Endoscopic Dacryocystorhinostomy with Flap Suturing

Milind V. Kirtane · Abhineet Lall · Kashmira Chavan ·
Dhruv Satwalekar

Received: 12 February 2011 / Accepted: 10 November 2011 / Published online: 7 December 2011
© Association of Otolaryngologists of India 2011

Abstract Multiple reports have demonstrated the efficacy of endoscopic dacryocystorhinostomy (DCR). However the results of the same have varied from centre to centre. Many still regard external DCR as the gold standard. To describe an endoscopic DCR technique which anatomically simulates an external DCR and assess its results. Prospective, nonrandomized and noncomparative interventional case series. Clinical charts of patients with nasolacrimal duct obstruction based on symptomatic, clinical and radiological basis were included in the study. All surgeries were done endonasally using standard operative technique. The modification in the standard technique included creating a wide exposure of the lacrimal sac, incising the sac and the suturing the medial wall of the lacrimal sac with the lateral nasal wall. The same was achieved by using either vascular clips or 5.0 vicryl sutures. Twenty (11 females and 9 males) were included in the study. The average age of the patients was 56.86 years old (range 27–85 years old). The main presenting symptom was epiphora and 1 patient with mucocele. Successful outcome was measured in terms of relief of sympto anatomical patency assessed by sac syringing and nasal endoscopy

showing a wide patent lumen. A primary success rate of 95% and ultimate rate of 100% was achieved in the cases with a nasolacrimal duct (NLD) block while an overall success rate of 82.6% was noted when the cases with NLD block and common canalicular block were considered together. Endoscopic DCR can now easily replace external DCR as a standard. It is not only minimally invasive, but has minimal complications and using this technique, we have been able to achieve very high success rates.

Keywords Endoscopic surgical procedure · Dacryocystorhinostomy · Lacrimal apparatus · Lacrimal duct obstruction · Lacrimal gland · Dacryocystitis · Lacrimal apparatus disease · Lacrimal · Lacrimal duct · Mucocele

Introduction

The surgery of dacryocystorhinostomy (DCR) is over 100 years old [1]. Caldwell [2] reported the first intranasal approach at the start of the last century and around the same time Toti [1] described the external approach. Due to difficulties in viewing the intranasal anatomy in those times, external approach was adopted by most ophthalmologists.

McDonough and Meiring [3] described the first endoscopic endonasal DCR in 1989, and since then it has gained popularity among otolaryngologist trained in endoscopic sinus surgery. However the debate between external and endoscopic approach still continues.

Endoscopic approach has had its problems like false localization of the lacrimal sac, granulation tissue formation around the stent tubes, retained bony spicules, inadequate removal of the medial wall of the sac and synechia between the lateral wall and the middle turbinate [4].

Electronic supplementary material The online version of this article (doi:10.1007/s12070-011-0354-z) contains supplementary material, which is available to authorized users.

M. V. Kirtane · A. Lall · K. Chavan · D. Satwalekar
P D Hinduja Hospital & Medical Research Centre, Mahim,
Mumbai, India

D. Satwalekar
Cumballa Hill Hospital, Mumbai, India

A. Lall (✉)
Kirtane Clinic, 1st Floor, Amar Bhuvan, French Bridge,
Near Opera House, Mumbai 400007, India
e-mail: abhineetlall@hotmail.com

Patency of rhinostomy site depends on approximation of cut edges of nasal and lacrimal sac mucosa. Without suturing, it is difficult to predict the pattern of approximation [5]. If lacrimal to lacrimal or nasal to nasal approximation occur, the rhinostomy will be closed [5].

Tsirbas and Wormald [1] described a technique of creating an H shaped incision on the sac wall and a U shaped lateral nasal flap. These flaps were apposed to each other with the help of stents.

We present our experience of suturing lateral nasal wall mucosa with the medial sac wall.

Methods

All patients undergoing DCR from June 2006 to November 2009 were included in the study. The preoperative evaluation included ophthalmologic assessment, sac syringing and dacryocystogram/dacrosintigraphy in case of revision surgeries.

A total of 20 patients underwent 23 endoscopic DCRs. All surgeries were performed by the same surgeon. Eleven patients had left DCR, six had right DCR and three had bilateral DCR. There were 11 females and 9 males in the study.

Surgical technique

All the procedures were performed under general anesthesia. The nose was initially decongested with 1:10,000 adrenaline neurosurgical cottoniod patties. The lateral wall of the nose and head of the middle turbinate was infiltrated with 2% lignocaine with 1:80,000 adrenaline. A 0 degree endoscope was used with a camera.

A scalpel is used to cut a mucosal flap starting 8 mm above the axilla of the middle turbinate, which then brought down anterior to the axilla for 8 mm. The flap is then elevated with the help of freer elevator. This posteriorly based elevated mucosal flap is then repositioned on the middle turbinate. Placing the mucosal flap on the middle turbinate prevents any damage on the middle turbinate during instrumentation thereby protecting against adhesions with the lateral nasal wall in the postoperative period (Figs. 1, 2).

The frontal process of the maxilla and the lacrimal bone is punched out using a kerrison's bone punch (Fig. 3). It is important to get a good exposure of the sac, especially superiorly where one needs to remove the frontal process of the maxilla and we have had to use drill occasionally when the bone was very thick (Fig. 4).

The size of the osteotomy should be at least 20×15 mm so as to expose the inferior and superior parts of the sac [7] (Fig. 5). The medial wall of the sac is then tented with a Bowmans probe passed through the inferior

Fig. 1 Line showing the site of incision

Fig. 2 Mucosal flap elevated and placed in the middle meatus

canaliculus (Fig. 6). A small amount of saline is infiltrated into the wall of the sac. A vertical incision is then taken on the sac wall as anterior as possible. The incision is extended horizontally both inferiorly and superiorly to make a posteriorly based flap. This marsupilizes the entire sac and the bowman's probe is clearly visualized. The mucosal flap is then trimmed in such a way that the edges of the flap approximates. A 5.0 vicryl or vascular clips are then taken to put the mucosal flap and the medial sac wall together (Fig. 7).

A neurosurgical cottoniod soaked with mitomycin C at 0.5 mg/ml is then placed at the osteotomy site for 3 min.

Fig. 3 Bone being punched out using a Kerrison's bone punch

Fig. 4 Frontal process of the maxilla being drilled

The area is then irrigated with saline. No nasal tamponade is used.

Results

A total of 20 patients (11 females and 9 males) were included in the study. The average age of the patients was

Fig. 5 Incision taken on the sac wall, sac being tented with a Bowman's probe

Fig. 6 Bowman's probe seen after completely marsupializing the lacrimal sac

56.86 years old (range 27–85 years old). The main presenting symptom was epiphora (19 patients) and epiphora with mucocoele in 1 patient. The average follow-up period varied from 4 to 41 months, with an average of 10.8 months. Among the 20 patients, 10 patients had a left sided nasolacrimal duct (NLD) obstruction, 6 had a right NLD obstruction, 2 had bilateral NLD obstruction, 1 had a bilateral common canalicular block and 1 patient had a unilateral common canalicular block.

Suturing the nasal mucosal and lacrimal sac flaps together

Fig. 7 Lateral wall of the sac and nasal mucosal flap being stitched together with a 5.0 vicryl

A total of 23 endoscopic DCRs were performed in 20 patients. Suturing with 5.0 vicryl was done in 20 DCRs and vascular clips (ligaclips) were used in 3 DCRs to put the mucosal flap and the medial sac wall together.

Successful surgical outcome was measured in terms of relief of symptomatic anatomical patency assessed by sac syringing and nasal endoscopy showing a wide patent lumen.

A total of 20 endoscopic DCRs were performed in the 18 patients with NLD block. Suturing with 5.0 vicryl was done in 18 DCRs and a vascular clip was used in two DCRs to put the mucosal flap and the medial sac wall together.

Of the 20 endoscopic DCRs performed in the patients with NLD block, primary surgical success was demonstrated in 95% cases (19 out of 20). One patient had persistent epiphora due to a granuloma obstructing the neo-ostium (mentioned above). Following removal of the granuloma in this patient, there was complete resolution of symptoms with a patent lacrimal neo-ostium. Thus, ultimately a successful surgical outcome was seen in all 20 cases (100%) with NLD block.

The two patients with common canalicular block (bilateral = 1, unilateral 1) had persistent epiphora at 4 and 5 months post-op respectively. In the patient with bilateral common canalicular block, a granuloma was found obstructing the left lacrimal neo-ostium (wherein a ligaclip had been used). Thus, ultimately a successful surgical outcome was seen in 20 out of 23 cases overall (86.96%) (Figs. 8, 9).

Sutured nasal mucosal and lacrimal sac flaps

Fig. 8 The common canaliculus seen well with the two surfaces sutured together

Fig. 9 Post operative endoscopic picture

Discussion

Ever since endoscopic DCR was popularized in the 90's, there has been constant debate between the two approaches and constructive skepticism from ophthalmologists that endoscopic DCR are not as successful as external DCR. With this article we hope to resolve some of the issues.

Dacryocystorhinostomy has been classified as external and endoscopic. The latter has been further sub-classified as laser-assisted DCR, endocanicular laser-assisted DCR and mechanical endonasal DCR with drills or without drills [1].

The other important aspect of lacrimal surgery is how we measure our success, so as to compare outcomes of different approaches. The Royal College of Ophthalmologist (1999) published guidelines for clinical governance suggesting that freedom from epiphora 3 months after surgery is marker for satisfactory procedure [6].

Leong et al. [7] have reported a success rate of 94% for external DCR as compared to 86% for endoscopic DCR, thereby concluding that external DCR offers better outcomes than endoscopic. However endoscopic DCR are associated with far fewer complication.

In effect any new technique must compare favourably to external DCR which having been present for 100 years must be regarded as the gold standard. The reported success rate of external DCR have varied but have often been reported as over 90% in many specialist lacrimal units [8, 9].

Tsirbas and Wormald [1] in their article have shown a new technique in endonasal DCR. They emphasize on preservation of nasal mucosa and creation of a flap anastomosis. The general principle of creating a mucosa lined fistula, vital in external DCR was emulated in the new method. We went ahead from there and actually sutured or put vascular clips. This obviated the need to put a stent to support the opening. In our initial cases we used 5.0 vicryl more often, but now with our experience with vascular clips and the ease of using it, we prefer the same.

Jin et al. [10] experienced success of over 96% in their technique of endoscopic DCR. Their technique was creating a large epithelialized fistula, thereby potentially minimizing the formation of granulation tissue and synechia.

The role of mitomycin [11–14] has been supported in a large number of articles. Mitomycin C is an antiproliferative agent, prevents postoperative adhesions and scarring. We tended to use mitomycin C in almost all our cases.

In the article by Onerci et al. [4] they have studied the causes of failure of endoscopic DCR. These include false localization of lacrimal sac, granulation tissue formation around tubes, retained bony spicules, inadequate removal of medial wall of the sac and synechia between lateral wall and the middle turbinate. Apart from the above cheese wiring has been a problem use of stents [5].

Finally the advantages of endoscopic DCR are as follows: (1) it is less traumatic and has shorter hospital stay, (2) no disruption of medial canthal ligament, and consequently enables preservation of lacrimal pump function, (3) a facial scar avoided, (4) access to the sac directly through the lacrimal bone, avoiding double side dissection of the sac. The disadvantages are the surgical field may be limited because of bleeding and there is occasional need for septoplasty for more space and postoperative evaluation.

There also appears to be increased likelihood of granulation tissue formation, resulting in stenosis [11].

In all our cases we took special care to create a good exposure and removing all the bony spicules. By avoiding the use of stents we prevented granulation tissue formation around the tubes. Unlu et al. [15] evaluated the long term role of intubation in endoscopic DCR and they did not find it particularly advantageous. Creating well mucosalized surfaces prevented synechia formation and contraction of the opening.

Conclusion

Over the last decade there has been lot of criticism over the long term results of endoscopic DCR. Here we describe a technique based on surgical principles similar to that of an external DCR along with the added advantage of endonasal approach.

References

1. Tsirbas A, Wormald PJ (2003) Endonasal dacryocystorhinostomy with mucosal flap. *Am J Ophthalmol* 135:76–83
2. Caldwell GW (1893) Two new operations for obstruction of the nasal duct, with preservation of the canaliculi, and with an incidental description of a new lacrimal probe. *Am J Ophthalmol* 10:189–193
3. McDonough M, Meiring JH (1989) Endoscopic transnasal dacryocystorhinostomy. *J Laryngol Otol* 103:585–587
4. Onerci M, Orhan M, Ogretmenoglu O, Irkec M (2000) Long term results and reasons for failure of intranasal endoscopic dacryocystorhinostomy. *Acta Otolaryngol* 120:319–322
5. Yuen KSC, Lam LYM, Tse MWY, Chan DDN, Won BWC, Chan WM (2004) Modified endoscopic dacryocystorhinostomy with posterior lacrimal sac flap for nasolacrimal duct obstruction. *Hong Kong Med J* 10:394–400
6. Yung MW, Hardman-Lea S (2002) Analysis of the results of surgical endoscopic dacryocystorhinostomy: effect of the level of obstruction. *Br J Ophthalmol* 86:792–794
7. Leong SC, Karkos PD, Burgess P, Halliwell M, Hampal SA (2010) Comparison of outcomes between nonlaser endoscopic endonasal and external dacryocystorhinostomy: single centre experience and a review of British trends. *Am J Otolaryngol* 31:32–37
8. Ozgur Y, Mehmet S, Umit T, Serdar C, Kadir E, Murat Y (2007) External and endoscopic dacryocystorhinostomy in chronic dacryocystitis: comparison of results. *Eur Arch Oto rhino laryngol* 264:879–885
9. Jha KN, Ramalingam WVBS (2009) External versus endoscopic dacryocystorhinostomy: a retrospective study. *MJAFI* 65:23–25
10. Jim HR, Yeon JY, Cho MJ (2006) Endoscopic dacryocystorhinostomy: creation of large marsialized lacrimal sac. *J Korean Med Sci* 21:719–723
11. Liao SL, Kao SC, Tseng JH, Chen Hou PK (2000) Results of intraoperative mitomycin c application in dacryocystorhinostomy. *Br J Ophthalmol* 84:903–906

12. Selig YK, Biesman BS, Rebeiz EE (2000) Topical application of mitomycin c in endoscopic dacryocystorhinostomy. *Am J Rhinol* 14:205–207
13. Zilelioglu G, Ugurbas SH, Anadolu Y, Akmer M, Akturk T (1998) Adjunctive use of mitomycin c on endoscopic lacrimal surgery. *Br J Ophthalmol* 82:63–66
14. Deka A, Bhattacharjee K, Bhuyan SK, Bhattacharjee H, Khaund G (2006) Effect of mitomycin c on ostium in dacryocystorhinostomy. *Clin Exp Ophthalmol* 34:557–561
15. Unlu HH, Gunhan K, Baser EF, Songu M (2009) Long term results in endoscopic dacryocystorhinostomy: Is intubation really required? *Otolaryngol Head Neck Surg* 140:589–595