated with a mixture of 1:200,000 epinephrine and 2% lidocaine. The patient was in supine position with the head elevated 15° and turned towards the surgeon. A 0 or 30°, 4-mm diameter nasal endoscope was inserted and an inverted u-shaped incision 10 × 10 mm, was made at the lateral nasal wall anterior and slightly superior (approx 2 mm) to the insertion of the middle turbinate. The inferiorly based mucosal flap is elevated backwards off the maxillary bone, extending up to the uncinate process and reflected over the inferior turbinate and protected with a saline soaked tagged cotton pack. The maxillary bone covering the lacrimal sac

then is gently punched using a DCR punch and drilled until the sac is widely exposed, extending to the level of the fundus. Metallic lacrimal probe was passed medially through the inferior canaliculi, and gently pushed so as to tent the sac, thus facilitating incision through the sac while precisely localizing the position of the sac lumen. An incision was then made with a sickle knife, avoiding injury to the sac lumen and, hence, minimizing hemorrhage. Patency was checked by saline irrigation via inferior canaliculus and flow into nasal cavity through new stoma visualized. The elevated nasal mucosal flap were trimmed to form a large anterior flap and adjusted in size and repositioned to cover the denuded bone surrounding the opened sac. The lacrimal sac flaps were incised, everted, and adjusted to accurately appose the nasal mucosa. A small gel foam patch was packed lightly in the exposed sac to keep the flap anastomosis in position throughout the initial healing period. A 3–0 polypropylene (Prolene; Ethicon, Inc.) suture was taken and threaded over a disposable Viscoelastic cannula, (24G, angled at 45°). It is then inserted through the inferior punctum (Fig. 1) and taken out through the rhinostomy site intranasally (Fig. 2) with the help of straight blakesly forceps and tied outside the nose (Figure 3). A light anterior nasal pack was put which was removed the following day.

Post-operatively, each patient was prescribed oral antibiotics and analgesics for 5 days. Antibiotic ophthalmic drops were advised 4 times daily for 14 days. Nasal decongestant drops were instilled 3 drops 3 times a day for 5 days. All patients were followed at 1st, 3rd, 6th week and 3rd month post operatively. Nasal endoscopy with syringing was done in each visit and patency was checked. Any crusting and granulations were removed. Saline douching of the nasal cavity was advised to prevent crust formation. The prolene thread was removed at third week. Patient

Fig. 1 3–0 prolene threaded over Visco cannula being inserted through the inferior punctum

Fig. 2 Endoscopic view of the cannula with the thread through the rhinostomy site

Fig. 3 Prolene suture being tied outside

symptoms and endoscopic findings of the neo-ostium were evaluated again at 6 weeks and then at 3 months. Irrigation through the punctum was performed to evaluate the patency of the neo-ostium. The neo-ostium was judged patent if the marsupialized sac had been well maintained in shape and size, with free flow of saline on irrigation. Surgery was considered unsuccessful if the patient had one or more of the following postoperative outcomes:

- (1) No marked improvement of preoperative chronic epiphora.
- (2) Inability to irrigate the lacrimal system and
- (3) Nasal endoscopy revealing obstruction of the neo-ostium with granulation tissue or synechia. Cases

with granulations or synechiae not occluding the neo-ostium were not considered failures.

Results

In our study of 51 cases, age of the patients ranged from 16 to 80 years with most of the patients in age group of 41–60 years (47%) followed by 27.5% belonging to 61–80 years group (Table 1).

In our study there was female preponderance as 64.7% are females whereas the male percentage is 35.3% (Table 2).

47 patients (92.2%) showed very good results. Two patients (3.9%) developed granuloma for which revision surgery was done. We lost 2 patients during follow up (Table 3).

Discussion

The main purpose of our study is to evaluate the effectiveness of prolene as an alternative stenting material in Endoscopic DCR operation. For this we had taken 51 cases of chronic dacryocystitis.

Most of the patients in our study are in the age group of 41–60 years. H. Basil Jacobs in his study in 1959 found the maximum incidence of this condition between 40 and 55 years of age [1]. Sarda et al [8] however noted the incidence to be highest in the third and fourth decade of life.

Table 1 Age wise distribution

Age-wise (in years)	No. of patients	Percentage
1–20	2	3.9
21–40	11	21.6
41–60	24	47
61–80	14	27.5

Table 2 Sex wise distribution

Sex wise distribution	No. of patients	Percentage
Males	18	35.3
Females	33	64.7

Table 3 Outcome

Results	No. of patients	Percentage
Success	47	92.2
Failure	2	3.9
Lost to follow up	2	3.9

In our study the disease was seen predominantly in females (64.7%). Dalglish [9] reported a percentage of 54% in females. He claimed that females were more commonly affected as they had a high vascular congestive factor and a narrower bony wall.

In our study the success rate of Endoscopic DCR with prolene stenting is 92.2%. Aslan [10] in their study of 42 cases reported a success rate of 92.9% with prolene stenting which is comparable with our results. Similar results were also found in studies by Weidenbecher [2], Zhou [11] and Wormald [12]. The procedure was a failure in two cases (3.92%) due to formation of granulation tissues and two patients (3.9%) were lost to follow up.

In the present study we evaluate the effectiveness of prolene as an alternative stenting material in Endoscopic DCR. Prolene is non absorbable, cheaper, readily available, less tissue reactive, good tensile strength and less prone to bacterial contamination.

However our sample size is small and further research work need to be carried out but whatever results we have observed, it is our belief that this technique with prolene can be used as an alternative to silicone stenting to not only increase the success rate of Endoscopic DCR surgery but also especially in settings with limited resources.

Ethical Standard All procedures performed in the study were in accordance with the ethical standards of the institution and with the 1964 Helsinki declaration.

Compliance with Ethical Standards

Conflict of interest We declare that we do not have any competing interests.

Informed Consent We declare that the procedures were conducted with the understanding and the consent of the patient.

References

1. Jacobs HB (1959) Symptomatic epiphora. *Br J Ophthalmol* 43(7):415–434
2. Weidenbecher M, Hosemann W, Buhr W (1994) Endoscopic endonasal DCR: results in 56 patients. *Ann Otol Rhinol Laryngol* 103(5 pt 1):363–366
3. Toti A (1904) Nuovo metodo conservatore di cure radicale della suppurazioni croniche del sacco lacrimale (dacriocistorrhinoostomia). *Clin Moderna Firenze* 10:385
4. McDonogh M, Meiring JH (1989) Endoscopic transnasal dacryocystorhinostomy. *J Laryngol Otol* 103(6):585–587
5. Zolli CL, Shannon GM (1982) Dacryocystorhinostomy: a review of 119 cases. *Ophthalmic Surg* 13(11):905–910
6. Sadiq SA, Ohrlich S, Jones NS et al (1997) Endonasal laser dacryocystorhinostomy—medium term results. *Br J Ophthalmol* 81(12):1089–1092
7. Allen K, Berlin AJ (1989) Dacryocystorhinostomy failure: association with nasolacrimal silicone intubation. *Ophthalmic Surg* 20(7):486–489
8. Sarda RP, Kulshrestha OP, Mathur RN (1961) Dacryocystorhinostomy. *Br J Ophthalmol* 45(2):138–143
9. Dalglish R (1967) Idiopathic acquired lacrimal drainage obstruction. *Br J Ophthalmol* 51(7):463–468
10. Aslan S, Oksuz H, Okuyucu S, Akoglu E, Dagli S (2009) Prolene: a novel, cheap, and effective material in dacryocystorhinostomy. *Acta Otolaryngol* 129(7):755–759
11. Zhou W, Zhou M, Li Z, Wang T (1996) Endoscopic Intranasal DCR in forty-five patients. *Chin Med J (Engl)* 109(10):747–748
12. Wormald PJ (2002) Powered endoscopic DCR. *Laryngoscope* 112(1):69–72