

Inferior turbinate fracture and congenital nasolacrimal duct obstruction

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PURPOSE. To evaluate the success rate of probing combined with inferior turbinate fracture in comparison with simple probing as a first attempt in the treatment of congenital nasolacrimal duct obstruction in children.

METHODS. In a prospective interventional case-control study, 86 eyes from 61 children older than 6 months with congenital nasolacrimal duct obstruction underwent surgical intervention. Forty-two eyes of 33 patients underwent probing combined with infracturing of the inferior turbinate and 44 eyes of 28 patients underwent simple probing. The outcome evaluation included a standard ophthalmologic examination plus a dye disappearance test 2 months after the surgical intervention.

RESULTS. In the case group (probing + infracture of the inferior turbinate), the results were good in 22 (66.7%) patients, fair in 8 (24.2%), and poor in 3 (9.1%). In the control group (simple probing), the results were good in 20 (71.4%) patients, fair in 3 (10.7%), and poor in 5 (17.9%) ($p=0.9$). Success rates were 91% and 82% in the case and control groups, respectively ($p=0.4$).

CONCLUSIONS. Based on the results of this study, infracturing of the inferior turbinate does not increase the success rate of simple probing as a first attempt. (*Eur J Ophthalmol* 2006; 16: 520-4)

KEY WORDS. Congenital nasolacrimal duct obstruction, Infracture of the inferior turbinate, Probing

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INTRODUCTION

Nasolacrimal duct obstruction (NLDO) is the most common abnormality of the infant lacrimal system, occurring in as many as 6% (1) up to 20% (2) of newborn infants at birth.

The persistent membranous obstruction breaks down quickly in most newborns; therefore, only a few affected children with persistent symptoms are referred to the ophthalmologist (3). Although probing of a congenitally obstructed NLD is sometimes an essential step in solving this problem, the success rate of probing varies in different reports.

Katowitz and Welsh (1) reported a 97% success rate with nasolacrimal duct probing for children younger than

13 months; however, a stepwise progressive drop to only a 33% success rate was found for children older than 24 months. Although the most common type of congenital NLDO is a simple membrane at the valve of Hasner (4, 5), the fusion at the junction of the inferior turbinate and the lateral nasal wall might account for a bony obstruction that may develop between the nasolacrimal canal and the inferior meatus or for a nondevelopment (stenosis) of the nasolacrimal canal inferiorly (6). Also, the inferior turbinate may be so closely apposed to the lateral wall of the nose that the two mucosal surfaces touch each other and block the drainage of tear (7). In these conditions, the fracture of the turbinate may open the obstructed nasolacrimal duct (6).

Havins and Wilkins treated patients with failed initial probing with infracturing of the inferior turbinate followed by probing and irrigation of the nasolacrimal duct to confirm patency and reported 88% success rate (8). If a probing procedure was unsuccessful in either eye the patient would need to be subjected to another surgical procedure.

Infracture is simple, quick, and has a very low morbidity; therefore, if this procedure is so effective, why not use it in the first probing procedure? The aim of this study is to compare the success rate of probing combined with inferior turbinate fracture with simple probing in patients with congenital NLDO as a first attempt.

METHODS

A prospective interventional case-control study was conducted on children with NLDO between April 2003 and January 2005. The diagnosis of congenital NLDO was clinical, as evidenced by epiphora beginning during the first few weeks of life, non-inflamed conjunctiva, crusting, increased tear meniscus, recurrent mucopurulent discharge, and reflux of the contents of the lacrimal sac on pressure. If the clinical signs did not corroborate the history, the fluorescein dye disappearance test according to the technique recommended by Katowitz and Welsh (1) was used to confirm the diagnosis, except that we used tetracaine 0.5% instead of proparacaine 0.5% as a topical anesthetic.

Exclusion criteria included mucocele of the lacrimal sac, craniofacial anomalies, genetic syndromes, dacryocutaneous fistula, history of trauma to the nasolacrimal system, previous lacrimal system surgery including probing, and incomplete follow-up.

All patients under 6 months of age were placed on a conservative medical regimen (topical antibiotic drop sulfacetamide 10% four times daily and nasolacrimal system

massage). If there was no improvement (continued epiphora and discharge) and the parents agreed, the patients underwent surgical intervention after 6 months of age. The patients were randomly placed in two case and control groups.

The case group underwent probing combined with infracturing of the inferior turbinate and the control group underwent simple probing. In this study all surgical procedures were done under general anesthesia with endotracheal intubation. In the case group, after insertion of a nasal speculum, a blunt edge periosteal elevator was placed under the inferior turbinate and moved medially to elevate the turbinate from the lateral wall and fracturing was done. Because the structure of the inferior turbinate is cartilage, the term "fracturing" is not precisely suitable; instead, the procedure is more akin to straightening clenched fingers with force (7). After infracturing was done, we attempted probing. In the control group, simple probing was done from the upper punctum.

The patency of the nasolacrimal system was evaluated by the irrigation of diluted fluorescein dye. The flow of the fluid into the nose was confirmed by the pediatric-size suction catheter placed in the ipsilateral nares.

The patients were placed on topical antibiotic (sulfacetamide 10%) and steroid (betamethasone) drops for 1 week four times daily and were reevaluated 2 days, 2 weeks, and 2 months later. At each follow-up visit, the parents were questioned regarding the presence of symptoms of residual NLDO and the child was examined for epiphora, discharge, swelling in the area of the lacrimal sac, regurgitation with pressure over the sac, and fluorescein dye disappearance test.

The outcome was graded as good if the examination and dye disappearance test had normal results and the parents' history suggested no residual symptoms of NLDO. The outcome was graded as fair if the symptom of epiphora initiated by stressful condition such as allergy, windy weather,

TABLE I - PATIENT DATA

Study groups	No. of eyes	No. of patients	F/M	Age, mo (range) mean \pm SD
Case group	42	33	18/18	8-54 19.91 \pm 12.09
Control group	44	28	15/13	6.5-72 24.63 \pm 16.32

SD = Standard deviation

or upper respiratory tract infections with a normal dye disappearance test or an abnormal dye disappearance test with an absence of symptoms was present. Constant symptoms of NLDO or an abnormal dye disappearance test with intermittent symptoms was graded as poor.

Success was defined as good or fair results 2 months after the surgery because the fair results were accepted by the parents and they did not ask for further operation.

For bilateral cases, the outcome determination was based on the eye with poorer outcome because if a probing procedure was unsuccessful in either eye, the patient would need to be subjected to another surgical procedure.

Chi-square test, t-test, Mann-Whitney test, and Fisher exact test were used for statistical analysis. Statistical analysis was set as $p < 0.05$.

RESULTS

Eighty-six eyes of 61 patients were studied in two case and control groups. Characteristics of the patients in the study groups are shown in Table I. The average age and the sex of the children in each group did not significantly differ ($p = 0.2$, $p = 0.94$). Of 33 patients in the case group (probing + infraction of the inferior turbinate), the results were good in 22 (66.7%) patients, fair in 8 (24.2%), and poor in 3 (9.1%). Of 28 patients of the control group (simple probing), the results were good in 20 (71.4%) patients, fair in 3 (10.7%), and poor in 5 (17.9%).

This difference was not significant ($p = 0.9$). Success rates were 91% and 82% in the case and control groups, respectively, which did not significantly differ ($p = 0.4$). Six patients in the case group and five patients in the control group were under 12 months of age. Success rates in this category of age were 91% in the case group and 82% in the control group, which was not significant ($p = 0.4$). Twenty-seven patients in the case group and 23 patients in the control group were in the category of 1 year or older. Success rates in this category of age were 89% in the case group and 83% in the control group, which was not significant ($p = 0.6$).

In the case group, success rate in patients under 12 months of age in comparison to patients 1 year or older was not statistically significant ($p = 0.53$).

There were no complications except mild and temporary epistaxis in some cases which underwent inferior turbinate fracture.

DISCUSSION

Probing the nasolacrimal system is a standard therapeutic procedure in the management of congenital NLDO (9). Jones and Wobrig advocated inferior turbinectomy in the case of failed nasolacrimal system probing (10). Some clinicians use the study of Jones and Wobrig as a justification for performing inferior turbinate fracture in some specific conditions, in order to increase the success rate of probing.

The aim of this study was to compare the success rate of probing combined with inferior turbinate fracture with simple probing as an initial surgical treatment in patients with congenital NLDO. In this study, success rate in the case group did not reveal a statistically significant difference from the results in the control group.

In the study of Kushner (4) on 23 patients older than 18 months, 3 patients had simultaneous infraction of the inferior turbinate at the time of the initial probing; all of them had complex NLDO. He mentioned that although the inferior turbinate would not be the direct cause of the complex obstruction that we observed in these patients, we did believe that it might be contributing to the patients' symptoms to some degree. In this study, overall success rate of probing in the children older than 18 months was 70%, in the simple membranous abstraction group 100%, and in the complicated obstruction group with 3 cases of inferior turbinate fracture 36%.

In the study of Katowitz and Welsh (1) on 672 eyes of 427 patients between 1 month and 9.5 years, if the inferior turbinate seemed impacted on the opening of the nasolacrimal duct at the initial examination and there was continued regurgitation of fluid through the opposite canaliculus following probing, then infraction of the inferior turbinate toward septum was done at the initial probing. According to this criterion, with increasing age, the need for inferior turbinate fracture increased in such a way that in the 0- to 6-month category, none of the patients required infraction of the turbinates, and in the category of 24 months and over, all had turbinate fracture with the initial probing procedure and had 33% cure rate. They pointed out that although a significant number of patients had infraction of the turbinate, only a slight increase in the rate of success was noted when this step was added during the initial probing.

Havins and Wilkins (8) reported no failure in the patients treated initially with infraction of the turbinate and probing and 88% cure rate in the previous probing failure eyes.

They recommended infraction of the inferior turbinate with probing in patients with previous probing failures or in patients who are to undergo general anesthesia for their initial probing. They reported 94% cure rate in patients under 8 months of age, 76% in patients 8 months of age and older, and 56% success rate in patients 18 months of age and older who were treated with standard initial probing technique.

In a study by Wesley (11), 52 patients had probing and irrigation combined with infraction of the inferior turbinate. The fracture of the inferior turbinate was done with a small hemostat placed into the nose to grasp the inferior turbinate and rotated a full 90° inward. Twenty-seven patients of his study group had been previously probed from one to four times and 25 patients had not been previously probed. His success rate was 94.2% for all patients. The three patients who failed to respond were found at the time of development of dacryocystorhinostomy to have anomalous development of the nasolacrimal duct and responded to DCR. The author mentioned that, even though the results of an uncontrolled surgical trial cannot be compared to other treatment methods, the data suggest that even very difficult cases of congenital nasolacrimal obstruction will respond to a simple turbinate fracture with a hemostat without the necessity of complicated tubes or stents.

There are some differences in previously reported outcomes of NLD probing combined with infraction of the inferior turbinate. Because in most published reports, the patient populations and treatment methods are not uniform and the control group is absent, it is difficult to give a clear idea about this treatment method and this is one of the controversies in the management of a NLDO.

In a panel of five lacrimal surgeons from England, France, the United States, and Australia assembled to answer the following question—During probing when, if ever, do you infract the inferior turbinate?—different ideas emerged about the inferior turbinate fracture (12). Adenis performed infraction of the inferior turbinate in rare cases

after the age of 1 year with the help of an ear, nose, and throat (ENT) colleague. Linberg notes: “It is rare for me to perform an infraction of the inferior turbinate, and I only add this step when direct visualization of the nasal anatomy documents a need”. Overall, only 5% of his patients undergo infraction of the inferior turbinate. Rose never infracts the inferior turbinate. Sullivan routinely inspects the intranasal space with a headlight and speculum or endoscope and assesses the position of the inferior turbinate. If this is laterally displaced, he gently infracts at that procedure. The author’s idea is that very few inferior turbinates can be implicated as a cause of the obstruction due to lateral displacement, and thus infraction is rarely necessary. Wobrig in failed probing repeats the probing under general anesthesia and always infracts the inferior turbinate.

In contrast to the studies of Wesley (11) and Havins and Wilkins (8), based on the findings of our study, addition of the inferior turbinate fracture to probing has no positive effect on the success rate of probing as a first attempt. In addition, turbinate infraction requires general anesthesia, while simple probing can be easily performed in an outpatient clinic without general anesthesia before age 1 year (10, 12).

We recommend simple probing as the first step in all children up to 6 years of age for whom surgical intervention for a congenital NLDO is necessary. We recommend inferior turbinate fracture if after a simple probing the irrigation of the nasolacrimal system is difficult or impossible, or there is continued regurgitation of fluid through the opposite canaliculus.

No authors have any proprietary interest.

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