



The Efficacy of Intervention Time on Probing Results

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Abstract

Background and objectives: Pediatric eye probing is a common treatment for congenital nasolacrimal duct obstruction which affect many infants who might be asymptomatic, careful monitoring should be done. The aim of this study was to determine which pediatric age group benefits most from eye probing in Duhok, Kurdistan region. This study provides insights into the demographics and outcomes of pediatric eye probing, guiding individualized treatment.

Methods: This retrospective cross-sectional study reviewed records of 192 children, aged 1 to 30 months, diagnosed with congenital nasolacrimal duct obstruction at Duhok Eye Hospital between January 1, 2023, and September 1, 2023. Data collected included age, gender, operated eye, and residency. The study observed the outcomes of eye probing.

Results: Majority of children who underwent probing were aged 7-12 months (34.9%), with an even distribution across age groups. Male accounted for 49.5% of cases. Most patients were from Duhok city (66.7%). Surgery was performed on the right eye in 26.0% of cases, the left eye in 33.3%, and both eyes in 40.6%. Procedure was successful in 91.1% of patients, with 90.6% requiring only one operation. The study shows no statistical benefit for the second time operation regarding age and gender, p value = 0.17, and 0.38, respectively.

Conclusion: Eye probing is highly effective for children aged 7-12 months. The observed gender differences in outcomes warrants further research.

Keywords: Congenital nasolacrimal duct obstruction, Epiphora, Probing

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Introduction

Eye probing is a common and well-known procedure in pediatric ophthalmology. It is used to treat problems like congenital nasolacrimal duct obstruction (CNLDO) and other problems with the lacrimal system.^{1,2} The timing of the intervention is a key factor in how well the procedure works and how well it works overall. People think that early intervention leads to better outcomes, especially in cases of CNLDO, because it allows the obstruction to be fixed quickly and lowers the risk of complications. But the best time to do eye probing is still up for debate, and more researches are needed to find out the best intervention time.^{3,4} Congenital nasolacrimal duct obstruction (CNLDO) is a condition where the nasolacrimal duct, responsible for draining tears from the eyes to the nasal cavity, is blocked at birth. This blockage prevents tears from draining properly, leading to persistent tearing and discharge from the eyes. CNLDO is a common issue, affecting up to 20% of newborns. In most cases, the obstruction is due to a membrane at the end of the nasolacrimal duct that fails to open. Even though only 5% of newborns with CNLDO have symptoms, it's important to carefully evaluate them, especially if they have watery eyes.⁵ This is because CNLDO needs to be differentiated from other serious conditions like infantile congenital glaucoma, which can also cause excessive tears, as well as photophobia and blepharospasm.⁶ Premature babies are more likely to have duct obstruction, and it doesn't matter what gender they are. Some affected babies may have a family history of the condition.⁷ Most of the time, an incomplete duct canalization at the valve of Hasner is the main cause of nasolacrimal canal obstruction. This leads to constant or intermittent tearing and discharge.⁸ Congenital nasolacrimal duct obstruction can be categorized into simple and complex types during the probing

procedure.⁹ Watery eyes happen when tears overflow from the conjunctival sac. This can be caused by conditions like epiphora, in which tears can't get out of the eye, or hyper lacrimation.¹⁰ Understanding when this procedure should be done is important for improving clinical decision-making and patient outcomes.^{11,12} The purpose of the study is to indicate which group get most benefit from probing in pediatric patients in Duhok.

Patients and methods

This is a cross-sectional study which included 192 children aged 1 month to 30 months who had examined ophthalmologically in Duhok Eye hospital, Kurdistan region. The study's main goal was to find out about these children's age, gender, and which eye was operated on. Medical records and online databases were searched for information that was relevant to the study's goals. From January 1, 2022 to September 1, 2023. Eye probing is a common medical procedure that is used to treat different eye problems in children. It involves putting a thin, flexible probe into the lacrimal drainage system to remove blockages, improve tear drainage, and stop eye problems. Procedure is usually done in a clean environment and needs to be done carefully to keep the patient safe and get good results. Preparation is done by Checking the patient's medical history, permission should be taken from the patient's parent or legal guardian with explaining the procedure.¹³ Then Give topical anesthesia, use an antiseptic solution to gently clean the eyelids and the area around them. a sterile drape is used.¹⁴ The procedure is done while the child is under general anesthesia.¹⁵ A punctum dilator is used to open up both the upper and lower puncta. A thin tube called a lacrimal cannula is attached to a sterile normal saline solution-filled syringe. The saline solution is used to flush fluid through the lower punctum while syringing. Syringing is done to confirm



that there is a blockage in the nasolacrimal duct. If the duct is blocked, fluid will come back up through the other punctum. This shows that the NLD is blocked. A Bowman probe, which comes in different sizes, is used. The following steps make up the process, the probe is pointed straight, moved medially until a feeling of bone is found. This where the nasolacrimal duct opens. Once the probe is at the opening, it is turned vertically and gently moved past the blockage. By syringing again, the nasolacrimal duct is checked to see if it is open. If fluid flows freely a, it means that the duct is now open. Antibiotic drops are used for 2 weeks after the procedure to prevent infection. patients are checked on at 2 weeks, 3 months, and 6 months to evaluate the results. When the symptoms of excessive tearing and discharge are gone and the lacrimal sac doesn't leak fluid when pressure is put on it two weeks after the procedure, this is considered a successful probing, Figure (1), Figure (2), Figure (3) and Figure (4).

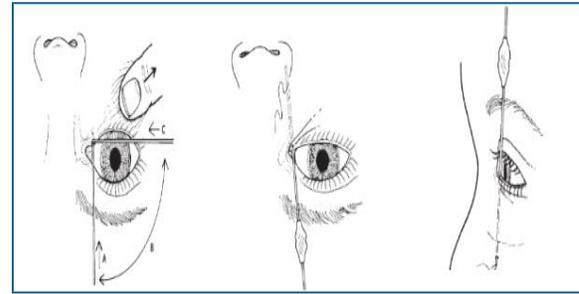


Figure (3): Drawings showing the steps of probing .¹²



Figure (4): Irrigation at the completion of the procedure .¹

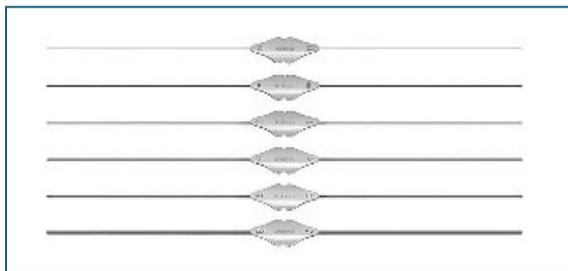


Figure (1): Probes with different sizes .¹⁷



Figure (2): Castroviejo double lacrimal dilator .¹¹

Data were entered into Excel 2016 and then converted and analyzed using SPSS 24. Data were described using frequency and frequency percent tables for categorial data and mean and standard deviation for numerical data. Categorial data were analyzed by Chi-square. P-value < 0.05 was considered statistically significant. The study was reviewed and approved by the division of Scientific Research-Department of Planning, Duhok Directorate General of Health Research Ethics Committee.

Results

The majority of children underwent eye probing between 7-12 months, accounting for 34.9% of the total. The distribution is even across age groups, with 192 children considered. Female children have slightly higher rates than male children of 49.5% and 50.5%, respectively. The majority of children underwent eye probing in Duhok, accounting





for 66.7% of the total. The distribution of children across other addresses varies, with smaller percentages ranging from 1.6% to 15.1%. These were shown in Table (1). Furthermore, Table (1) presents the eyes operation characteristics of children who underwent eye probing in percentages. The data indicates that among the participants, 26.0% had their right eye operated, 33.3% had their left eye operated, and 40.6% had both eyes operated. In terms of the benefit of the operation, 91.1% of the children experienced a positive outcome, while 8.9% did not. Regarding the number of operations, 90.6% underwent a single operation, 8.3% had two operations, and only 1.0% had three operations. Table (2) shows the side of operation and if the procedure helped children who had eye probing. The results showed that 92% of subjects had their right eye operated and benefited, whereas 8% did not. Similarly, 91% of left eye surgeries were successful, whereas 9% were not. In youngsters who had both eyes operated, 91% benefited and 9% did not. In this characteristic, 100.0% of 175 children were included, with 93.1% benefiting from ocular probing and 6.9% not. Furthermore, Table (2) shows that 80% of 1-6-month-olds had positive surgery results, while 20% did not. In the 7–12-month age group, 95.5% of children benefited from ocular probing, whereas 4.5% did not. For 13-18 months old 93.4% had positive outcomes and 6.6% did not. The surgery helped 100% of 19-24 months old, and none reported not benefiting. Eye probing helped 80% of 25-30 months old, but 20% did not. Interesting gender discrepancies were found. Eye probing was successful for 92.6% of male children and unsuccessful for 7.4%. However, 89.6% of female children benefited from the surgery, while 10.4% did not. Additionally, in Table (2) shows a complete distribution of children who had eye probing, categorized by number of operations and benefit results. The table

shows counts and percentages for clarity. The data show that most children (93.6%) profited from a single eye operation, 75% from a second, and none from a third. Most individuals (93.6%) had good results from ocular probing, while (6.4%) did not.

Table (1): Demographic characteristics of children underwent eye probing

Demographic characteristics	No.	%
Age (months)		
1-6	15	7.8
7-12	67	34.9
13-18	61	31.8
19-24	14	7.3
25-30	35	18.2
Total	192	100
Gender		
Males	95	49.5
Females	97	50.5
Address		
Duhok	128	66.7
Akri	7	3.6
Amedy	3	1.6
Semel	10	5.2
Shexan	5	2.6
Zakho	10	5.2
outside Duhok	29	15.1
Eye characteristic underwent operation		
Right eye	50	26.0
Left eye	64	33.3
Both eyes	78	40.6
Total	192	100
Benefit of operation		
Yes	175	91.1
No	17	8.9
Operative trials		
1	174	90.6
2	16	8.3
3	2	1.0





Table (2). Distribution of children underwent eye probing according to side of operation, status of benefiting, age, gender, and trials of operation.

Side of operation	Benefit of operation				Total	p-value
	Benefited		Doesn't benefit			
	No.	%	No.	%		
Right eye	46	92%	4	8%	100%	0.91
Left Eye	58	91%	6	9%	100%	
Both eyes	71	91%	7	9%	100%	
General character of Age						
1-6 months	12	80%	3	20%	100	0.11
7-12months	64	95.5%	3	4.5%	100	
13-18months	57	93.4%	4	6.6%	100	
19-24months	14	100%	0	0	100	
25-30months	28	80%	7	20%	100	
Gender						
Males	88	92.6%	7	7.4%	100	0.47
Females	87	89.6%	10	10.4%	100	
Operative trials						
1	163	93.6%	11	6.4%	100%	
2	12	75%	4	25%	100%	
3	0	0%	2	100%	100%	

Table (3); For the right eye, 93.6% of children with one procedure benefited, whereas 67% with two did. The low number of right eye two and three operation cases is noteworthy. The right eye benefit outcome is not statistically associated with the number of surgeries ($p=0.2$). For the left eye, 92.9% of children who had one procedure benefited, whereas 83.4% who had two benefited. The

left eye beneficial outcome is statistically associated with the number of operations ($p=0.003$). For both eyes, children who had one procedure had a 94.3% benefit rate, while those who had two had 71.4%. Statistically, the number of operations and benefit outcome for both eyes are associated ($p=0.001$).

Table (3): Distribution of children underwent eye probing according to status of benefiting with side and number of operative trials

Side of operation	Operative trials	Benefit of operation				Total	P- value
		Benefited		Doesn't benefit			
		No.	%	No.	%		
Right eye	1	44	93.6%	3	6.5%	100%	0.2
	2	2	67%	1	33%	100%	
	3	3	100%	0	0.00%	100%	
Left eye	1	53	92.9%	4	7.1%	100%	0.003
	2	5	83.4%	1	16.6%	100%	
	3	0	0.00%	1	100%	100%	
Both eyes	1	66	94.3%	4	5.7%	100%	0.001
	2	5	71.4%	2	28.6%	100%	
	3	0	0.00%	1	100%	100%	





Table (4) shows a distribution of children who had eye probing by address and second surgery benefit. The second operation helped 93.30% of Duhok children, whereas 6.66% did not. The second operation helped 100.00% of children from outside Duhok. Furthermore, the distribution of children who had eye probing depending on their second

surgery benefit, grouped by side. All youngsters who underwent their second right eye operation benefited, according to the data. For the left eye, 85.8% benefited from the second operation, 14.2% did not. A significant 100.00% of children who had both eyes operated on again had positive outcomes.

Table (4): Distribution of children underwent eye probing according to status of benefiting in the 2nd operation and address and side of operation.

Address	benefit of the 2 nd operation				p- value
	Benefited		Doesn't benefit		
	No.	%	No.	%	
Duhok	14	93.33%	1	6.66%	0.011
Outside	4	100.00%	0	0.00%	
Total	18	94.73%	1	5.26%	
Side of operation					
Right eye	4	100%	0	0%	0.019
Left eye	6	85.8%	1	14.2%	
Both eyes	8	100%	0	0%	

Table (5), grouped by age and gender, shows the distribution of children who received ocular probing based on their second surgery benefit and accompanying p-values. It appears that all children aged 1-6 months benefited from the second procedure. In the 7–12-month age group, 67% benefited and

33% did not. At 13-18 months, 100.00% of children benefited, with none not. No one in the 19–24-month age group did not benefit from the second operation. A p-value of 0.17 for age groups and 0.38 for gender reveals no statistically significant relationships between these variables and second-operation benefit.

Table (5): Distribution of children underwent eye probing according to status of benefiting in the 2nd operation and age and gender

Age (months)	benefit of the 2 nd operation				Total	P- value
	Benefited		Doesn't benefit			
	No.	%	No.	%		
1-6	3	100%	0	0%	100%	0.17
7-12	2	67%	1	33%	100%	
13-18	9	100%	0	0%	100%	
19-24	3	100%	0	0%	100%	
Gender						
Males	8	100%	0	0%	100%	0.38
Females	10	90.9%	1	9.1%	100%	





Discussion

Although the nasolacrimal duct probing is the standard therapeutic procedure used in children with CNLDO, the recommendations concerning the optimal time to intervene are divergent.^{1,2,5,7} The study showed that eye probing was done for a lot of children, especially those between 7 and 12 months old, whom made up 34.9 % of the total sample. This is more common in this age group, which means that there are medical recommendations or specific eye conditions that affect babies and young children more often. Also, the data showed a small difference between boys and girls; 49.5% of boys and 50.5% of girls had their eyes poked. This could be because of biological or health factors. Also, the study found that there were a lot of cases of eye probing in the Duhok region, where 66.7 % of all cases. This suggests that there may be differences in access to health care or targeted health initiatives in this area. Lekskul et al. found that probing was successful in 90.2% of the 6 different age groups, with the highest rate being in the 6-12 months age group (90.3%) and the lowest rate being in the 36-60 months age group (33.3%).⁷ The study found that 40.6% of the children who took part had surgery on both eyes. This suggest that closure of tear ducts effect both eyes. Also, the very high success rate of 91.1% shows that eye probing procedures usually have good results when it comes to improving eye health or fixing problems that are deeper down. The way the number of operations is spread out shows how effective the procedure is. For example, 90.6% of children only need one operation, which shows that it works well to fix eye problems. The study showed that most children (93.1%) needed one eye surgery, and the results were satisfactory. The high percentage (93.1%) of positive results in the study backs up the idea that eye probing procedures usually have good results when it comes to improving children's eye

health or fixing underlying problems, which is confirming with what other studies have found.¹² According to the study, 26.3 % of children who had surgery on their right eye felt better afterward, while 23.5 % did not. In the same way, 33.1 % of those who had surgery on their left eye improved, while 35.3 % did not. For children who had surgery on both eyes, 40.6% got better and 41.2% got worse. Overall, all 175 children who were considered for this trait were included, with 93.1 % of them getting better after the eye probing procedure and 6.9 % not getting better. Rashid et al. did a study that showed the overall success rate of probing in children was 94.23 %. This is the same as what we found.¹⁶ Several recent studies also showed success rates were much higher in late and very late initial probing.¹⁶ Valcheva et al. found that 54 % of children over 2 years old were cured, but Machado et al. found that only 42% of similar cases were cured.^{17,18} This high success rate could be because many of these children didn't get the right treatment when they needed it. Or they showed up late in the disease's course without having had any good treatments before. The study found that younger children (ages 1-6 months) and older children (ages 25-30 months) are less likely to benefit from the procedure, with 6.9% and 16.0%, respectively, having good outcomes. On the other hand, between 32.6 and 36.6% of children aged 7-12 months, 13-18 months, and 19-24 months have good outcomes. There are interesting differences between boys and girls. For example, a slightly higher percentage of boys than girls benefit from the eye probing. In line with these results, Sharif et al found that 97 children aged 1 to 2 years had a 100% success rate and 23 children aged 2 to 3 years had an 87% success rate.¹⁹ Perveen and colleagues did a study with 118 children between the ages of 4 and 48 months.²⁰ The success rate was highest for children between the ages of 7 and 12 months, at 94%, and dropped





sharply as the children got older, reaching only 33.3 percent for those between the ages of 37 and 48 months. In a study of children over 15 months old, Reynolds et al. found that the success rate of probing drops with age.²¹ The study found that the success rates of eye probing procedures vary by age group, which is in line with what other research studies have found. Younger children, like those aged 1 to 6 months, tend to have lower success rates. This could be because their tear drainage systems aren't fully developed yet or because their eyes aren't in good shape.²²⁻²⁴ Also, older children, between 25 and 30 months, have lower success rates. This could be because they have more long-term or complicated problems. In contrast, the middle age groups of 7–12 months to 19–24 months have higher success rates, which suggests that eye probing may be more effective in this age range when it comes to tear duct development and treating conditions.²⁵ Also, the differences between boys and girls are interesting and may point to differences in anatomy or physiology between boy's and girl's tear ducts.²⁶ The differences between men and women that have been seen are interesting and may need more researches. These differences could be because of differences in how men's and women's tear ducts are built or work, or they could be caused by other factors that were not taken into account in this study.²⁷

Conclusion

Pediatric eye probing is effective for addressing ocular issues in children, with a high success rate, particularly in those aged 7-12 months. Gender differences in outcomes warrant further investigations. The study provides valuable insights into the demographics and outcomes of eye probing in pediatric patients, facilitating personalized treatment approaches.

Disclosure

The authors assert that they have no conflicts of interest.

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