Rhinology, 38, 83–86, 2000

The technique of nasendoscopy in the evaluation of nasolacrimal duct obstruction in children*

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SUMMARY

Epiphora in infancy is most commonly the result of failure of canalisation of the nasolacrimal duct and most cases resolve spontaneously within 12 months. Lacrimal probing is the standard operative treatment when conservative expectant management fails. While this carries a high success rate, it does not reliably localise the site of obstruction, can create a false passage and may induce traumatic stenosis in the lacrimal passages. Nasendoscopy in conjunction with the lacrimal probing overcomes these problems as the procedure is performed under direct vision. The precise site of opening of the nasolacrimal duct is ascertained, the nature of obstruction established and the risks of false passage creation minimised. We report this technique of endoscopic assessment of lacrimal probing, and the outcome results of twenty such procedures performed on thirteen children.

Key words: congenital nasolacrimal duct obstruction, lacrimal probing, nasendoscopy

INTRODUCTION

Congenital obstruction of the nasolacrimal drainage system is a condition frequently encountered by the ophthalmologist. Estimates of the incidence of congenital nasolacrimal obstruction in full term newborn infants is around 20% (MacEwen et al., 1991). Clinical presentation is usually in the form of epiphora and/or a sticky mucoid or mucopurulent discharge. Other less common manifestations include dacryocystocele, recurrent conjunctivitis or recurrent dacryocystitis. Diagnosis can be confirmed by the fluorescein dye disappearance test(Zappia et al.,1972). About 96% of cases resolve spontaneously within 12 months (MacEwen et al., 1991). Persistence of epiphora beyond twelve months is managed by lacrimal probing, followed if unsuccessful by lacrimal intubation with silicone tubes, or more rarely by dacryocystorhinostomy. Traditional lacrimal probing involves dilatation of the puncta and passage of a lacrimal probe through the canaliculi, lacrimal sac and into the nasolacrimal duct. At the site of obstruction some resistance may be felt. In some cases a "popping" sensation is detectable, thought to indicate rupture of the membrane obstructing the duct. This procedure has been employed essentially unchanged for over 100 years. The problem with the above approach is that the nature of any lower end obstruction remains unknown. Nasendoscopy of the inferior meatus of the nose at the time of probing is a minimally invasive technique which allows precise localisation and determination of the nature of the lower end nasolacrimal duct obstruction. It also facilitates any added procedure such as tube insertion which may be indicated.

METHOD

Technique

The procedure is performed under general anaesthesia as a combined technique involving both ophthalmologist and otolaryngologist. Neurosurgical pledgets soaked in 1:1000 adenaline in an appropriate dose for age and weight are placed in the inferior meatus and between the septum and inferior turbinate for five minutes. The pledgets are then removed, the nose aspirated and a 2.7 mm 30 degree Storz telescope is placed in the nasal cavity. Connection of the telescope to an endoscopic camera and attached video monitor facilitates a team approach to the procedure. An initial nasendoscopy is performed to assess the nasal cavity for any abnormality.

The involved eye is then examined by the ophthalmologist and the puncta examined for any stenosis. A lacrimal cannula is inserted via each upper canaliculus and fluorescein dye injected. In the absence of anatomical obstruction to the nasolacrimal duct the flush of fluorescein dye is visualised in the inferior meatus with the previously placed nasendoscope. The inferior turbinate is then in-fractured gently as necessary using a Freer elevator to allow introduction of the telescope into the inferior meatus (Figure 1). The dye injection is repeated and by noting

* Received for publication August 12, 1999; accepted October 11, 1999

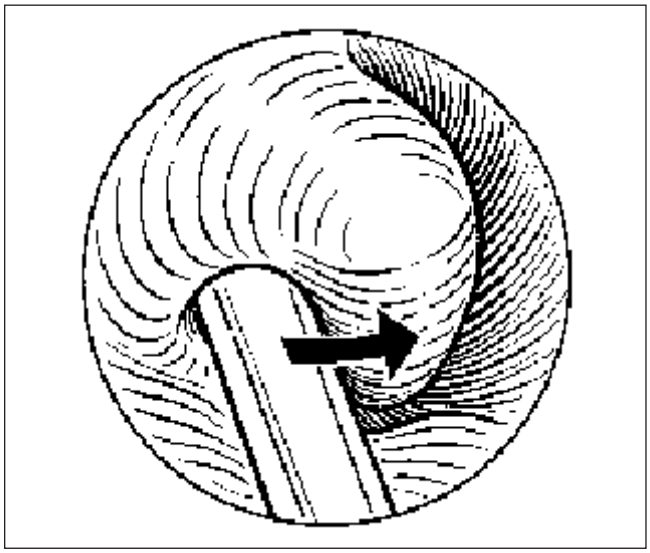

Figure 1. Depicts the inferior turbinate being gently in-fractured using a Freer elevator.

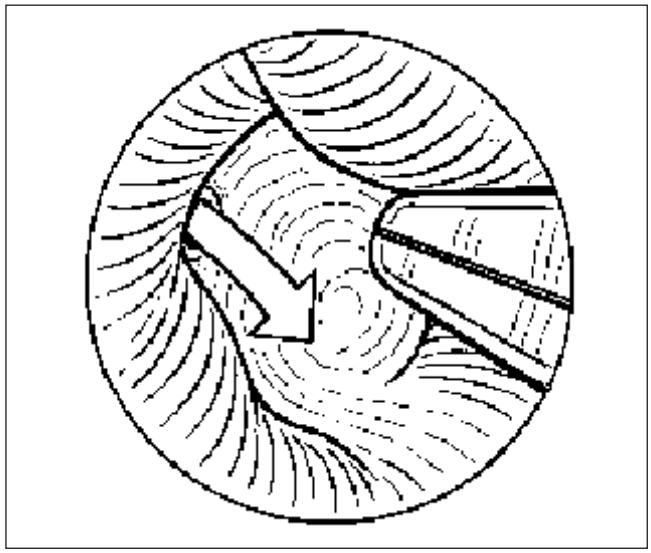

Figure 2. Depicts the appearance of fluorescein dye indicating the precise site of opening of the nasolacrimal duct.

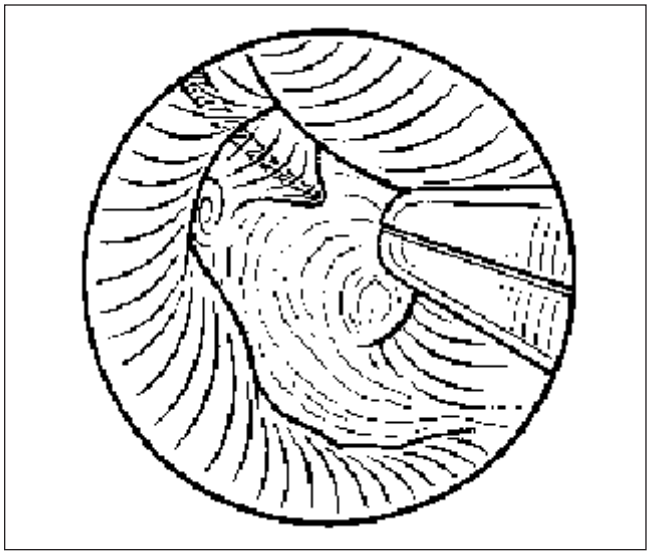

Figure 3. Depicts malposition of the lacrimal probe as seen at nasendoscopy.

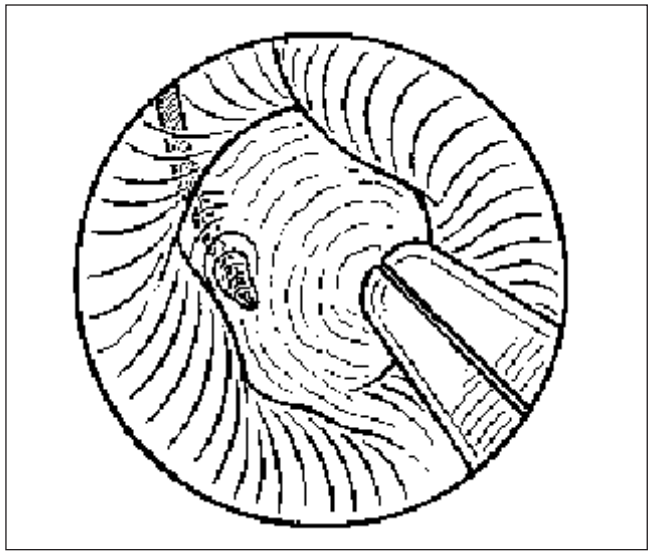

Figure 4. Depicts the lacrimal probe being gently steered to the natural opening under endoscopic guidance and the stenosis dilated.

the point of appearance of the fluorescein dye the precise site of opening of the duct can be confirmed (Figure 2).

In cases of complete ductal atresia fluorescein dye will fail to appear in the nose, while in cases of incomplete obstruction an increased resistance to flow will be felt. In ductal obstruction of the membranous type, the site of the duct opening may be seen to bulge medially as the opthalmologist attempts to flush. In these situations it will generally be deemed appropriate to probe the system to either dilate up a stenosis or to breakdown any atretic areas. The lacrimal probe is usually introduced through the upper punctum and at the site of obstruction some resistance is may be encountered. Malpositioning of the probe can easily occur at this stage (Figure 3). In cases of stenosis the probe is steered to the natural opening under endoscopic control and gently dilated (Figure 4). In cases of obstruction of the membranous type, the obstruction is overcome by applying gentle pressure with the probe and rupturing the membrane. Alternatively it is be possible to incise through the membrane using a sickle knife under endoscopic guidance. The lacrimal probe is then removed, the punctum re-cannulated and fluorescein again injected to confirm free flow. Finally dye injection is repeated through the lower canaliculus to confirm its patency. If tube insertion is deemed necessary this again is greatly facilitated by using the nasendoscope imaging system.

Table 1. Showing the sequence of nasendoscopy and lacrimal probing employed in this study.

Nasal vasoconstrictor preparation
Initial nasendoscopy
Eye examination
Nasendoscopy with fluorescein flush
In-fracture of inferior turbinate
Inferior meatus endoscopy with repeat flush
Inferior meatus endoscopy with probing
Check lower canaliculi for patency

Table 2. Results of Endoscopic lacrimal probing.

Site of obstruction	Nature of obstruction	No. of cases	Treatment procedure	Outcome
Lacrimal punctae	stenosis	3	lacrimal probe dilitation/snip with scissors	symptoms much improved
Common calaliculi	stenosis	1	endoscopic DCR and tubes	resolved
Lower nasolacrimal duct obstruction	membranous atresia	11	endoscopic lacrimal probing	symptoms completely resolved
Lower nasolacrimal duct obstruction	membranous atresia with mucosal tenting	4	endoscopic incision with sickle knife	symptoms completely resolved
Lower nasolacrimal duct obstruction	granulation tissue/atypical epithelium+ stenosis	1	excision	symptoms much improved

RESULTS

Between June 1996 and June 1998 twenty endoscopic evaluation procedures were performed on thirteen children. There were nine females and four males. The mean age at presentation was 34.7 months and at probing 39.4 months. Eleven procedures were performed on the right side and nine on the left side. Symptoms at presentation included watery or sticky eyes or both. Of the thirteen children two had had conventional lacrimal probing performed elsewhere without success. The endoscopic findings, treatment procedures and their outcome results are presented in Table 2. None of the children developed any intra-operative/postoperative complications. In nine out of the thirteen children the epiphora resolved completely, the remaining four achieved partial resolution. No child required reprobing.

DISCUSSION

Epiphora secondary to nasolacrimal duct obstruction occurs in up to 20% of neonates. The aetiology is related to failed canalisation (Cassady, 1948). Anomalies of the nasolacrimal system include punctal stenosis, punctal atresia, canalicular stenosis, and nasolacrimal duct obstruction. Development in utero of the nasolacrimal duct system begins as an invagination of ectoderm beside the nose. The analge becomes a solid cord of cells which later canalise. The last parts to canalise are the connections to the surface at the eyelid and within the nose. If both connections fail to perforate, then a mucocele forms. In most infants the connections at the eye are patent at birth. The nasal connection may develop later. Pathological examination of still-births has shown that 70% of the nasolacrimal ducts have membranous obstruction at term (Cassady, 1952).

In affected infants the time of onset of symptoms is variable but in most cases symptoms occur within one month of birth. Spontaneous resolution, occurs in up to 96% of cases by the end of the first year of life (MacEwen et al, 1991) This known high rate of spontaneous resolution has influenced current practice which is to defer probing until between one and two years of age. Those who continue to have symptoms beyond the age of two years will include a high percentage of more complicated or severe obstructions. A lower success rate for probing would therefore be expected. Probings carried out on children over two years of age have shown a poor success rate as low as 33% in one large study (Katowitz et al., 1987) It is therefore appropriate to consider techniques that could improve on this success rate at a first procedure.

Conventional lacrimal probing often does not allow us to define or categorise the nature of any distal obstruction in most cases. Complications with such blind probing include false passage creation, bleeding, canalicular stenosis and re-stenosis of the obstruction. The use of nasendoscopy in conjunction with lacrimal probing reduces the risk of such complications and precisely identifies the nature of any distal duct anomaly. When nasendoscopy is used to define these abnormalities, decisions over the need for further intervention, such as tube insertion or dacryocystorhinostomy, can be made in a more informed way. Furthermore division of membranous atresia with the sickle knife and controlled turbinate infracture can be achieved endoscopically. Even in cases of punctal occlusions, fluorescein flush under endoscopic giudance is indicated in confirming the patency of the rest of the nasolacrimal duct. Our experience of this new technique as an aid to diagnosis and therapy of distal congenital nasolarimal duct obstruction has made us appreciate how little is known about the nature of these anomalies. We hope that other Ophthalmology-Otolaryngology teams will adopt the technique both for the procurement of knowledge and as a means of improving the quality of diagnosis and therapy in congenital nasolacrimal duct obstruction.

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