ORIGINAL RESEARCH

Endoscopic Dacryocystorhinostomy (DCR): a team approach

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Abstract

Aim: Endoscopic transnasal dacryocystorhinostomy (DCR) has recently increased in popularity as it has advantages over the traditional external DCR in that no external incision is required, the medial canthal ligament is not disturbed and the pump action of the orbicularis oculi muscle is not disrupted. The surgery is performed endoscopically through the nose with assistance provided from the eye. The surgical technique is presented in detail.

Materials and methods: In the 29 consecutive patients who underwent this procedure, 3 (10%) required septal surgery for adequate exposure of the operative site. There were 26 patients who had primary DCRs and 3 patients who had revision DCRs.

Results: The overall success rate was 84% (24 out of 29) with 2 failures in the primary DCR group and 1 in the revision DCR group. Complications were minor with 3 epistaxis, 1 orbital fat exposure and 1 minor corneal abrasion.

Conclusion: The ophthalmologist and otolaryngologist provide different but equally important skills in this procedure. The ophthalmologist is best placed to diagnose nasolacrimal duct obstruction while the otolaryngologist diagnoses potential predisposing conditions such as sinusitis and anatomical variants that may need to be dealt with at the time of surgery. The surgery is a combined procedure with the otolaryngologist exposing the lacrimal sac endoscopically and the ophthalmologist confirming the site and size of the sac and tenting the sac wall for incision. The ophthalmologist also places silastic tubes should this be required. This team work optimizes the success of endoscopic DCR.

Introduction

The development of endoscopic instrument for functional endoscopic surgery has in recent years lead to an increased interest in endoscopic intra-nasal dacryocystorhinostomy (DCR).[1] During the past ten years otolaryngologists have acquired new skills in the intra-nasal management of sinus disease using the angled telescopes to improve visualization. Once the anatomical relationship between the nasolacrimal sac and duct and the lateral wall of the nose is understood, endoscopic opening of the sac is a natural extension for the endoscopic intra-nasal surgeon. However, in the past, DCR has been more frequently performed by ophthalmologists than otolaryngologists as eye symptoms will usually present first to ophthalmologists. Ophthalmologists have traditionally used the external approach as first described by Toti in 1904.[2,3] While this operation is successful with reported patency rates of between 85 and 97%,[4,5] it does necessitate an external incision and some disruption of the lacrimal pump action of the orbicularis oculi muscle. Endoscopic DCR has similar reported success rates[6,7] and can be performed without an external incision. Patients, if given the choice, would usually choose not to have a facial scar if the operation

can be performed as successfully without a scar. This provides an ideal opportunity for the two specialties to work together in the management of the patient. This study gives the surgical technique of endoscopic DCR as performed by an ophthalmology/otolaryngology team and presents the results.

Materials and methods

All patients presented primarily to the ophthalmologists and were referred to the otolaryngologists for additional assessment. The diagnosis of nasolacrimal duct obstruction was made by the ophthalmologists by syringing of the lacrimal apparatus and in some instances probing of the lacrimal sac. All patients underwent a pre-operative otolaryngology assessment in order to assess possible intra-nasal causes for the naso-lacrimal duct obstruction and deformities which may need correction during the surgery. Twenty-nine consecutive patients underwent an endoscopic DCR in Groote Schuur Hospital, Cape Town, between 1994 and 1995. The male to female ratio was 1:2 with a average age of 51 years (STD = 18). Twenty six of the operations were primary procedures and 3 were revision DCRs.

Surgical technique

The procedure is done under either local or general anesthetic depending on the patient preference. The nasal cavity is packed with ribbon gauze soaked in 4ml 2% tetracaine hydrochloride and 1ml 1:1000 epinephrine for 10 minutes. After removal of the nasal packs the lateral wall of the nose will be infiltrated with 0.5-1 ml of 1:80 000 epinephrine and 2% lidocaine. If the procedure is performed under local anesthetic additional local anesthetic is given around the lacrimal sac externally and to the anterior aspect of the septum. If a septal deviation compromises the view of the middle turbinate, a limited endoscopic submucous resection of the deviated portion of the septum is performed through a Killian incision. Surgery on the septum is facilitated by an endoscub ® machine (made by Xomed Treace) to keep the Hopkin rod lens clear of blood as well as a suction Freer's dissector to simultaneously develop the submucous plane and keep the field clear of blood. If the middle turbinate has a bulbous anterior projecting end, this is also removed with a curved endoscopic scissors. The anatomical features indicating the location of the lacrimal sac in the lateral nasal wall are identified (Figure 1). [1,6,8] Two horizontal incisions are made with a sickle knife. The upper incision begins just under the anterior insertion of the middle turbinate (the "axilla" of the middle turbinate). The lower incision begins at the anterior end of the middle turbinate approximately 8mm below the upper incision. These two incisions are continued anteriorly for approximately 8 mm. A "Canal knife" (ear instrument) is used to join the upper and lower incisions (Figure 1). All incisions are made firmly onto the underlying bone. The canal knife is used to elevate the mucosa in a sub-periosteal plane backwards till just under the anterior end of the middle turbinate. The 8 by 8 mm square of nasal mucosa is removed and the underlying hard bone of the frontal process of the maxilla and soft lacrimal bone is exposed. The canal knife is "Walked" along the hard bone of the frontal process of the maxilla until the junction of the frontal process and soft lacrimal bone is identified. The soft lacrimal bone is then flaked off the posterior half of the lacrimal sac. The Hajek Koefler sphenoid punch is used to back-bite the hard frontal process until the anterior half of the lacrimal sac is entirely exposed (Figure 2). The ophthalmologist places a number 1 Bowman's lacrimal probe through one of the puncta and into the lacrimal sac and tents the medial wall of the sac. A sickle knife is used to make a vertical incision in the anterior aspect of the sac. The sac lumen is identified and two horizontal incisions are made posteriorly to create a posteriorly based flap. This flap is removed with microscissors from the otological surgical tray. In-so-doing the entire medial wall of the lacrimal sac is removed (Figure 3). The ostium created into the lacrimal sac should be of approximately 6 by 6 mm and the edges of the ostium should approximate the edges of the original mucosal incision. O'Donaghue or Crawford's silastic tubes are inserted if the lacrimal sac is small and contracted or if the procedure is a revision DCR. Tubes are not inserted if the sac and the ostium are large. In all cases thick spongistan or gelfoam is cut into a triangle and placed into the ostium as an additional stent.

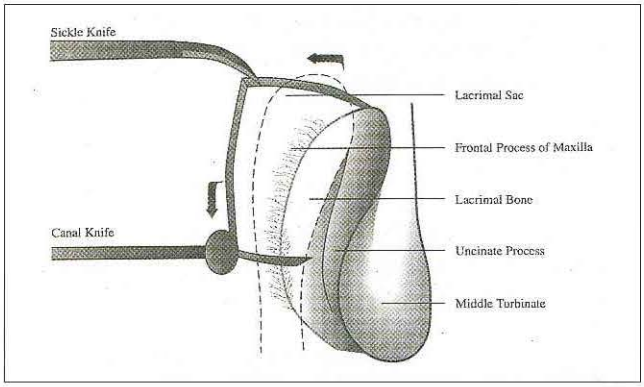

Figure 1. The anatomical relations between the lacrimal sac and lateral nasal wall and placement of mucosal incisions.

No nasal packing is used. The patient is instructed to perform saline nasal douches 4 to 5 times a day and the patient is followed up one week post-operatively. If tubes have been placed, they are removed at 6 weeks.

Results

Of the 29 patients, 15 presented with epiphora only, 7 with epiphora and a mucocoele, 6 with a lacrimal sac abscess and 1 with chronic dacryocystitis. On endoscopic nasal assessment, 5 patients (17%) had a significant septal deviation of which 3 (10%) required surgical correction before the DCR could be performed.

Intra-operatively 22 had Crawford tubes inserted and 7 had spongistan stenting alone. Of the six patients who had minor complications, 3 had post-operative epistaxis (not requiring management) , one patient had orbital fat

exposed and one patient had a slight corneal abrasion. Twenty four patients (83%) had a successful operation with a visibly patent ostium at follow-up (follow-up between 6 and 18 months). Two primary DCRs and one revision DCR developed re-stenosis of the ostium with a recurrence of symptoms. It was interesting that 60% of patients with Crawford's tubes developed granulations around the ostium. In contrast this was a rare occurrence (14%) in patients who did not have tubes placed.

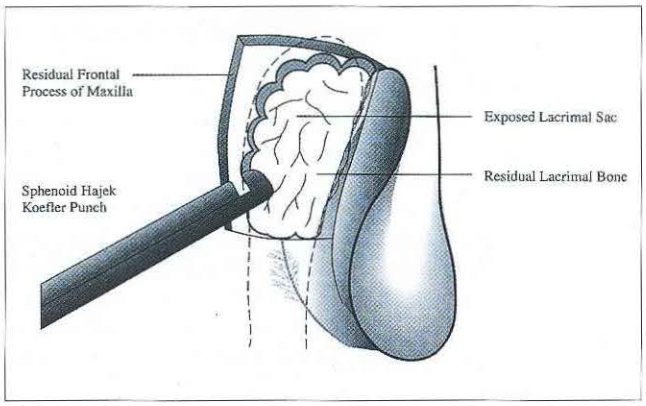

Figure 2. Exposure of the lacrimal sac by removal of lacrimal bone over the posterior half of the lacrimal sac and removal of bone of the frontal process of the maxilla from the anterior half of the sac.

Discussion

In the past the traditional external approach DCR was performed by both ophthalmologists and otolaryngologists with little cooperation or team work. The endoscopic approach to the nasolacrimal sac relies on successful interaction and cooperation between the two specialties. The ophthalmologist is best placed to diagnose the nasolacrimal duct obstruction as the patient will in most circumstances present to them. They are also technically skilled to exclude common canaliculi obstruction and diagnose any eye disease that may have contributed to the nasolacrimal duct obstruction.

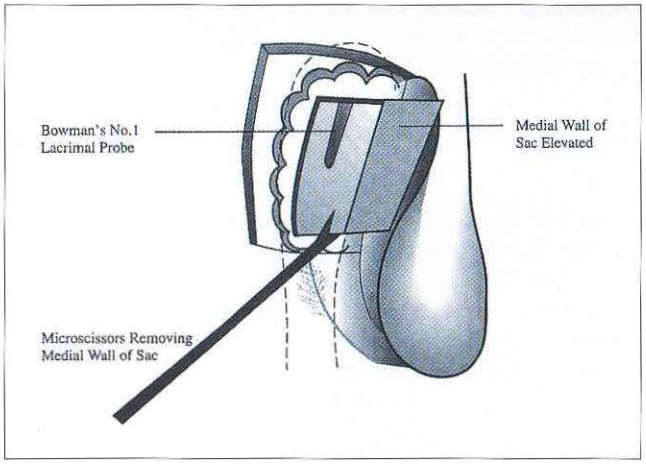

Figure 3. Confirmation of the position of the lacrimal sac by a Bowman's lacrimal probe with removal of the medial wall of the sac with microscissors.

However, the otolaryngologist is best placed to assess the nose and determine whether any additional nasal surgery should be performed at the same time as the DCR. In his study 7% of the patients needed septal surgery to allow adequate visualization of the operative site. This is similar to Weidenbecher's study[9] in which 10% of patients required septal surgery and 16% required additional sinus surgery. As seen from the surgical technique, the initial endoscopic exposure of the sac is done by the otolaryngologist with assistance from the ophthalmologist for confirmation of the site and dimensions of the sac. If the otolaryngologist is unsure of the precise location of the sac, the ophthalmologist may help by placing either a specially designed light probe (Endo-illuminator, Storz instruments)[8] or vitreous light source probe into the sac via a canaliculus and illuminating the sac. However, once the otolaryngologist becomes skilled at identifying the anatomy, this is seldom necessary. Another variation of the surgical procedure described is laser removal of the medial wall of the sac.[8] A possible advantage of the laser is the reduced bleeding from the sac wall. If Crawford or O'Donaghue tubes are required, the ophthalmologist has the necessary skill to insert the tubes through the canaliculi and into the sac. The various skills of both the ophthalmologist and the otolaryngologist complement one another and emphasize the team approach needed for the success of endoscopic DCR.

In this study the sphenoid punch is advocated for removal of the bone overlying the anterior half of the lacrimal sac. The punch allows precise removal of bone without trauma to the surrounding tissue. If a drill is used to remove the bone of the frontal process of the maxilla and the lacrimal bone, the reported incidence of orbital fat exposure and post-operative synechiae is higher.[7] This is probably due to damage to the lamina papyracea on removal of the lacrimal bone and damage to the adjacent middle turbinate on removal of the frontal process of the maxilla. Most surgeons[2,7-10] advocate the placement of silastic stents after creation of the ostium to prevent stenosis and eventual closure of the ostium. The value of such stents is as yet not proven as the stents in this study were associated with a high incidence of granulations around the ostium (60%) which in themselves may predispose to increased scarring and ostium contraction. McDonagh in his study[6] does not routinely place stents and had a comparable (87%) surgical success rate. Should stents be placed, the ideal length of time that these stents should remain in place is also not clear. In this study and others[1,9] the stents were removed at around 6 weeks while in other studies the time span varied from 2 months[10] to 6 months.[8]

It is clear from this study that the cooperation and teamwork between the ophthalmologist and otolaryngologist is essential and can influence the success of endoscopic DCR. Both surgeons need the skills and expertise of the other surgeon and both can benefit by learning additional skills to improve the success rate of endoscopic DCR.

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