

Success Rate of Primary Probing in Congenital Nasolacrimal Duct Obstruction in Different Age Groups

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Aim: To study the success rate and safety of primary probing for Congenital Nasolacrimal Duct Obstruction (CNLDO) at various ages and to analyse the outcome of probing in different types of obstruction.

Setting and Design: A hospital-based, prospective, interventional study.

Materials and Methods: One hundred twelve eyes of 97 children with CNLDO in the age group of 6 to 48 months with history of epiphora (fulfilling the inclusion criteria) were included. After unsuccessful lacrimal sac massage and topical antibiotics instillation for 6 weeks or more, probing was performed under general anaesthesia by a single surgeon.

Abstract

Statistical Analysis: Bivariate analysis with selected socio demographic variables like age, sex etc was performed among groups using Chi square test.

Results: The most common type of obstruction found on probing was membranous in 98 eyes (87.5%) and osseous in 14 eyes (12.5%). The overall success rate of primary probing in CNLDO in our study was 85.71% (95% CI: 77.8-91.6, $p < 0.0001$). The highest success rate of 96.77% was found in the age group 6-12 months and lowest success rate of 50% was found in the age group of 24-36 months (95% CI: 23.0-76.9, $p = 1$) and 36-48 months (95% CI: 1.2-98.7, $p = 1$). This depicts that the success rate of probing decreases as the age of patient at the time of primary probing increases.

Conclusion: As the age of children increases, the incidence of osseous type of obstruction increases, resulting in lower success rate in the older age group.

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Keywords: CNLDO, Membranous obstruction, Osseous obstruction, Epiphora

Introduction

Congenital Nasolacrimal Duct Obstruction (CNLDO) is the most common cause of epiphora in children, mostly due to non-canalization of the NLD at its distal end,¹⁻³ resulting in a membranous obstruction.^{4,6} A complete osseous obstruction occurs with anomalous passage.⁵ The incidence of CNLDO in newborn is approximately 6% (1.2% to 30%).⁷ Because of its reported spontaneous resolution in 80-96%,⁸ probing was done after 1 year.⁹ But recent studies show higher success with early probing.^{2,10-14} The purpose of our study is to evaluate the success rate of probing in CNLDO in different age groups (6-48 months) and identify age-wise appropriate treatment modalities.

Materials and Methods

This hospital-based, prospective interventional study was carried out on children with history of epiphora, presenting to the outpatient department of Sahai Hospital and Research Centre, Jaipur, from April 2017 to January 2018, after obtaining ethical clearance. The study was conducted on 112 eyes of 97 children belonging to age group of 6 - 48 months. The diagnosis was based on the history of epiphora with or without mucopurulent discharge and confirmed by torch light examination showing evidence of increased tear lake, matting of lashes, swelling over lacrimal sac area and Regurgitation On Pressure Over Lacrimal Sac Area (ROPLAS). All infants with CNLDO received conservative treatment including Criggler¹⁵ massage (10 strokes/time, twice daily)¹⁶ and administration of topical antibiotics (eye

drop tobramycin QID). This conservative medical regimen was continued for a minimum of 6 weeks in all patients and discontinued only if there was spontaneous resolution of epiphora or when probing was performed. Children with punctal pathology (eg punctal agenesis, ectopic puncta), secondary causes of watering, facial malformations, nasal pathology and previous history of probing were excluded from the study.

Children with previous history of unsuccessful lacrimal sac massage done for 6 weeks or more were advised probing directly. Before performing probing, proper history taking and complete ocular and systemic examination was done and written informed consent was obtained from child's parents. Probing was performed under general anesthesia by single pediatric surgeon. The objective of NLD probing is to establish a connection between the NLD and nasal cavity by removing the obstruction at the distal end of duct.

The children were divided into 5 age groups- Group 1: 6-12 months, Group 2: 12-18 months, Group 3: 18-24 months, Group 4: 24-36 months and Group 5: 36-48 months.

After Pre Anesthetic Clearance (PAC), probing was performed under general anesthesia by using Nettleship punctum dilator and appropriately sized Bowman's probe.

Defining the types of obstruction:

- A membranous CNLDO was defined as an obstruction at the end of the nasolacrimal duct which was overcome without much resistance and a "popping" sensation was felt during probing.

- In osseous CNLDO, the probe is felt to fit snugly when it reaches the NLD and a gritty tactile sensation like sand paper is felt while passing the probe. A firm bony resistance prevented the probe from reaching the nasal cavity. The type of obstruction was noted.

The presence of metal-on-metal contact when a second probe was passed into the nares to palpate the probe in the NLD confirmed that the probe had been passed successfully. Any per operative complications (like bleeding, etc) were noted and managed accordingly. Following the procedure, topical antibiotic drops and massage were continued for 2 weeks. Outcome of the procedure was assessed by parental history of residual symptoms at follow up visits at 2 weeks, 1 month and 3 months postoperatively.

Statistical Analysis

Statistical analysis was performed with the SPSS, version 21 for Windows statistical software package (SPSS inc., Chicago, IL, USA). The Categorical data was presented as numbers (percent). Bivariate analysis with selected socio demographic variables like age, sex etc was performed among groups using Chi square test. Multivariate logistic regression analysis was performed. Probability was considered to be significant if less than 0.05.

Results

The study was conducted on 112 eyes of 97 children belonging to age group of 6 – 48 months (Table 1). Fifteen (26.78%) children had bilateral NLD block and 82 (73.22%) children had unilateral NLD block.

The most common presenting symptom in children with CNLDO in our study was epiphora with discharge seen in 68 eyes (60.71%), followed by only epiphora in 41 eyes (36.61%), 2 eyes (1.79%) had dacryocystocele and only 1 eye (0.89%) had acute dacryocystitis (probing was done after control of infection). The average duration of Criggler massage done in patients with CNLDO was 8.37±3.3 weeks. (6-20 weeks)

The overall success rate of primary probing in CNLDO in our study was 85.71% (95% CI: 77.8-91.6, $p < 0.0001$). The success rate of probing decreased as the age of patient at the time of primary probing increased as shown in Table 2. The highest success rate (96.77%) of probing was found in the age group of 6-12 months (95% CI: 88.8-99.6, $p < 0.0001$). During probing, 2 children developed lower punctal bleed which was managed conservatively.

The most common type of obstruction found on probing was membranous in 98 eyes (87.5%) and osseous in 14 eyes (12.5%). The association between age and type of obstruction was statistically significant ($p = 0.0001$) (Table 3). As the age of the patients increased, osseous type of obstruction was more common.

Discussion

The first line of management of CNLDO is conservative treatment, which includes hydrostatic massage of the lacrimal sac and topical antibiotic eye drops. The timing of probing has always been a topic of debate.^{17,18} Some studies advocated early probing at presentation while some after

a period of conservative management.[19] Therefore, we selected a wide range of patient from age of 6 months to 48 months to study the results of primary probing in different age groups.

Syed et al in their retrospective study, reported results of syringing and probing for CNLDO in different age groups. Out of the total 90 patients belonging to the age group of 6 months to 5 years, 42 patients (46.7%) were infants, which is similar to our study and 27 (30.0%) were 1-2 years old, 15 (16.7%) were 2-3 years old and 06 (6.7%) patients were 3-5 years old. These results were comparable to our study because we also had maximum eyes (62.36%) in 6-12 months age group. The probable reason for most patients presenting at the age of 6-12 months is the parent's anxiety for early symptomatic relief and treatment of the child at early age.²⁰ Children with CNLDO come to the hospital with different presenting complaints. In our study, the most common presenting complaint was epiphora with discharge seen in 68 eyes (60.71%), followed by only epiphora seen in 41 eyes (36.61%), 2 eyes (1.79%) had dacryocystocele and only 1 eye (0.89%) had acute dacryocystitis. Similar observations were reported by Perveen et al. They found that the most common complaint was epiphora with discharge in 61% (72 eyes). This was followed by epiphora on ocular examination in 33.1% (39 eyes), mucocele in 5.1% (6 eyes) and lacrimal sac abscess formation in 0.89% (one eye).²¹

The type of obstruction in CNLDO is an important factor in determining the outcome of probing. In a study conducted by Medghalchi et al, 62 patients (67%) presented with membranous and 38 patients (33%) presented with the osseous type obstruction. The average success rate of surgery after 6 months was 91% in the membranous group and 52% in the osseous group ($p < 0.001$). In our study also, the most common type of obstruction found on probing was membranous in 98 eyes (87.5%) and osseous in 14 eyes (12.5%), depicting that the membranous type of obstruction had higher incidence in our study as compared to the osseous type. The average success rate of surgery in eyes with membranous obstruction was 89.8% and in osseous obstruction, it was 35.71% ($p < 0.05$).²²

Various studies have suggested that the incidence of osseous type of obstruction increases with age and therefore, probing is more successful in the younger age group. The success rate of probing drops in older age groups, due to fibrosis.^{17,23-25} Kashkouli et al concluded that older children are more likely to have osseous obstructions that might reduce the cure rate.²⁶ Similarly, Honavar et al showed that the osseous CNLDO was more likely to be found in older children, with subsequent lower success rate.²⁷

The main aim of our study was to find the success rate of probing in different age groups. Medghalchi et al in their study observed the overall cure rate of 91%, 89% and 60% in 9-12, 12-24 and 24-48 months old children respectively. They have found that with increasing age, the success rate of probing decreases. These results are similar to our study as we also found the maximum success rate in 6-12 months age group i.e. 96.77% (95% CI: 88.8-99.6, $p < 0.0001$). In older age group of 12-18 months also, there was significant success rate of 83.33% (95% CI: 77.6-95.2, $p = 0.002$), but above 18

months, success rate of primary probing in this study was not statistically significant ($p > 0.05$).²²

Katowitz A et al studied 427 patients with congenital nasolacrimal duct obstruction involving 572 eyes. They found that the success rate of initial probing was found to be 97% under 13 months of age. Stepwise regression was observed from 76.4% between 13 and 18 months to 33.3% for patients probed after 24 months.¹⁷

Ahn et al found that the success rate of the initial probing was 82% (111 of 136) in the 6 to 12 month age group, 79% (64 of 81) in the 13 to 18 months age group, and 78% (21 of 27) among individuals older than 19 months ($p = 0.868$, Pearson chi-square test).²⁸ Their values are very much comparable to our results. Mannor et al also had results matching with our study. They found that the success of nasolacrimal duct probing was negatively correlated with increasing age: 92%, 89%, 80%, 71%, and 42% at age 12, 24, 36, 48, and 60 months, respectively ($p = .001$ at each interval). They concluded that although the success of nasolacrimal duct probing declines with age, probing in older children can remain the first line of treatment.²⁹

Zhao et al studied 872 eyes of 741 children with CNLDO in whom nasolacrimal duct probing was done. Two types of obstructions were encountered during probing, i.e. simple and complex. They were divided into early (4 - 12 months) and late (1 - 4 years) groups, based upon the age at the time of initial probing. The success rate was 90.0% in early group versus 70.4% in the late group ($p < 0.01$).³⁰

We have studied various aspects of probing including the success rate of probing in different age groups and also the type of obstructions seen. Overall, probing is the most effective procedure to cure CNLDO. The success of probing increases if performed early (<12 months).

Despite fair number of patients included in our study, it was limited by less number of patients in the age group of 2-4 years. We believe that for more statistically conclusive results, another study with larger sample size of older children with CNLDO is required. Our study was also limited by not labeling the type of obstruction by endoscopy. Nasal endoscopy provides better visualization of the nature of distal blockage (i.e., stenosis, atresia, inferior turbinate position) and direct observation of the probe and fluorescein outflow.³¹⁻³³ Also, cases of failed probing were not further investigated by imaging studies like dacryocystography and outcomes of repeat probing in cases of failed probing were not assessed in our study.

We recommend early probing, preferably at 6 months of age, to avoid complications due to recurrent episodes of epiphora as well as increase awareness among people about early treatment of CNLDO.

Conclusion

Our study concluded that increasing age is negatively correlated to success of probing. Probing should be more widely used by ophthalmologists for early treatment of epiphora in cases of CNLDO. We also prospectively evaluated the prognostic role of type of obstruction in success of probing. In our study, the most common type of obstruction found on probing was membranous, which

opens on probing with a give away feeling. Hence, it had a higher success rate of probing. We concluded that as the age of children increases, the incidence of osseous type of obstruction also increases, which is difficult to open on probing, therefore, resulting in lower success rate in older age group.

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