ORIGINAL RESEARCH

Gloria Isaza¹ MD
Sourabh Arora² MD

¹ Division of Ophthalmology, Department of Surgery, McMaster University Hamilton, Ontario, Canada L8N 3Z5

² McMaster University, Michael G. DeGroote School of Medicine, Hamilton, Ontario, Canada L8N 3Z5

Probing without Irrigation in Children with Congenital Nasolacrimal Duct Obstruction

Abstract

Purpose: The purpose of this study was to evaluate the results of probing, without fluorescein irrigation, as a primary treatment for epiphora and/or mucous discharge, secondary to congenital nasolacrimal duct obstruction (CNLDO)

Methods: The medical records of nine-two children (127 eyes) with CNLDO who underwent a single probing without the use of fluorescein irrigation between January 2006 and December 2011 were reviewed retrospectively. Inclusion criteria were no prior nasolacrimal surgical procedure, history of epiphora and/or discharge since birth or shortly after birth in one or both eyes and at least one of the following clinical signs: epiphora, mucopurulent discharge and increased tear meniscus height. Children were investigated in two sub-groups based on age at time of probing; group 1 (51 eyes/40 children) included children who underwent probing at age ≤ 2 years and group 2 (76 eyes/52 children) included children who underwent probing at age > 2 years.

The primary outcome was the complete disappearance of symptoms and signs in the affected eye(s), assessed at 3 months after surgery.

Results: The success rate for the overall sample was 83.5 % (106/127 eyes), in group 1 was 90.2% (46/51) and in group 2 was 78.9% (60/76). There was no significant difference in success rate between groups ($p=0.094$). Gender ($p=0.292$), affected eye ($p=0.647$) and bilateral cases ($p=0.739$) were not associated with successful elimination of symptoms.

Conclusion: Probing without fluorescein irrigation for CNLDO beyond 1 year of age is highly successful and comparable to the published efficacy rates of the traditional probing with fluorescein irrigation.

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Correspondence to:

Gloria Isaza
McMaster University Medical Centre
4V2 Clinic
1200 Main St. West
Hamilton, Ontario, L8N 3Z5
Canada
E-mail: isazazgm@mcmaster.ca

Congenital nasolacrimal duct obstruction (CNLDO) is a common cause of tearing and/or eye discharge in young children (6%-30%) [1]. Incomplete canalization of the distal nasolacrimal duct is the most common cause of the CNLDO [2]. The initial management of CNLDO is sac massage, which helps to rupture the membranous obstruction at the lower end of the duct. This technique has been shown to have a high success rate within the first year of life (>90%) [3,4]. Probing and irrigation (P&I) is the standard management procedure when symptoms of epiphora and/or mucous discharge persist beyond several months of conservative treatment [2,5-9]. Studies have suggested that factors that correlate with probing failure include increasing patient age, severity and duration of symptoms, presence of bilateral symptoms and nonmembranous CNLDO [6,10]. When P&I is unsuccessful, an alternative treatment is required; for example, nasolacrimal intubation, balloon dacryocystoplasty or dacryocystorhinostomy [11]. The objective of the present study was to assess the success rate of probing, without fluorescein irrigation, in primary CNLDO cases and to compare the results of two different age groups within the entire cohort.

Methods

The medical records of 93 consecutive children, who underwent uneventful probing without irrigation as a primary treatment for CNLDO, between January 2006 and December 2011 at McMaster Hospital, were reviewed retrospectively. All probings were performed by one surgeon (GI) when children were older than one year of age. Institutional Review Board approval was obtained and the study followed the Declaration of Helsinki tenets. The diagnosis of uncomplicated CNLDO was made based on a history of epiphora and/or discharge since birth or shortly after birth, in one or both eyes, and corroborated by clinical signs of epiphora, muco-purulent discharge and/or increased tear meniscus height. Occasionally fluorescein dye disappearance test was used to confirm the diagnosis if the clinical signs did not match the history [12]. Patients with craniofacial disorders, lid malposition, punctal or canalicular anomalies, acute dacryocystitis, or any history of

trauma to the nasolacrimal system were excluded from the study. One child was excluded from the study because of missing chart information. Ninety-two children fulfilled the inclusion criteria of this study.

Data were separated into two age sub-groups: group 1 included children less than or equal to 2 years, and group 2 included children older than 2 years. Probing was performed in the operating room under brief general anesthesia. A fine punctal dilator was used to enlarge the punctum. A probe, size 00 (0.90-mm diameter) for young children and size 1 (1.10-mm diameter) for older children, was inserted perpendicular to the upper and lower eyelid margin and then rotated horizontally to be passed through the canaliculus toward the lacrimal sac while lateral traction was applied to the eyelid; then, the probe was rotated 90 degrees and advanced toward the nasolacrimal duct until it entered the nasopharynx. Intra-operative patency after probing was confirmed by touching the probe in the nasopharynx with a second probe. The probe was then removed. Fluorescein irrigation to assess patency was not performed in any child. None of the children had any surgical or anesthesia-related complications during the procedure. Post-operatively, all children received topical antibiotic/steroid combination during the first postoperative week. Follow-up visits occurred the day after surgery, in order to rule out any postoperative complications, and three months after surgery, which was considered the primary outcome visit. Success of the procedure was defined as a complete negative history of epiphora and discharge and absence of clinical signs of epiphora, muco-purulent discharge, as well as no regurgitation on pressure over the sac in the affected eye(s).

Results

The results of probing without irrigation are presented in Table 1. A total of 127 eyes of 92 children with CNLDO were included in this study. The patients were almost equally divided between the sexes (53.5% of the children were male). The overall mean age at the time of surgery was 36.0 months (range 11.8 to 136.8 months). Group 1 consisted of 51 eyes of 40 children with a mean age of 19.2+/- 2.9 (11.8-23.1) months at

TABLE 1. Summary data for study groups

Group	Total eyes/patients	Age range (months)	Male eyes	Female eyes	OD/OS	Mean age (months)	Number of successfully treated eyes (% success rate)
1	51/40	11.8-23.05	29	22	25/26	19.21+/- 2.87	46 (90.2%)
2	76/52	24.2-136.8	39	37	34/42	47.3+/-25.9	60 (78.9%)
Total	127/92	11.8-136.8	68	59	59/68	36.0	106 (83.5%)

OD: right eye. OS: left eye

the time of surgery, while Group 2 consisted of 76 eyes of 52 children with a mean age of 47.3+/-25.9 months (24.2-136.8). The overall success rate following probing without irrigation for the entire group was 83.5% (106/127 eyes), and 90.2% (46/51 eyes) in Group 1 compared to 78.9% (60/76 eyes) in Group 2. The difference between Group 1 and 2 was not significant ($p=0.094$) based on Pearson Chi-Square. Gender ($p=0.292$), affected eye ($p=0.647$) and bilateral cases ($p=0.739$) were not associated with treatment success. None of the patients in this cohort were lost to follow-up at the 3 month visit after probing.

Discussion

Conservative treatments for CNLDO are preferred in children less than 1 year of age [13]. If conservative treatment fails, the P&I procedure has been widely accepted as the primary surgical option. There have been no published studies on the utility of intra operative fluorescein recovery as a determinant of success rate of the P&I procedure in children with CNLDO. The major objective of this study was to evaluate the success rate of the probing without fluorescein irrigation in children with CNLDO. The success rate of probing in the absence of fluorescein irrigation in sub-groups of younger and older children with CNLDO was also assessed.

The anatomy of the nasolacrimal duct is variable [14]. It is difficult to detect false passage of the probe when probing is performed without endoscopy [15-17]. In this study, every attempt was made to confirm that the probe, once inserted, was indeed in the nasopharynx by touching the probe using a second probe inserted through the nose, therefore the use of irrigation, strictly for this purpose, is redundant.

In addition, when the child is laying in the prone position, under anesthesia, the irrigation into the nasopharynx is difficult to recover with nasal suctioning, and deeper suctioning may cause vagal stimulation leading to bradycardia or hypoxia and may stimulate bronchospasm.

Finally, in some cases of P&I, fluorescein cannot be detected passing through the nose and the probe requires further manipulation in positioning. This may be indicative of a complicated obstruction or malformation. Despite this, expectant management is typically accepted. In these situations, the fluorescein irrigation would most likely not be considered useful in making the decision about an additional procedure (such as silastic intubation) at the same time of the probing and irrigation.

The flow of fluorescein following syringing into the nose confirms that the anatomic obstruction has been partially or completely cleared by the P&I procedure. The applied hydro-

static pressure from the irrigation step may also contribute to opening the obstruction in the lacrimal system: this may be a separate mechanism from the mechanical effect of probing. If this hypothesis were true, the probing procedure performed in this study, without the accompanying fluorescein irrigation, may have resulted in a decreased success rate.

Probing success varies by studies [18-20]. Similarly, the interval following probing at which success was determined is variable among studies and might affect the comparison of success rates. The overall success rate with probing without irrigation procedure in this study was 83.5%, higher than the success rate of 78% with P&I procedure reported by the Pediatric Eye Disease Investigator Group in 2008.¹⁰ Our overall success rate of 83.5% was very similar to the overall success rate of 84.5% reported by Maheshwari in 2005 with the P&I procedure [21]. Maheshwari also analyzed identical age groups as our study, and achieved similar results: success rate for ≤ 2 years, 88.15% as compared to 90.2% in our study, and 80.1% for children > 2 years, as compared to 78.9% in our study. A very similar overall success rate to our study was reported by Limbu *et al.* with P&I procedure of 82.6%.⁸ Their success rate in children ≤ 2 years was identical to ours at 90.2%, and those > 2 years had a similar success rate of 72.9%. The results of our study were also similar to the P&I success rate reported by Honovar in children ≥ 2 years of 73.3% [22].

The success rate of probing without fluorescein irrigation in children with CNLDO in this study was similar to the reported success rates of the P&I procedure in the literature, confirming that the two techniques are equally successful. This may also suggest that our hypothesis about the hydrostatic effect of the fluorescein irrigation on the lacrimal system may be false.

The previously reported reductions in the success rate of the P&I procedure in older children has been suggested to be secondary to the presence of a more complex obstruction than that seen in young children. It has been hypothesized that such an obstruction may develop due to prolonged inflammation of the nasolacrimal system with subsequent fibrosis, leading to an obstruction that is more resistant to the P&I procedure; however, in this study, both groups had high success rates and the success rate in the older group was even higher than reported in some studies [23,24].

According to some studies, bilateral symptoms are present in about 15–30% of children with CNLDO [25,26]. In our study, 38% of patients underwent bilateral probing. Unilateral and bilateral cases were considered as independent correlates to successful probing and there were no significant associations. Thus, we suspect that there is no difference in the success of

TABLE 2. Probing outcomes for patients with unilateral versus bilateral CNLDO.

	Probing outcome eyes/patients	
	Success	Failure
Unilateral Probing	48/57	9/57
Bilateral Probing	28/35	7/35

Success of the procedure was defined as a complete absence of tearing and discharge in the affected eye(s) at three month followup.

probing without fluorescein irrigation if a patient has a bilateral CNLDO (Table 2).

The limitations of this study design are that it is a retrospective case series review and that the cases were not matched comparisons to patients having probing with and without fluorescein irrigation. Another limitation was that we did not record the level and severity of the obstruction encountered at surgery, making it difficult to evaluate the success rate quantitatively or by complexity of obstruction. A larger, prospective study comparing probing with and without fluorescein irrigation would be needed to confirm these results.

Conclusion

The success rate of probing without fluorescein irrigation in children with CNLDO in this study was similar to the success rate reported in other studies where the standard P&I procedure was performed. The success rate did not differ when comparison was made to children who underwent the procedure prior to age 2 years, or those who had probing after age 2 years. Eliminating the step of fluorescein irrigation in the P&I procedure would reduce both the cost and the duration of the procedure. Further studies need to be performed to confirm the results.

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