· Original article ·

Outpatient probing and TobraDex ointment infusion for pediatric nasolacrimal obstruction

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泪道探通术联合妥布霉素地塞米松眼膏治疗儿童泪道阻塞

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摘要

目的:评估门诊泪道探通联合妥布霉素地塞米松眼膏注入治疗先天性鼻泪管阻塞(CNLDO)的效果及安全性。

方法:前瞻性设计。对2008-10/2012-04济南军区总医院眼科泪道门诊接诊的先天性泪道阻塞患者,在接受泪道探通的同时妥布霉素地塞米松眼膏注入,并对治疗效果进行了分析。

结果:根据病史,59例儿童(男38例,女21例)中,5例(8.47%)双眼受累,其中1眼于12月龄时自愈,共64眼纳入研究。接受治疗时的年龄为16.9(3~96)mo。1女性患儿因双侧骨性鼻泪管发育不全,未完成探通,除1眼需二次探通外,其余所有患者均一次探通后缓解。接受治疗时的年龄、眼别、慢性炎症不影响最终疗效,未见严重并发症。

结论:与其他治疗方法相比,作为首次治疗或单纯泪道探通失败后的替代疗法,泪道探通联合妥布霉素地塞米松眼膏注入治疗儿童鼻泪管阻塞十分安全有效。

关键词:先天性鼻泪管阻塞;联合探通;再探通

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Abstract

• AIM: To evaluate the effect and safety of outpatient probing with a lumbar needle and TobraDex ointment infusion for congenital nasolacrimal duct obstruction (CNLDO).

• METHODS: Prospectively designed lacrimal probing with simultaneous infusion of TobraDex ointment infusion was conducted for CNLDO children at the Lacrimal Clinic, Jinan Military General Hospital from Oct. 2008 to Feb. 2012. The results were retrospectively reviewed.

• RESULTS: According to the medical histories, five out of fifty-nine (8.47%) children (38 boys, 21 girls) were bilaterally affected, with one eye being spontaneously resolved at 12mo of age before treatment. Sixty-four eyes were finally enrolled. The average age at surgery was 16.9mo (range: 3-96mo). There was an incomplete probing of one female with bilateral dysplasia of the bony nasolacrimal duct. All remaining obstructions were resolved after single probing, except for one eye that received a re-probe. Age, side operation, and chronic infection at the time of surgery appeared to have no influence on the final outcome. No significant complications were encountered.

• CONCLUSION: Compared with other treatment modalities, probing with a lumbar needle and TobraDex ointment infusion for pediatric nasolacrimal obstruction is highly effective and safe, both as a primary treatment and an alternative measure after failed simple probing.

• KEYWORDS: congenital nasolacrimal duct obstruction; combined probing; reprobe
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INTRODUCTION

Congenital nasolacrimal obstruction (CNLDO) affects 6% to 20% of newborns, with 85% to 95% of cases resolving spontaneously by one year of age[1-2]. Lacrimal probing is regarded as a reliable first procedurewith 77% to 97% children responding to a single probing, and only a small percentage require repeat probing[3-6]. Poorer outcomes have been reported in patients with delayed and repeated probing[7]. Other reported treatment modalities include balloon dacryocystoplasty, endocanalicular dacryocystorhinostomy with a multidiode laser[8], monocanalicular or bicanalicular silicone intubation[9], catheter dilatation[10], and endonasal dacryocystorhinostomy when repeated intubation fails. In this study, we adopted a simplified method of combined lacrimal probing with simultaneous tobramycin and dexamethasone eye ointment infilling for the treatment of CNLDO and evaluated the results.

SUBJECTS AND METHODS

To analyze the effects of outpatient probing with a lumbar needle and TobraDex ointment infusion on CNLDO, approval of institutional review board (IRB) of the hospital was obtained before the start of investigation, and written informed consent was obtained from the parents of all participants before surgery.

A total of 59 CNLDO children (64 eyes) who underwent probing with a lumbar needle and TobraDex ointment infusion at the Lacrimal Clinic in the Dept. Ophthalmology, Jinan Military General Hospital from Oct. 2008 to Feb. 2012 were enrolled for analysis.

The complete medical history of the children was acquired from their parents concerning the children's history and symptoms, age at time of visit, gender, and laterality, along with information on simple probing received and times received before the present probing, in addition to other ophthalmic and systemic anatomic abnormalities.

At the start of this study, the eligibility criteria were children aged more than 6 months, which allowed for spontaneous resolution. With increased experience and achievement of good results, children younger than 6 months also were subjected to the protocol after generaland ophthalmic development assessment, especially the matching diameters of the lumbar needle and punctum or canaliculus.

Success was defined as the complete resolution of epiphora as an absence of discharge observed by the parents[10].

Combined Lacrimal Probing Procedure All combined probing was performed in an air-conditioned outpatient office with a temperature of approximately 23℃ by the first author. Children were tightly wrapped up in a bath towel with their heads being held by one assistant. Another assistant providing lighting to clearly illuminate the puncta, and the third assistance transferred the necessary appliances, such as a punctal dilator, syringes with irrigation solution and finally TobraDex ointment. After superficial anesthesia with oxybuprocaine hydrochloride eye drops (20ml: 80mg, Santen Ltd.) and punctal dilatation with a punctal dilator, lacrimal irrigation with 0.5g of metronidazole and 2.25g of sodium chloride solution (in 250 ml) through the lower punctum was routinely applied to rinse away purulence in children with chronic dacryocystitis, which allowed initial determination of the blocking site according to the reflux performance from the upper or lower punctum. Lacrimal probing with a 7# lumbar puncture needle (its tip was burnished smooth and stylet slightly longer, and it was newly high pressure sterilized for each patient) further identified the blocking site, number, and configuration of the bony lacrimal duct based on the probe feeling. A correct probe was confirmed by the appearance of crying stop and swallow once metronidazole of approximately 0.2-0.3 ml sodium chloride solution was slowly administered. Finally, a syringe with tobramycin and dexamethasone eye ointment (tobramycin 0.3%, dexamethasone 0.1%) was connected to the puncture needle, and 0.4-0.5 ml of the ointment was forcefully infilled with the needle being simultaneously and slowly pulled out. The result was a lacrimal passage fully infused with the ointment.

Post-probing Management The parents or surveillants were fully informed about the observation method to report recurrence and encouraged to re-visit the clinic for free re-probing. Tobramycin eye drops and nitrofural nasal drops were applied for 1wk from the 1st operative day. However, lacrimal sac massage was prohibited for 3 days post-operatively to achieve long ointment action, followed by lacrimal sac massage from the 4th operative day both before and after eye and nasal drop application for one week. Post-operation, all concerned parents were requested to re-visit the clinic at 1 post-operative week and call to report the results or recurrent episodes at 1, 3, 5, and 7mo post-operatively.

RESULTS

Fifty-nine CNLDO children (38 males, 21 females) completed a 7mo post-operative follow-up and were enrolled into the final analysis. The number of affected eye is right 30, left 24, and bilateral 5, respectively. The average age at surgery was 16.9mo (range 3-96mo) with 22 (37.3%) children older than 12mo and 14 (23.7%) children at or younger than 6mo. Among these children, the average age of 12 children (13 eyes) who received a failed simple probing is 12.7mo with 2 children younger than 6mo and 5 children older than 12mo, whereas the average of the 47 cases (51 eyes) who received primary probing at our clinic is 17.9mo.

Five out of 59 (8.47%) were bilaterally affected with no diagnosed neonatal dacryocystocele or Down or Rubinstein-Taybi syndrome. The parents of a 84-month-old female with a bilateral lower punctal defect informed us their full-term born daughter also had an atrioseptal defect without receiving cardiovascular repair and no other systemic abnormalities. She received lacrimal probing via the upper lacrimal canaliculus.

One child presented typical CNLDO presentation in both eyes after birth; the left eye spontaneously resolved at 12 months, and the child was 24 months old at visit.

Among 47 cases (51 eyes) without prior probing, one female had bilateral dysplasia of the bony nasolacrimal duct on probing, and the remaining 46 cases (49 eyes) had blocking membranes at the Hasner Valve, with bilateral punctal absence, a thick membrane at the common canalicular duct, and atresia but patent punctum in each of three patients, respectively.

Twelve children (13 eyes) received failed simple probing prior to presentation at our hospital, with 5 cases having being probed 2 times, 2 cases probed 3 times and the remaining 5 cases probed 1 time. Among these cases, the Hasner Valve remained obstructed in 10 eyes. A patent Hasner Valve but possibly newly created blocks at both the upper opening and in the middle of nasolacrimal duct, partial canalicular block, and mild nasolacrimal duct stenosis in each eye of three children, respectively, were also observed.

Out all 64 eyes, both eyes of a female child with bilateral dysplasia of nasolacrimal duct were subjected to an uncompleted probe. Only one patient (1 eye) needed a

reprobe, and the remaining 61 cases were resolved after a single combined probing. Based on medical history, the overall reprobing rate was 20.3% (13/64), and the reprobing rate after combined primary probing was 1.56% (1/64). The overall success was 96.9% (62/64).

Nose bleeding in 2 cases (2/64 = 3.13%) automatically stopped within 5 minutes without any intervention. Complications such as false passage formation, foreign body granuloma from the ointment, and aspiration pneumonia from irrigation were not encountered.

Table 1 Characteristics of patients

Gender	Age(mo) at time of surgery	Laterality	Preveous Probing times: cases
M: 38	At or less than 6:14	R:30	1:5
F: 21	6 to 12:23	L:4	2:5
	Older than 12:22	B:5	3:2

M=male; F=female; R=right; L=left; B=bilateral.

DISCUSSION

The commonly recommended treatment for CNLDO is first waiting for spontaneous resolution in neonate or with lacrimal sac massage[11-13], followed by lacrimal probing[14] or silicone intubation. If symptoms persist, endoscopic dacryocystorhinostomy (DCR)[15-16] or endocanalicular DCR[8] are indicated. External DCR is rarely involved.

In our study, we replicated the common findings[6] that the Hasner Valve is the most common blocking site, and that failed simple probing creates more and complex obstruction as detected in three of our cases. In addition, we also found that only a small percentage of children (1.56% in our case series) required repeat probing, which is also a common finding.

Controversy remains regarding the optimal timing of probing[4,11-14]. Using computed tomography (CT) scans, Moscato *et al*[17] found a predominant expansion of nasolacrimal duct volume in the first 6mo of life, which coincides with the clinical observation of spontaneous resolution in most cases. Some patients, as demonstrated in our case series, do experience late spontaneous resolution at 12mo. Though the mean age of patients in our report is relatively younger, we do not recommend a fixed or earlier probing timing but propose that, once probing is necessary, factors such as timing of spontaneous resolution, sufficient restraint needed for outpatient management, compliance of older children, signs and symptoms, overall development (especially the punctum diameter), parental urgency, and also the possibility of obtaining professional treatment locally should be taken into consideration, and probing should be advanced to some extent.

Many reports[1,5,10,14] indicate a poorer outcome once a probe is delayed. In our case series, no discrepancy in the success and recurrence rates was found concerning the age at time of probing, from 3mo to 96mo. This difference might be induced by the relatively smaller mean age and/or the involvement of tobramycin and dexamethasone eye ointment in our case series.

Based on intraoperative findings during probing, Ali *et al*[18] divided and compared simple and complex types of CNLDO. They found bony obstruction, craniofacial syndrome, and buried probe were the most common reasons for a complex type which commonly in older children and having much poorer outcomes when compared with simpler obstructions. In our report, only one case with dysplasia of both bony lacrimal duct was encountered and failed to receive successful probing. Repka *et al*[10] reported reduced success with probing in bilaterally affected eyes. There was 8.47% bilaterality in our study. The simultaneous bilateral lower punctal absence and atrioseptal defect in one case in our study support the assumption of significant local variations. The presentation might also be a marker of another tissue defect or syndrome. Based on this observation, we speculate that upper lacrimal puncta develop earlier than lower one, and an unknown influential factor causes atrioseptal and punctal defects.

In his another report of 20 patients receiving repeat probing, Repka*et al*[19] achieved a 56% success rate. Twelve patients (13 eyes) who suffered a failed simple probing in our case series had their condition totally relieved (100%) after combined probing, with 12 eyes relieved after one reprobe and only one eye requiring a second reprobe (Table 1). An unfinished probe was conducted on a female child due to bilateral nasolacrimal duct dysplasia. Compared with simple probing, the only difference in our combined probing is the infilling of TobraDex ointment. Judging by this observation, we assume that the difference in the success and recurrence rates with previous investigations might be due to the eye ointment's complex components and chemical characteristics. Tobramycin in the ointment prevents infection. Its semi-liquidity stops bleeding, and dexamethasone, as a corticoid, inhibits membrane formation. The high binding capacity of corticoid receptors in children might also contribute[20].

Though many selective treatment protocols are available, Cakmak *et al*[21] suggested simple management other than endoscopy in most cases, especially in the primary case. In this respect, we hold the same opinion considering the lower compliance of patients at this age and, more importantly, the satisfactory results achieved with simple or combined probing. To further simplify the procedure, we omitted the routine dye disappearance test[10] and post-probing irrigation on follow-up visits with no adverse effects on both the diagnosis and recognition of recurrence. These procedures are indicated only for cases with persistent tearing or mucous discharge.

No reported complications[21] were encountered in our procedure. Nose bleeding occurred, but the frequency was low (3.13%), and required no special management. To reduce complications and the enhance success rate, we adopted a standard procedure of pre-probing irrigation to rinse away purulent discharge and primarily determine the blocking site; probing with a lumbar puncture needleto validate the site, number of blocking membrane, and configuration of

lacrimal canal; ensuing irrigation to flush blood and secure correct probing; post-probing with TobraDex ointment infilling; and finally lacrimal sac massage both before and after eye drop and nasal drop application from the 4th postoperative day to eliminate ointment residue.

Though highly effective and cost-effective, the combined probing has the following contraindications: A relative contraindication concerns patients with a blocking site at the common canaliculus. Once the blocking membrane at this part is penetrated, there is a high risk of ointment penetrating into the submucous tissue and foreign body granuloma formation, which sometimes requires surgical removal. Canalicular intubation might be indicated in such case. Absolute contraindication is the absence or severe dysplasia of any part of the lacrimal passage.

In conclusion, the cost-effective combined probing is a simple and safe procedure for both the process of probing and ointment infilling and can be conducted on an outpatient basis with no need for general anesthesia and sophisticated instrument. No adverse effects from pre-probing irrigation and ointment infusion were observed. The overall results are excellent in terms of manipulation, success rate, and recurrence rate. The results demonstrate that the technique is valid for the resolution of CNLDO in both a primary and substitutive manner after failed probing.

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