ORIGINAL CONTRIBUTION

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Endoscopic assisted probing for symptomatic congenital nasolacrimal duct obstruction after one year of age*

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SUMMARY

Purpose: *When probing treatment for congenital nasolacrimal duct obstruction fails, it is often unclear whether it is due to technical difficulties or the severity of obstruction. Therefore our aim was to study the causes of probing failure and how to treat them.*

Method: *In a prospective study, 36 lacrimal systems of 26 children aged 12 months to 4 years with congenital nasolacrimal duct obstruction (CNLDO) were treated by probing. In all children probing was done under direct vision using nasal endoscopy. Different forms of CNLDO were treated and studied to determine the potential predictors for treatment failure.*

Results: *The overall success rate was 94.5 %. Expected failure was attributed mainly to the construction of different forms of membranous penetration on probing. Surgical membranotomy at the area of Hasner's valve under direct nasal endoscopic visualization is an essential step for proper management of CNLDO.*

Conclusions: *Nasolacrimal duct probing under direct nasal endoscopic visualization can be considered as the standard treatment of CNLDO as it minimizes intranasal trauma and leads to a better surgical outcome.*

Key words: epiphora, tearing, probing, NLD, endoscopic assisted probing

INTRODUCTION

Congenital nasolacrimal duct obstruction (CNLDO) is caused by membrane formation over the duct opening in the nasal cavity or by epithelial debris closing the duct, which is due to failure of canalization of the inferior tip of the lacrimal pathway, and typically occurs at the 8th month of gestation [(1)]. The reported incidence varies from 1.75% to 12.5% in some studies [(2)] and up to 20% of newborns in other studies [(3,4)].

Probing is the standard treatment of congenital nasolacrimal duct obstruction, but it is very common to wait at least one year of age before considering probing under general anaesthesia. There is still controversy regarding the optimal age of probing [(4)].

Probing is effective in most of patients, but the probe may pass through the submucosal space, or the symptoms may worsen because of complications such as canaliculi laceration, bleeding, scaring and intranasal trauma. By using intranasal endoscopy, the intranasal structure can be seen directly during probing. This can be helpful in reducing intranasal trauma caused by blind probing and also in identifying the abnormalities causing the obstruction. In addition, probing can be performed in the most ideal direction [(5)].

PATIENTS AND METHODS

Patients

This prospective study included 36 lacrimal systems of 26 children aged from 12 months to 4 years, and was run from January 2004 to June 2006. All children were diagnosed as having CNLDO. The diagnosis was made based on a history of epiphora plus or minus discharge since birth, or shortly after birth, in one or both eyes supported by objective evidence of reduced lacrimal outflow using a fluorescein disappearance test (FDT) [(6)].

The initial examination included looking for the lacrimal puncta, anomalies of the lids and ruling out conjunctivitis, allergic inflammation or craniofacial abnormalities. The ages at surgery ranged from 12 months to 4 years, with a mean of 22.9 months. The mean length of follow-up was 5.3 months (3-9 months). Six cases had past probing history, 3 of them had received the procedure once and the other 3 twice.

Nasolacrimal duct probing procedure

Probing was done under direct vision using nasal endoscopy. The procedure was carried out under general anaesthesia in all cases. Nasal pack soaked in 1: 100.000 epinephrine was inserted into the nasal cavity for 5-10 minutes and then

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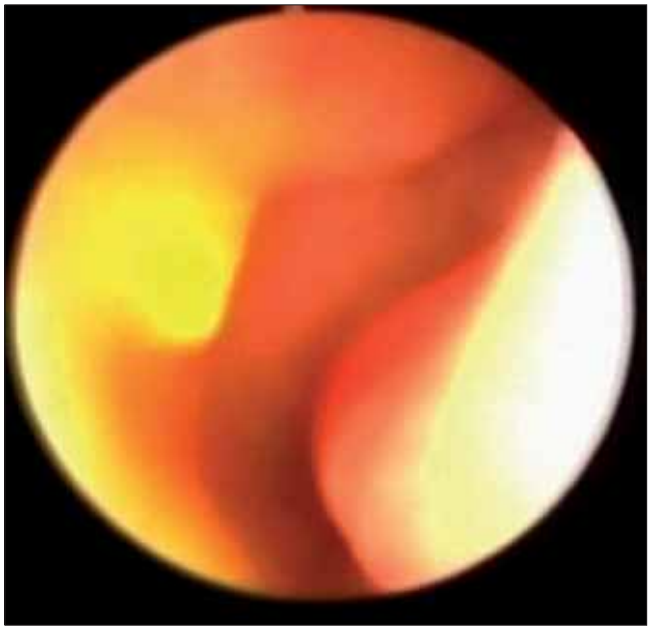

Figure 1. Free passage of fluorescein under the inferior turbinate of Rt side.

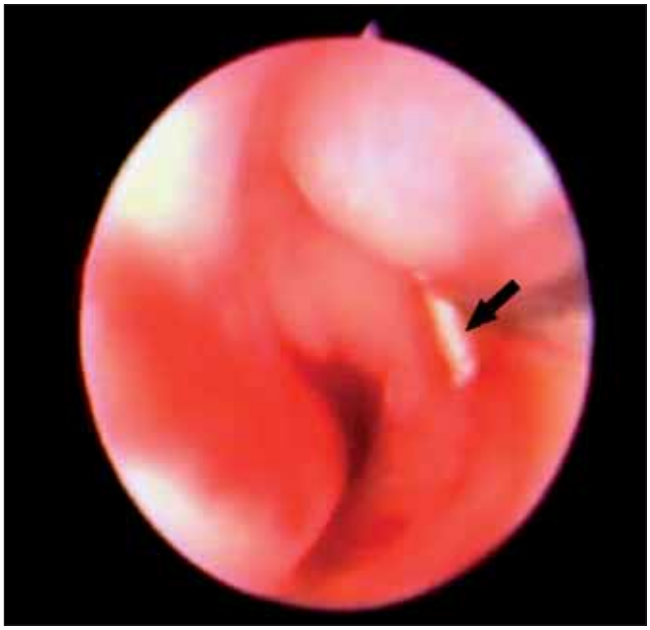

Figure 2. The probe is seen passing through the ostium under the inferior turbinate in Lt side.

removed. After dilatation of the upper punctum, probing was carried out using Bowmann's probes No. 00.0 and No. 01. The probes were introduced vertically into the punctum, then rotated horizontally 90° in the same plane to enter the canaliculus and then advanced until they reached the nasal wall of the lacrimal sac, giving a sensation of hard stop [7]. The probe passed through the upper punctum, canaliculus, lacrimal sac into the duct and allowed endoscopical visualisation in the inferior meatus. Topical tobramycin and dexamethazone eye drop 2 times / day for two weeks were applied.

Complete resolution was defined as a complete absence of watering or stickiness with a normal FDT (Figure 1). Partial resolution was diagnosed if the parents reported a complete or near complete remission of symptoms, but with persistent relative delay of FDT. Failure was defined as lack of any improvement in either the symptoms or the FDT.

RESULTS

During the procedure the following situations were found:

1. The probe tip protruded through the stenotic valve or obstructing membrane in 22 cases (60.1%). By side to side movement of the probe, we could relatively widen the opening without need for extra surgical interference (Figure 2).
2. The probe failed to perforate a clearly thick membrane and went through a submucosal plane in 5 cases (13.9%). A false passage laterally was down to the floor of the nose without perforation of the mucosa into the nasal cavity. The probe was redirected towards the apex of the inferior meatus and prevented from sliding laterally by supporting it using the suction tip.
3. The probe tip protruded through ballooned nasal mucosa at the level of Hasner's valve in 4 cases (11%). For these patients there was a high possibility for postoperative probing failure. This is because once the probe was taken out out, the edges of the opening in this redundant membrane will oppose each other and closing the valve again (trap door effect). Trying to widen this opening by moving the probe from side to side was not enough as the ballooned membrane moved with the probe without widening the opening. To prevent probing failure we cut down with a sickle knife on the probe (membranotomy and membranectomy) to increase the size of the mucosal fistula created by the probe and get large lower opening of the duct.
4. The probe tip protruded though a stretchable valve 3 cases (8.3%). In these cases the valve is stenotic and highly elastic so that once the probe came out, the valve closes up. We cut down onto the probe to disrupt the elastic valve and got a free mucosal opening.
5. The probe failed to perforate a clearly thick membrane and went medially perforating the inferior turbinate mucosa in 2 cases (5.6%). So, a false medially pathway was created. The probe was taken out and the inferior turbinate was displaced more medially. The probe was again redirected carefully to the apex of the inferior meatus where multiple sickle knife cuts were done over its tip.

Among our patients, failures occurred in 2 cases, one of them was due to ballooned nasal mucosa at the level of Hasner's valve and the other was due to stretchable stenotic valve for whom another 2nd endoscopic assisted probings were done with widening of the mucosal openings, without improvement

of symptoms and finally we shifted to endoscopic dacryocystorhinostomy with complete resolution of symptoms.

An improvement of symptoms was confirmed by the parent's observations and FDT. The overall success rate was a 94.5% (34/36 eyes). There were no serious complications although some nasal bleeding occurred in 5 patients (average amount was 40 cc) for whom small merocel nasal packing were used for 12 hours. During the follow up period there were no recurrence depending on the parent's observation and the results of FDT.

DISCUSSION

The nasolacrimal duct originates from a cord of ectodermal tissue situated between the maxillary process and lateral aspect of the nasal process. Formation of the nasolacrimal structure occurs as it expands centrally to create the lacrimal sac and vertically to form the duct and canaliculi. Congenital obstruction of the nasolacrimal duct is a common problem in infants affecting up to 20% of newborns and spontaneous resolution is reported to occur by 12 months in 96% of the of the cases [3,4,8].

Probing is the surgical treatment of choice for CNLDO, there are many reports indicating that, probing is a successful procedure for treatment of CNLDO, but if probing failed, the cause of that failure could not be identified [4]. In many studies probing was performed blindly without using nasal endoscopy, the success rate in such cases varies greatly from 55% to 90% [10-12]. In this study probing was assisted by nasal endoscopy with overall success rate 94.5%. Our results are similar to that reported by Wallace et al. [4] when probing is assisted by nasal endoscopy. The use of nasal endoscopy greatly improved the success rate as it identifies the causes of obstruction of the NLD, minimizes intranasal trauma, facilitates the guidance of the probe and avoids false passages.
In this study we detected stenotic valve or obstructing membrane, false passage in submucosal plane laterally, ballooned nasal mucosa at the level of Hasner's valve making a trap door effect, stretchable stenotic valve or false submucosal passage medially perforating the turbinate mucosa as causes of probing failure. Choi et al. [13] recorded results similar to our results regarding the causes of CNLDO and probing failure using nasal endoscopy. They stated that tearing was caused by mucosal obstruction, pus collection and inferior turbinate impaction and submucosal passage of the probe.

The management of failed probing for congenital nasolacrimal duct obstruction is given by a panel of authors. Treatment options examined are repeat probing, inferior turbinate infracture, closed lacrimal intubation, balloon dacryoplasty and dacryocystorhinostomy [14]. Pediatric dacryocystorhinostomy had been described by Bernal-Sprekelsen et al. [15]. In a recent study, pediatric dacryocystorhinostomy had been shown to be very effective and safe procedure for the treatment of a low mechanical obstruction of the lacrimal pathway in children unresponsive to previous probing [16]. Although probing is the surgical treatment of choice for the children who continue to suffer of epiphora, there is still controversy in the literature regarding the optimal age of probing [17]. It is our opinion to do probing after one year of age because more than 90% of our cases clear and become asymptomatic with conservative management (topical antibiotics and the parents are instructed for proper technique of lacrimal sac compression and massage).

CONCLUSION

Stenotic valve, obstructing membrane and false passage of the probe are the most common causes of probing failure. Endoscopic assisted probing of the nasaolacrimal system can be considered as the standard treatment for management of CNLDO as it minimizes intranasal trauma and leads to a better surgical outcome. It is a team work between rhinologist and ophthalmologist, better to be done after one year of age.

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CORRIGENDUM

In the article "V.A.S. in the follow-up of turbinectomy" by Francesco Mora et al. (Rhinology 2009; 47: 450-453), the address of the corresponding author Dr Ciprandi was incomplete.

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ERRATUM

In the paper entitled "Sphenoid sinus symmetry and differences between sexes" by B.C. Filho, C.D. Neto, R. Weber, R.L. Voegels (Rhinology. 2008; 46 (3): 195-199), the surname of Dr Pinheiro-Neto was incorrect. This erratum is meant to show the proper surname of Dr C.D. Pinheiro-Neto.

ERRATUM

In the paper entitled "Impact of gender, age, and comorbidities on quality of life in patients with chronic rhinosinusitis" by I. Baumann, G. Blumenstock, I.M. Zalaman, M. Praetorius, Ch. Klingmann, Ch. Sittel, P.K. Plinkert, J.F. Piccirillo (Rhinology. 2007; 45 (4): 268-272), Dr Baumann has found a wrong statement in the "*data assessment*" section: "The overall score (OS) and sub-scores are calculated by using a normalized scale of 0 to 100, with 0 being the **worst** and 100 the **best** score". The corrected sentence should be "The overall score (OS) and sub-scores are calculated by using a normalized scale of 0 to 100, with 0 being the **best** and 100 the **worst** score".