

# Efficacy of probing for congenital nasolacrimal duct obstruction in a private tertiary hospital: 10-year experience

## *Eficácia de sondagem para obstrução congênita de ducto nasolacrimal em hospital terciário privado: 10 anos de experiência*

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### ABSTRACT

**Objective:** To evaluate the success rate of initial and repeated probing as treatment approach for congenital nasolacrimal duct obstruction (CNLDO) in children between 2 and 46 months. **Methods:** A retrospective review of 73 children diagnosed with CNLDO who underwent probing of the NLD from March 2010 to 2020 was conducted. Data were collected from Hospital Oftalmológico de Anápolis in Anápolis, Goiás. **Results:** The procedure was performed in 90 eyes. The study sample was constituted of 36 males and 37 females. Bilateral involvement occurred in 18 (24.6%) children whereas 55 (75.3%) of them were unilaterally affected. The age ranges of the patients were divided into 4 groups: A - up to 6 months old (5.5% of the eyes), B - 7 to 12 months (27.5%), group C - 13 to 24 months (39.5%) and group D - older than 24 months (26.4%). The mean age of the sample was 18.6 months. Initial probing obtained an overall success rate of 88.8% and group B showed the best percentage (96%) from all age ranges. The second intervention had a lower outcome, successfully in 55.5% of the cases. **Conclusion:** All age ranges showed high success rates for initial probing, although there was a decrease in subsequent procedures outcomes. Our results demonstrate that the success rate for primary probing is not affected by age.

**Keywords:** Nasolacrimal duct; Lacrimal duct obstruction; Ophthalmologic surgical procedures; Diagnostic techniques, ophthalmological; Diagnostic techniques, surgical

### RESUMO

**Objetivo:** avaliar a taxa de sucesso de sondagem inicial e de repetição como abordagem de tratamento para obstrução congênita do ducto nasolacrimal em crianças entre 2 e 46 meses. **Métodos:** conduziu-se uma revisão retrospectiva de 73 crianças diagnosticadas com obstrução congênita do ducto nasolacrimal que se submeteram à sondagem do ducto nasolacrimal de março de 2010 a 2020. Os dados foram coletados no Hospital Oftalmológico de Anápolis em Anápolis, Goiás. **Resultados:** o procedimento foi realizado em 90 olhos. A amostra do estudo constituiu-se em 36 pacientes do sexo masculino e 37 do sexo feminino. O acometimento foi bilateral em 18 crianças, enquanto 55 (75,3%) delas foram afetadas de forma unilateral. Os pacientes foram divididos em 4 grupos, de acordo com a faixa etária: A- até 6 meses de vida (5,5% dos olhos); B- 7 a 12 meses (27,5%); grupo C- 13 a 24 meses (39,5%) e grupo D- mais que 24 meses (26,4). A média de idade de amostra foi de 18,6 meses. A sondagem inicial teve uma taxa de sucesso global de 88,8%, e o grupo B mostrou a melhor porcentagem (96%) de todas as faixas etárias. A segunda intervenção teve uma taxa de sucesso menor, de 55,5% dos casos. **Conclusão:** todas as faixas etárias mostraram altas taxas de sucesso na sondagem, embora tenha havido um decréscimo nos resultados dos procedimentos subsequentes. Nossos resultados demonstram que a taxa de sucesso na sondagem primária não é afetada pela idade

**Descritores:** Ducto nasolacrimal; Obstrução dos ductos lacrimais; Procedimentos cirúrgicos oftalmológicos; Técnicas de diagnóstico oftalmológico; Técnicas de diagnóstico por cirurgia

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## INTRODUCTION

**C**ongenital nasolacrimal duct obstruction (CNLDO) is an abnormal condition characterized by an impaired lacrimal drainage system which causes epiphora.<sup>(1)</sup> The pathogenesis of the disorder is described as a mechanical obstruction located at the valve of Hasner.<sup>(2)</sup>

CNLDO affects more commonly one eye, although includes both of them in 20% of cases.<sup>(1)</sup> In addition to clinical signs, the diagnosis can be confirmed by the Fluorescein Dye Disappearance Test (FDDT), which quantitatively measures lacrimal drain function.<sup>(3,4)</sup>

The obstruction usually resolves spontaneously or due to hydrostatic Crigler massage of the lacrimal sac in most infants.<sup>(5)</sup> For those cases it does not occur, mechanical probing of the NLD is the first-line treatment choice.<sup>(2,5-7)</sup>

Although most physicians prefer to perform it in infancy or early childhood, a consensus on the optimal timing for probing intervention has not been established. The controversy lies on some clinicians belief on initiating treatment soon after diagnosis. Others suggests that waiting for spontaneous resolution reduces the number of procedures and is not related with their increase in failure rates.<sup>(2,3,6)</sup>

If primary probing fails, there are other therapeutic approaches for CNLDO, such as further observation, repeated probing, silicone tube intubation, balloon dilatation of the lacrimal drainage system, inferior turbinate fracture and dacryocystorhinostomy.<sup>(2)</sup>

The purpose of this study is to assess the success rate of initial and repeated probing for congenital nasolacrimal duct obstruction (CNLDO) in children between 2-46 months.

## METHODS

The medical records of 73 children diagnosed with CNLDO at the Hospital Oftalmológico de Anápolis, Anápolis, Goiás, between March 2010 and May 2020, were retrospectively reviewed. This study included infants aged 2 to 46 months who had undergone probing of the NLD. The parent or guardian of each infant signed informed consent for their participation in the study. The Committee of the Ethics of Research Activities in Hospital Oftalmológico de Anápolis reviewed and approved the protocol for this study. The study was IRB approved and adhered to the ethical principles outlined in the Declaration of Helsinki.

The sample for analysis included 91 eyes from 37 girls and 36 boys. Eligible patients to probing did not receive any therapy besides lacrimal sac massage before initial probing. Subsequent probing was indicated in cases of primary probing failure, defined as the development of excessive tearing and crusting by the patient within 6 weeks of the initial intervention.

The procedure was performed by a single surgeon in the operation room. The child underwent general anesthesia. A Bowman 00 or 0 probe (Bausch & Lomb, Rochester, NY)<sup>(8)</sup> was inserted into the upper and lower punctum after dilation and advanced towards the canaliculus on the way to the medial wall of the lacrimal fossa. The probe entered the NLD, being gently leaded until resistance was felt and overcome the obstruction. The patency of the lacrimal drainage system was confirmed by irrigation with fluorescein dye that was recovered in the nostril. Subsequently to probing, antibiotic and steroid eye drops were prescribed 4 times a day for one week.<sup>(2)</sup> The mean follow-up period was 4,81 months.

This study adopted the FDDT as a postoperative evaluation. This test consists of using a drop of sterile 2% fluorescein solution in the lower conjunctival fornix of each eye and then observing the tear film, preferably with a cobalt blue filter. The test is graded on a 0 to 4+ scale based on Zappia-Milder, considering a lesser or greater degree of fluorescein remaining in the eyes after 5 minutes.<sup>(9)</sup> When the test is positive, without dye flow, it means that there is obstruction of the lacrimal pathways.

**Table 1**  
Epidemiological data

Total number of children n(%)	73	100
Female	36	50.7
Male	37	49.3
Average age of children	18.6 months	
Total number of eyes n(%)	90	100
Right eye	51	56.6
Left eye	39	43.4
Number of eyes by age n(%)	90	100
Group a (<6m)	5	5.5
Group b (6-12m)	25	27.5
Group c (13-24m)	26	39.5
Group d (> 24m)	24	26.4

**Table 2**  
General success rate and success rate by age

	General success rate	%
First approach	80/90	88.8
Second approach*	5/9	55.5
Success Rate By Age		
	First approach	%
Group A (<6m)	4/5	80
Group B (6-12m)	24/25	96
Group C (13-24m)	31/36	86.1
Group D (> 24m)	21/24	87.5
	Second approach	%
Group A (<6m)	0/1	0
Group B (6-12m)	1/1	100
Group C (13-24m)	3/5	60
Group D (> 24m)	1/2	50

\*Of the 10 patients without success in the first approach, only 9 patients realized a second approach.

**Table 3**  
Procedures

	First approach	%
Probe without tube	83/90	92.3
Probe with tube	7/90	7.77
	Second approach	%
Probe without tube	8/9	88.8
Probe with tube	1/9	11.2

Results of the effectiveness of probing varied from successful - absence of watering, discharge or reflux from lacrimal sac pressure and a negative FDDT test in the postoperative period; questionable - children lost its follow-up; and unsuccessful - permanent tearing, reflux from pressure and a positive FDDT test. A value of  $p < 0.05$  was considered statistically significant. All statistical evaluations were performed using SPSS 25 software.

## RESULTS

Between March 2010 and May 2020, 73 medical records from Hospital Oftalmológico de Anápolis were reviewed. The nasolacrimal probing was performed for NLDO in 90 eyes. The demographic profile of the evaluated children was: 36 (49.3%) males and 37 (50.7%) females; 51 (56.6%) right eyes and 39 (43.4%) left eyes with CNLDO.

Patients ranged from 2 months to 46 months with a mean age of 18.6 months. They were divided into four groups according to the age at which initial probing was performed: group A – up to 6 months old, group B – 7-12 months old, group C – 13-24 months old and group D – older than 24 months old. Group A included 5 (5.5%) eyes, group B had 25 (27.5%), 36 (39.5%) were in group

C and group D included 24 (26.4%) of them. (Table 1)

Fifty-five children (75.3%) were unilaterally probed and 18 children (24.6%) were bilaterally probed. Out of the 90 eyes, 88.8% (80 eyes) were successfully probed, 10.0% (9 eyes) needed subsequent probing and 1.11% (1 eye) were directly submitted to dacryocystorhinostomy.

The overall success rate of the initial probing was 88.8% (80/90 eyes). This success was 80% (4/5 eyes) in group A, 96% (24/25 eyes) in group B, 86.1% (31/36 eyes) in group C and 87.5% (21/24 eyes) in group D. 10% (9/90 eyes) necessitated repeated probing. The success percentage decreased to 55.5% in second probing (5/9 eyes) being 0% (0/1 eye) in group A, 100% (1/1 eyes) in group B, 60% (3/5 eyes) in group C and 50% (1/2 eyes) in group D. (Table 2)

Regarding the procedures performed, in the first approach, 92.3% (83/90 eyes) were submitted to probing without tube and 7.77% (7/90 eyes) to probing with tube. In the second approach, 88.8% (8/9 eyes) suffered probing without tube and 11.2% (1/9 eye) probing with tube. (Table 3)

## DISCUSSION

Lacrimal probing was considered the first-choice intervention for CNLDO. Data exhibited an initial probing overall success rate of 88.8%, which is consistent with the results ranging from 78% to 88% demonstrated by other authors.<sup>(7,10,11)</sup> Children from category B had the best success percentages (96%) when compared to the other age ranges; this predominance was also observed in previous reports.<sup>(7,11)</sup>

There is a controversy among studies regarding the age-dependent decrease in probing successful outcomes.<sup>(1, 2, 6, 7)</sup> In our investigation, an inverse association between age and success rate was not documented. In fact, the second-best success percentage of probing was seen in children from group D. These results are sustained by the findings of Elbakary and Shalaby, authors of a prospective interventional case series of 25 children aged 2 years or older that showed a success rate of 84% comparable to percentages of probing performed around the first year of life.<sup>(12)</sup> Our lowest efficacy rates were seen in patients from group A. This result was already expected because of the fact that these infants had dacryocystitis and dacryocystocele and, therefore, when submitted to early probing, the prognosis of the infant would be poorer.

This study also aimed to determine the efficacy of repeated probing in the treatment of CNLDO. Subsequent probing was performed in cases which the patient was unresponsive to initial intervention characterizing treatment failure. The procedure was successful in 5 of the 9 eyes of the patients who underwent it, establishing an overall rate of 55.5%. Similar results were reported by Katowitz et al., who conducted a retrospective study with 427 patients that found a rate of 56.8% efficacy on second probing.<sup>(13)</sup> Although there was a significant 32.3% reduction in second surgical intervention success rates compared to the first procedure, we still support a repeated procedure rather than other interventions.

Some studies have shown a presence of bilateral disease in 17-33.3% of patients with CNLDO.<sup>(6-7, 10)</sup> In our analyses, 24.6% (18 eyes) of bilateral involvement were reported. Bilateral involvement might be a marker for more significant anatomical or physiological variations in the nasolacrimal duct, mucous membrane physiology or the tear pump mechanism, which may be more difficult to cure with probing, as shown statistically by prior reports.<sup>(6, 7)</sup> Alternatively, such children might have allergic rhinitis, a condition which would not be cured with probing.

Our study analyzed only the conventional probing technique, although prior reports have demonstrated the efficacy of other approaches. For instance, Galindo-Ferreiro et al. reported that the endoscopic procedure led to higher success rates when compared to conventional probing, both for primary and subsequent interventions.<sup>(8)</sup> Thus, future studies should be supported

to do further exploration on the endoscope-assisted approach.

The authors acknowledge some limitations to this study, such as the fact that it is retrospective and that it did not include a control group. There were variations in the number of eyes per age range and, for more reliable results, the sample of each group of children should be more similar. Another limitation is that there was no collected data regarding obstruction type as well as the syndromes associated. Obstruction with syndromes associated is more resistant to probing and result in worse success rates while simple type has a high recovery rate.

## CONCLUSION

Probing is considered the first-line invasive treatment for CLNDO. There is a controversy among studies regarding the age-dependent decrease in probing successful outcomes. In our investigation, an inverse association between age and success rate was not documented. All age ranges showed successful rates for primary probing. Our results indicate that the success rate for initial nasolacrimal duct probing is not affected by age. Moreover, is necessary further study to definitively determine the most appropriate age for probing in children with CNLDO.

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