Endoscopic dacryocystorhinostomy seems promising for lacrimal stenosis

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ABSTRACT

INTRODUCTION: Acquired nasolacrimal drainage obstruction (ANLDO) is a common ophthalmic problem with symptoms like epiphora and dacryocystitis. The standard surgery for ANLDO is dacrocystorhinostomy (DCR) in which the lacrimal sac is connected directly to the nose. There are two types of DCR, external (exDCR) and endonasal (enDCR). Our aim was to determine the total outcome of enDCR and specifically to analyze the success rate in relation to obstruction levels as there only have been few former reports on these aspects.

MATERIAL AND METHODS: A retrospective chart review was performed at the Department of Otorhinolaryngology at the Hospital of Holstebro in the 2005-2010 period. All patients were evaluated by an ophthalmologist before surgery. The ophthalmologist categorized the site of obstruction as proximal (from punctum to the end of the common canaliculus) or distal (saccus and the nasolacrimal duct). The need for additional nasal surgery was evaluated by an otorhinolaryngologist. The surgical outcome was evaluated at the second follow-up six months after surgery and the subjective improvement and the patency of the neo-ostium were determined.

RESULTS: A total of 61 operations were performed of which 55 were included. The success rate after enDCR was 91%. Categorizing the level of obstruction, 41% were distal of which 92% were successful, and 59% were proximal of which 90% were successful.

CONCLUSION: We suggest enDCR for both distal and proximal stenosis of the lacrimal system as the obstruction level seems to have no influence on the success rates.

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Acquired nasolacrimal drainage obstruction (ANLDO) is a common ophthalmic problem and accounts for 3% of clinic visits to ophthalmologists [1]. The most common symptoms of ANLDO are epiphora and acute or chronic dacryocystitis. ANLDO is often idiopathic, but can also be due to Wegener's granulomatosis, sacoidosis, trauma, previous nasal surgery or herpes simpex virus (HSV) infection.

The standard surgery for obstruction of nasolacrimal drainage is dacryocystorhinostomy (DCR) in which the lacrimal sac is connected directly to the nose. There are two main types of DCR; external DCR (exDCR) and endoscopic DCR (enDCR). The endoscopic approach has evolved over the past 20 years, and the technique has been the operation of choice at Holstebro Regional Hospital, Denmark, since 2005.

Many factors influence the outcome of enDCR. Some studies have shown that the obstruction level is an important factor [1, 2].

At present, no reports regarding the effect of enDCR have been issued in Denmark, and none have specifically analyzed the success rate in relation to obstruction levels. The aim of this paper was therefore to determine the success rate of enDCR and to determine whether the obstruction level is an important factor for the success rate.

MATERIAL AND METHODS

Patients and data selection

A retrospective chart review was performed on all patients operated at the Department of Otorhinolaryngology at Holstebro Regional Hospital registered with the operation: endoscopic dacryocystorhinostomy in the 2005-2010 period. Patients were treated consecutively by enDCR and we therefore included those with Wegener's granulomatosis, sacoidosis, trauma, previous nasal surgery or HSV infection.

All patients were evaluated by an ophthalmologist before surgery. The site of obstruction was evaluated using irrigation and probing of the canaliculi. Patients with less than 8 mm patent canaliculi were excluded. Proximal obstruction was defined as a soft stop in the canaliculi proximal to the lacrimal sac. A distal stop was categorised as a hard stop and by reflux of mucus when pressed at the lacrimal sac. This categorised the site of obstruction as proximal (between the punctum and the end of the common canaliculus) or distal (saccus and the nasolacrimal duct).

If functional obstruction was suspected, patients were evaluated with scintigraphy.

The need for additional nasal surgery was evaluated by an otorhinolaryngologist (ORL) who used a 4 mm, 0 degree and 30 degree rigid endoscope. All patients were evaluated by the same two doctors preoperatively. Indications for enDCR were epiphora, recurrent acute and chronic dacryocystitis.

ORIGINAL ARTICLE

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Surgical technique

The procedures were performed under general anaesthesia.

Topical decongestion was applied to the nasal cavity with neuropatties soaked in Muffat's solution (cocain 4% 5 ml, adrenalin 1% 1 ml, bicarbonate 8% 10 ml). The lateral nasal wall and the head of the middle turbinate were infiltrated with 2-3 ml xylocain. The 0- and 30-degree Storz endoscope with three-chip camera was used for the entire operation.

Using the Crescent knife, a vertical incision was made 10 mm anterior from the attachment of the uncinate process at the lateral wall and extended from just above the anterior attachment of the middle turbinate to the attachment of the inferior turbinate. A mucoperiosteal flap was elevated and the lacrimal bone was fractured and removed.

The exposure of the inferior and superior parts of the lacrimal sac requires a large osteotomy of at least 20 × 15 mm. In most cases, the agger nasi cell above the axilla of the middle turbinate was opened.

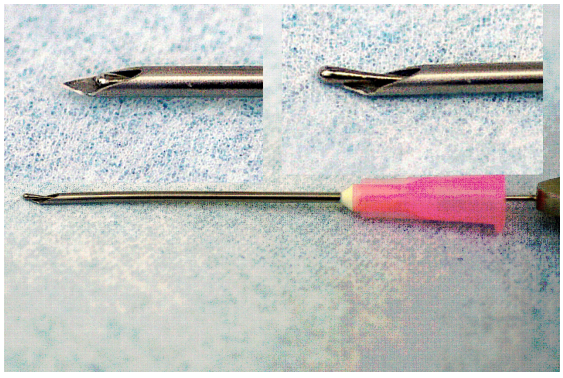
A Bowman's probe was then used to tent the medial wall of the sac while a crescent knife was used to open the sac vertically along its entire length which created a large anterior and posterior flap.

In cases with proximal stenosis, sharp dissection of the common canaliculus was performed with a bent tip of an 18G 40 mm cannula. The sharp tip of the cannula was guarded with a 0.8 steel probe and introduced through the inferior canaliculus to the obstructed common canaliculus. The cannula was then advanced over the steel probe to dissect and remove the obstruction in the common canaliculus entering the saccus, **Figure 1**.

The muciperiosteal and the lacrimal flaps were replaced end-to-end after creating closed apposition of the edges on the nasal wall. A silicone tube (Crawford tube) was positioned bicanalicularly in all cases. The ends of the silicone tubes were fastened with multiple knots intranasally. A small gel foam patch was packed lightly in the exposed sac to keep the flaps in position throughout the initial healing period. No patients received any prophylactic postoperative medication (antibiotics, nasal-steroid or eye drops). Nasal irrigation with saline was recommended to prevent crust formation. The silicone tubes were removed, typically 6-12 weeks after the operation.

FIGURE 1

The sharp bent tip of the cannula guarded with a 0.8 steel probe to introduce through the inferior canaliculus to the obstructed common canaliculus.



Follow-up

At the first follow-up 6-12 weeks after surgery, the silicone tube was removed. At this visit, all cases were examined with nasal endoscopy by an ORL. The surgical outcome was evaluated at the second follow-up a minimum of six months after the operation by subjective improvement and the patency of the neo-ostium on nasal endoscopy. Patients refusing the second follow-up (six patients) were contacted by phone and asked to describe their symptoms.

The criteria for a successful enDCR were defined as subjective improvement and a patent neo-ostium on nasal endoscopy.

Trial registration: not relevant.

RESULTS

From 2005 to 2010, a total of 54 patients underwent enDCR, 22 females and 32 males, with a mean age of 63 years (range from 34 to 97 years). Seven patients underwent bilateral surgery, which yielded a total of 61 operations. Eight patients had a history of previous external DCR and were considered "revision DCR operations". ll of the revision cases had a successful outcome.

Most of the patients had idiopathic ANLDO, but three patients had previously suffered trauma to the face, one had sacoidosis and one had sequelae after surgery for Ewing's papilloma. All of these patients had successful operations.

The follow-up period ranged from 1.5 to 46 months (the mean being ten months) with only two patients being followed for less than three months. Four patients with persistent symptoms were offered a second operation after which all became symptom-free (results from the second operations are not included in this study). Six patients with unilateral operation failed to show up at the second follow-up and were therefore contacted by phone and asked whether they had any symptoms, which two patients did. We excluded patients who did not show up at the second follow-up as our overall success criteria included the determination of both subjective and objective findings.

The overall success rate after enDCR was 91% (50/55). Categorizing the level of obstructions, 59% were proximal and 41% were distal of which the outcome was successful in 90% (28/31) and 92% (22/24), respectively, **Table 1**.

Eight of the patients were revision cases after former exDCR. All of these eight patients had a successful enDCR in regard to both relief of symptoms and endoscopic findings.

There were no serious complications. Two patients experienced post-operative bleeding (both had a successful DCR), 19 patients had an infection and were treated with local antibiotics (successfully in 17 cases), six patients experienced looping of the tube (successful outcome in five cases) and the tube was lost completely in four cases (successful in all four cases).

TABLE 1

Outcomes due to symptoms and objective findings distributed according to the three groups.

	Overall		Proximal		Distal	
Evaluation	**n**	**%**	**n**	**%**	**n**	**%**
Symptoms	55 (61[a])	100	31 (35[a])	100	24 (25[a])	100
Complete relief	46 (50[a])	85 (82[a])	25 (28[a])	82 (7[a])	20 (21[a])	88 (88[a])
Some Relief	5	8	3	8	2	8
No effect	4 (6[a])	7 (10[a])	3 (5[a])	10 (14[a])	1	4
a) Incl. follow-up by telephone	6	–	5	–	1	–
Endoscopy	55	100	31	100	24	100
Open ostium	51	93	29	94	22	92
Closed ostium	4	7	2	6	2	8
No second follow-up (not included)	6	–	5	–	1	–

DISCUSSION

Endoscopic DCR has gained acceptance during the past two decades as the treatment of nasolacrimal duct obstruction. The advantages of minimally invasive enDCR compared with exDCR are the avoidance of external incisions with scar in the medial canthus and the associated wound complications. The absence of an external incision also diminishes the risk of disrupting the medial palpebral ligament, the orbicularis oculi muscle and the pretarsal fibres and therefore maintains the lacrimal pump. Another advantage is the ability to address other nasal and/or paranasal sinus abnormalities through the same surgical approach. The enDCR needs to be performed by an experienced functional endoscopic sinus surgeon (FESS), and this could be a disadvantage given the steep learning curve and equipment and instrumentation costs [3].

In our study, a relatively large proportion of the patients had proximal stenosis, which has not been found in other studies where only approximately 25 % of the patients had proximal stenosis [1, 2, 4]. This difference may be explained by the fact that we found the level of obstruction preoperatively using only syringing and probing, where the specificity is not as high as the specificity at scintigraphy used in other studies. Some of our patients with proximal stenosis could only have a thin membrane or a kink at the site of the Rosenmuller valve, and therefore, in fact, could have a distal obstruction. It wound be interesting if a scintigraphy had been made in all of our patients, which we would recommend in further studies.

We decided to perform sharp dissection of the common canaliculus in all proximal stenoses. This may not always be necessary, but the surgical procedure was successful in 91% of cases in our study, which is similar to previously reported success rates ranging from 70% to 96% [4-10]. Surprisingly, when we made a subdivision into proximal and distal stenosis, we still found a high success rate for both proximal (90%) and distal (92%) stenosis. It is well known that distal stenosis is well-treated with enDCR, but it was a surprise that the success rate for proximal stenosis reached 90%. Using the χ^2-test with Yates' correction, we found no statistically significant difference between the data of distal and proximal stenosis (p-value 0.79)

Our success criterion was a combination of both objective and subjective findings, but we are aware of the fact that a patent neo-ostium is not the same as a patent common canaliculus. We therefore tried to divide the data into "objective" and "subjective" data, but this made no difference. There was still no statistically significant difference between the proximal and the distal stenosis (p-value 0.79 for objective findings, p-value 0.80 for subjective symptoms), **Figure 2**.

Comparing our results concerning obstruction levels to other studies has been difficult as most studies only report on distal obstructions. We found few reports [1, 2], and the results were difficult to compare due to different classifications of obstruction levels, and the studies only had subjective outcomes. If our outcome only included subjective findings and we therefore included only the six patients who did not show up at the second follow up, but were contacted by phone, the success rate for the symptoms would be 86% for proximal stenosis and 96% for distal stenosis (p-value 0.40).

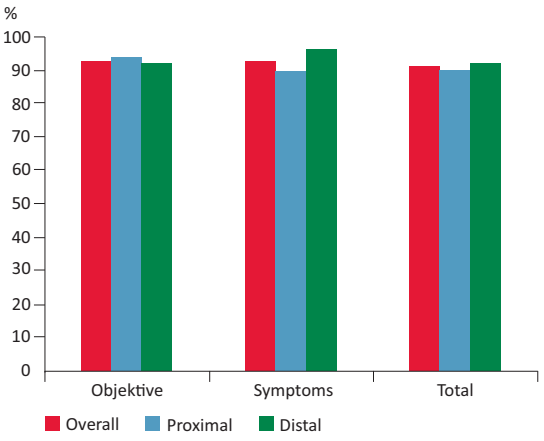
Our data indicate that the obstruction level is not an important factor for success.

It would be interesting to perform further studies with an even more specific classification of obstruction and a larger amount of patients as one study has shown a relatively lower success rate for saccal obstructions [1].

Given the advantages of enDCR described earlier, we would recommend enDCR both for primary DCR and revision surgery after exDCR as all revision cases were successful. However, this study has a small sample size –

FIGURE 2

Success rates divided into symptoms and objective findings as well as total.



especially of revision enDCR cases, so further studies are needed with larger numbers of patients. Reviewing the literature regarding the outcome of revision DCR, it has been stated that there is no statistically significant difference between revision enDCR and revision exDCR [11-13].

When reviewing the literature, we inevitably encountered the discussion about whether or not to tube the lacrimal system at the end of enDCR. In our study, four patients had tubes that were rejected and all of these patients had a successful outcome after the operation. We are fully aware that no conclusion about tubing/non-tubing can be made based on these findings, but we are looking forward to further studies regarding this subject as new literature indicates that tubing may not be necessary [14-19].

CONCLUSION

To conclude, we suggest enDCR for both distal as well as proximal stenosis of the lacrimal system as the obstruction level does not seem to be an important factor to the success rate. We are planning a further, prospective study on the possible association of enDCR outcomes and obstruction levels as well as tubing/non-tubing as the literature mostly contains retrospective studies. Furthermore, our hope is to establish a national database with a large number of patients as the literature lacks large studies.

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