

Outcome of probing and syringing in congenital nasolacrimal duct obstruction at various age groups in a tertiary eye center in Western Nepal



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ABSTRACT

Background: Congenital nasolacrimal duct obstruction (CNLDO) is one of the commonest problems encountered in daily ophthalmology practice. Though probing and syringing is the mainstay of management of CNLDO, there is no clear guideline about the optimal time to perform. **Aims and Objective:** To evaluate the efficacy of probing and syringing in cases of congenital nasolacrimal duct obstruction in various age groups. **Materials and Methods:** In this prospective, hospital based, interventional, cross-sectional study done over a period of 2 years (July 2015- June 2017), children of various age ranging from 10 days to 8 years who underwent probing and syringing under general anesthesia for CNLDO refractory to conservative measures were included. **Results:** Children of as young as 10 days to as older as 8 years underwent probing and syringing with male to female ratio of 1.2:1. Overall success was 80.6% (58/72) which was statistically significant when analyzed with age ($P = 0.006$). Majority of cases with successful outcome were below 24 months of age (90.62%). There was predominance of membranous obstruction (128/194) over bony obstruction (66/194). **Conclusions:** Nasolacrimal duct probing under GA is a safe and viable option as a primary treatment modality for CNLDO. Though the success of probing is high in the younger children, it's worthwhile to consider the same in older children at least up to 5 years of age before going for more invasive procedure like DCR surgery since more than 2 third of probing has successful outcome up to that age.

Key words: Congenital nasolacrimal duct obstruction; Probing and syringing; Age group

INTRODUCTION

Congenital nasolacrimal duct obstruction (CNLDO) is one of the commonest problems encountered in daily ophthalmology practice. It can be unilateral or bilateral with no reported sex or genetic predilection. CNLDO is prevalent in approximately 6% of new born with wide variation of 1.2% to 30% due to failure of canalization of nasolacrimal duct mostly at the lower end.^{1,2} However, in as many as 90%, the membrane that obstructs valve of hasner dissolves spontaneously in the first 6 months with or

without conservative treatment comprising of sac massage, lid hygiene and topical antibiotics.³

The causes of failure of long term conservative treatment include poor parent's compliance, faulty technique of hydrostatic massage, poor hygiene. However, obstruction type may also play the role in the outcome as well. Along with bothersome watering as the prime issue, CNLDO may cause repeated attacks of conjunctivitis, dacryocystitis, mucocele or pyocele and lacrimal fistula formation as well. Beside these ocular problems watering due to CNLDO may

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affect both the children and the parents psychologically and socially.

Children usually present with watery and sticky eye, matted eyelashes, discharge, skin. Regurgitation on pressure over lacrimal sac and/or positive fluorescence usually confirm the diagnosis.⁴ However, it is crucial to rule out the other causes of epiphora such as lid and lash abnormalities and corneal abrasions, congenital glaucoma.

Probing under topical or general anesthesia (GA) is standard management of CNLDO who does not respond to the conservative treatment.⁵ Studies have found probing to be successful in 70% to 97% of CNLDO.^{1,6,7}

The question about the optimal time for probing remains unsolved. Some authors believe that delay in probing beyond 1 year is associated with a lower rate of success and this worsens with increasing age^{1,6,8} which could be, perhaps, due to prolonged inflammation and fibrosis in the lacrimal duct system. Moreover the apparent decline in success rate in older children is due to accumulation of more complex obstruction as less severe obstruction clears spontaneously.^{5,9} Earlier intervention may prevent the occurrence of prolonged inflammation in the lacrimal drainage system and avoid its possible complications and inconvenience. However, others believe that primary probing continues to be an effective treatment well beyond 2 years of age and that the cure rate does not vary markedly with age.^{10,11} There are, thus no clear guidelines for management of congenital nasolacrimal duct obstruction, in terms of probing, especially for older children.

There are very few studies from other parts of Nepal. So, with this study we aim to evaluate the cure rate and assess the factors affecting the cure rate of probing and syringing for CNLDO among the children of wide age range in a tertiary eye hospital in western Nepal.

MATERIALS AND METHODS

This study was conducted between July 2015 and June 2017. A total of 194 eyes of 149 consecutive patients, 81 males and 68 females, aged between 10 days to 96 months old who underwent probing of the nasolacrimal system for CNLDO, not responsive to conservative measures, were included into the study. The cases of epiphora with history of trauma to the nasolacrimal system, punctal or canalicular abnormalities, craniofacial anomalies, and abnormalities of the eyelids were excluded from the study. Ethical approval was obtained from the Institutional Research Review Board of Lumbini Eye Institute. A written informed consent was obtained.

The diagnosis of CNLDO was clinical, as evidenced by history of epiphora beginning during the first few weeks of life, non-inflamed conjunctiva, crusting, increased tear meniscus height, recurrent mucopurulent discharge, and regurgitation on pressure over lacrimal sac (ROPLAS) along with fluorescein dye disappearance test (FDDT) whenever necessary.

Probing was performed after 2 to four-week course of conservative treatment including proper hydrostatic Crigler lacrimal massage and topical antibiotics. Acute dacryocystitis were treated conservatively and cases of lacrimal abscess were treated first by incision and drainage several days before taking for probing.

The probing was performed under GA with a laryngeal mask airway. Throat pack with a moistened soft cotton gauge roll was done in each case to absorb excess fluid from lacrimal irrigation. Probing was carried out through the lower punctum using Bowman probe of appropriate size for individual patient starting from 0000 (0.70-mm diameter) to 0 (1.00-mm diameter) size decided on the table.

Once the nasolacrimal canal was entered, the probe was gently advanced until resistance was encountered. Firm pressure was then applied to the probe, attempting to advance it beyond the obstruction. The types (membranous or firm) of the obstruction of nasolacrimal duct were noted in each case. A membranous obstruction was characterized by lack of or minimum resistance to the probe at the lower portion of the nasolacrimal duct that is overcome without much effort where as it is classified as hard or firm type if it needs much effort to overcome the obstruction.

The patency of the nasolacrimal system was evaluated by irrigation of fluorescein stained saline through the lower punctum and confirmed by the direct visualization of stained fluid in the ipsilateral nostril or by seeing yellowish staining of throat pack.

Each post probing child received steroid-antibiotic eye drop four times a day for 2 weeks along with lacrimal sac massage till next follow up or until the symptoms disappears.

Duration of follow-up for all patients was at least 2 weeks after the probing. Each patient was evaluated at around 2 weeks, 6 weeks, and 10 weeks after probing whenever possible.

Success of probing was the main outcome measure and was predefined as complete remission of watering, discharge or reflux of sac content on pressure within 2-6 weeks of the procedure. At least two attempts of probing at least 6 weeks apart, if the first attempt fails, was mandatory

before the procedure was declared as failure. All the data was collected on a proforma and the results were analyzed using SPSS version 20.0. Analysis was performed using the chi-square test. Statistical significance was set at $p < 0.05$.

RESULTS

During 2 years of study period (July 2015 – June 2017), a total of 194 eyes of 149 children with CNLDO, including 81 boys and 68 girls (Table 1) were divided into six age groups e.g. 0-1 year, 1-2 years, 2-3 years, 3-4 years, 4-5 years and more than 5 years (Table 2). Mean age of the children at the time of intervention was 31.83 months (SD ± 21.52) years ranging from 10 days to 8 years (Table 1).

About 71.8% of children ($n=107/149$) had onset of the symptoms within 2 weeks of age where as 28.2% (42 children) developed symptoms 2 weeks or more after birth. Unilateral obstruction was present in 104 children (69.8%, Right Eye 60 and Left Eye 44), while bilateral obstruction was present in 45 other children (30.2%). The most common signs were epiphora with or without discharge, crusting on the lids, matting of lashes and macerated eczematous lid skin, sac swelling or lacrimal abscess. There was regurgitation of mucoid/mucopurulent material with pressure over the lacrimal sac in the majority of subjects.

The success of the initial probing was 78.9% (153/194) which escalated up to 82.5% (160/194) after repeat probing (Table 2). Five children out of 32 of failed initial probing got cured after repeat probing and one child improved. Successful initial or repeat probing noticed more in younger age group (Table 2) and declined with the increasing age which was clinically significant ($p=0.002$ and 0.001).

There was higher requirement of repeat probing among the bony obstruction (36%) as compared to membranous obstruction (11.7%) which was clinically significant ($p \leq 0.001$) (Table 3).

The mean distance between punctum to nasal floor measured as the length of probe was 30.78 mm (SD 3.63 mm) with minimum 23 mm and maximum 40 mm.

DISCUSSION

Congenital nasolacrimal duct obstruction (CNLDO) manifests at birth due to the failure of canalization of the ectodermal cord of cells. Regular and frequent massage is the primary treatment by which 95% of the cases resolve during the first year of life. Probing is the method of choice for the treatment of CNLDO, non-responsive to conservative treatment. However, the timing of probing has always been a topic of debate. Early probing has been advocated at presentation or shortly after a period of conservative treatment irrespective of the age of the child. Probing is usually performed at or after 1 year age, but as the child grows, resistance to the passage of the probe results in higher failure rates in older children.

Ffookes recommends early probing of the nasolacrimal system, after a short course of topical antibiotic therapy to avoid the complications like acute or recurrent dacryocystitis or canaliculitis or the formation of lacrimal abscess and to free the child and parents of the inconvenience of persistent epiphora, discharge and recurrent infections.^{1,12-14} Moreover, some authors believes that delayed probing beyond 1 year may be associated with lower cure rates because of fibrosis due

Table 1: Patients demography and laterality of involvement

Sex of the patients	Laterality			Total patients	Total eyes
	Right	Left	Bilateral		
Male (81, 54.36%)	31 (38.3%)	23 (28.4%)	27 (33.3%)	81 (54.36%)	108 (55.67%)
Female (68, 45.63%)	29 (42.6%)	21 (30.9%)	18 (26.5%)	68 (45.63%)	86 (44.32%)
Total	60 (40.3%)	44 (29.5%)	45 (30.2%)	149 (100.0%)	194 (100%)

Mean age: 31.83 months (SD 21.52 months); minimum 10 days, maximum 8 years

Table 2: Success of probing according to the age group

Age category (month/s)	Success after single probing		Overall success	
	yes	no	Yes	No
0 to 12 (n=53)	47 (88.7%)	6 (11.3%)	49 (92.5%)	4 (7.5%)
13 to 24 (n=57)	51 (89.5%)	6 (10.5%)	52 (91.2%)	5 (8.8%)
25 to 36 (n=34)	25 (73.5%)	9 (26.5%)	27 (79.4%)	7 (20.6%)
37 to 48 (n=15)	9 (60.0%)	6 (40.0%)	11 (73.3%)	4 (26.7%)
49 to 60 (n=17)	11 (64.7%)	6 (35.3%)	11 (64.7%)	6 (35.3%)
>60 (n=18)	10 (55.6%)	8 (44.4%)	10 (55.6%)	8 (44.4%)
Total 9N=194	153 (78.9%)	41 (21.1%)	160 (82.5%)	34 (17.5%)
P value	p-value=0.002		p-value=0.001	

Table 3: Success of probing according to types of obstruction

Type of obstruction on probing	Success after first time probing		Overall success	
	Yes	No	Yes	No
Membranous (n=128)	113 (88.3%)	15 (11.7%)	116 (90.6%)	12 (9.4%)
Bony (n=66)	40 (60.6%)	26 (39.4%)	44 (66.7%)	22 (33.3%)
Total (n=193)	153 (78.9%)	41 (21.1%)	160 (82.5%)	34 (17.5%)
p-value	<0.001		<0.001	

to prolonged inflammation in the lacrimal drainage system with increasing age.^{7,9}

In our study, the initial success rate was 78.9% which escalated to overall success of 82.5% with repeat probing which is comparable to previous studies.^{1,15-17} We found a significant trend of decreasing success rates (overall) with increasing age: 92.5%, 91.2%, 79.4%, 73.3%, 64.7% and 55.6% at 0-1 year, 1-2 years, 2 to 3 years, 3 to 4 years, 4-5 years and more than 5 years respectively which is consistent with other studies.^{8,15,16} Kashkouli et al⁷ concluded that older children are more likely to have complicated, non-membranous obstructions that might reduce the cure rate. In contrast, El-Mansoury and associates¹¹ in their study of 138 children ranging from 13 months to 7 years, found more than 90% cure rate regardless of age. Robb reported similar data, reflecting a uniform cure rate of nearly 90% with the first-time probing in children ranging in age from 1 to 9 years old and noticed that altered anatomy is important in determination of failure.¹⁸ In current study, we noticed favorable outcome in cases of membranous obstruction at the lower end of nasolacrimal duct consistent to the study of Kushner.¹⁹

Most of our study population (71.1%) had onset of symptoms like tearing, discharge, matted lashes, swelling over the lacrimal sac region within 2 weeks of birth and 28.9% had symptoms developed after 2 weeks of age as noticed by Ballard.^{16,20} However Ffookes¹² reported that 188 out of 443 cases developed symptoms during one week after birth which may be due to reflex tear production from inflammation of the lacrimal sac.

Our result shows higher success rate in cases of membranous obstruction indicating the anatomic basis of outcome of probing. The majority of obstructions were felt at the lower end of the NLD. However, we could not comment on the exact site of obstruction and the condition at the site of the valve of Hasner, as we didn't use nasal endoscope. Though endoscope may provide better visualization of the nature of distal blockage (i.e., stenosis, atresia, inferior turbinate position) and direct observation of the probe and fluorescein outflow^{21,22} it does not alter the outcome significantly.²³

In the present study, a Bowman probe of largest appropriate size ranging from size 000 to size 1 was used.

Many authors recommend using a specific size of Bowman probe despite of the fact that there is no standardization among instrument manufacturers with respect to the size of the Bowman probe.¹⁶

Previously probing in children was usually performed under topical anesthesia as office procedure which may be due to lower availability of anesthesia service in their center.^{6,24,25} In our study, all probing procedures were performed under general anesthesia as recommended by many authors because it provides better control over the procedure and paying attention to the site and nature of the obstruction.²⁶ It also reduces the potential risk of trauma to delicate structures of the lacrimal drainage system and soothed the apprehension of the child and parents. We could measure and found the average punctum to nasal floor distance (30 mm) by measuring the fraction of the probe passed through the punctum to reach the nasal floor which was longer than described in a only one study which may probably be due to large age range in our s study.²⁷ However, it would be nicer to measure the distance between the punctum to the obstruction point.

The successful outcome of single or repeat probing at 2 weeks post-operative follow up was highly correlated with the final results at 6 months or more as observed by Perveen S, et al¹⁶ indicating that the early result could represent the final result of probing.

CONCLUSION

Nasolacrimal duct probing under GA is a safe and viable option as a primary treatment modality for CNLDO. Though the success of probing is high in the younger children, but in cases of delayed presentation, it would be worth to consider the same in older children at least up to 5 years of age before undertaking for DCR surgery since more than 2 third children has successful probing. Simple membranous obstructions have favorable probing outcome than in cases of bony obstruction.

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Authors Contribution:

KS-Concept and design of the study, literature review, Data collection and analysis and revision of manuscript; **BB**-Literature review, Editing the manuscript; **LDM**-Data analysis, Editing the manuscript; **SKC**-Critical revision of the manuscript; **AP**-Editing the manuscript; **SG**- Editing the manuscript.

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