

Nasolacrimal duct Probing versus Silicone Intubation in the Treatment of Complex Congenital Nasolacrimal Duct Obstruction

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ABSTRACT

Background and Purpose: to compare the results of probing alone versus primary silicone intubation in cases of complex congenital NLDO.**Methods:** The study was done in ophthalmology department, Zagazig university hospitals from May 2022 to December 2023. Patients with complex CNLDO in children aged 1 - 4 years were included. We excluded cases of simple CNLDO, failed previous probing or intubation. Patients were divided randomly into two groups. The first group (group I) (32) eyes were treated with intubation and the second group (group II) (32) eyes were treated with probing and syringing .**Results:** 64 patients with complex type of CNLDO were enrolled. There was no significant difference between both groups regarding age ($P = 0.990$) and gender ($P = 0.448$). Failure rates were significantly higher in group II than in group I at one week (40.6 percent vs. 15.6 percent, $P = 0.026$) . The results remained constant at the first and third month postoperative in which the failure rates at group II vs group I were (56.3 % vs. 15.6 %, $P 0.001$), and the results were also the same at the fourth and sixth month with the failure rates at group II vs group I were (68.8 % vs 15.6 % , $P 0.001$).**Conclusion:** Primary silicone intubation is recommended in cases of complex CNLDO because it produces better results than probing and has a longer success rate.**Keywords:** Probing, Silicon intubation, Complex CNLDO, Simple CNLDO.

INTRODUCTION

Congenital obstruction of the nasolacrimal duct is a common condition that begins within the first few weeks of life and is characterized by continuous tearing and recurrent mucopurulent discharge due to associated conjunctivitis [1, 2].

About 4–6% of the infants complain of symptomatic congenital nasolacrimal duct obstruction CNLDO [3, 4]. In between 80% and 96% of infants with this condition, spontaneous resolution may occur [4, 5]. The usual course of treatment involves hydrostatic massage of the lacrimal sac followed by nasolacrimal duct (NLD) probing at around one year of age [6-12].

In the 18th century, Petrus Camper described the technique of probing that essentially involves removing the congenital obstruction by using a

metallic probe that was inserted into the nasolacrimal duct [13]. Probing had a variable success rate between 55% and 95% [14-16]. A more severe obstruction may become present with age, which would explain why older ages have a reduced success rate [17].

Two theories for explanation of the decreased cure rate after performing probing and syringing in older children. Some surgeons hypothesized that it might be caused by chronic inflammation with subsequent fibrosis and persistent infection in old children [8, 17], Kushner[18] and Honavar and associates[14] reported that the complex type of CNLDO was more likely to be present in the older children.

There is no widely accepted standard strategy for the treatment of CNLDO in older children[14].

Two forms of CNLDO (simple and complex) are present and we can differentiate between them intra operatively. Simple obstruction is present if the probe passed easily through the lacrimal passages and obstruction is removed without much resistance. However, if the metallic probe is felt inside the nasolacrimal duct to be tight, the movement is not easy and there is a significant resistance during passage of the probe through the obstruction, this means a complex type of NLD obstruction. Also, It is possible to distinguish between the two types of obstruction through tactile sensations that can be transmitted to the surgeon's finger during passage of the probe [19]. The purpose of the current study is to compare the results of probing alone versus primary silicone intubation in cases of complex congenital NLDO.

PATIENTS AND METHODS

The current study was done in the ophthalmology department of Zagazig university hospitals during the period between May 2022 to December 2023. Approval from Institutional Review Board of the Faculty of medicine, Zagazig University (IRB #: 9371-8-5-2022) before beginning our study was done. All participants signed a written consent which was taken from their parents to participate in the study and for publication of data before enrollment in the study. All patients complaining of complex NLDO in children aged 1 - 4 years were included in our study. The diagnosis of CNLDO was based on history of tearing and / or discharge during the first few weeks after birth which was taken from the parents and on clinical examination of the child evidenced by increased tear meniscus height, persistent mucopurulent discharge, and reflux of the lacrimal sac contents on pressure over the lacrimal sac below the medial palpebral ligament. We excluded cases of simple CNLDO and cases with failed previous probing or intubation. All complex cases such as facial anomalies, genetic syndromes, buried probe, inferior turbinate impaction and history of trauma were also excluded. Randomization was done using computer-generated random numbers. To ensure unbiased allocation of participants to the studied groups , the allocation sequence was concealed from the study investigators in sealed

envelopes. Envelopes containing the allocation data were selected sequentially by the patient in the presence of the study nurse. The study participants were divided into two equal groups. The first group (group I) (32) eyes were treated with primary silicone intubation and the second group (group II) (32) eyes were treated with probing and syringing alone.

All operations were done under general anesthesia by a single surgeon. The upper punctum was widened using a punctal dilator. The diagnosis of CNLDO was determined first by dilatation and syringing of the nasolacrimal system through the upper punctum. A #0 Bowman probe was inserted vertically into the upper punctum for about 2 mm then rotated horizontally into the upper canaliculus to reach the lacrimal sac by passing through common canaliculus. After feeling a hard stop, The direction of the probe was then changed to be downward, backward and laterally toward the direction of the nasolacrimal duct and then into the nasal cavity.

If the NLDO was easily overcome and there was no much resistance, it was classified as simple or membranous obstruction, and the case was treated just with probing and was excluded from the study. If the obstruction was overcome with resistance during the passage of probe beyond the obstruction, The case was considered a complex type of obstruction and was treated with either primary silicone intubation in the first group in which a silicone lacrimal stent was inserted and was retrieved from the nose or probing and syringing alone in the second group.

All cases were given topical antibiotic and steroids 4 times daily for 2 weeks postoperatively plus nasal decongestant twice daily for 3 days. The silicone tube in group I was removed 3 months postoperative. The criteria for success or failure was depending on the history of improvement or persistence of symptoms as documented by the mother and disappearance or persistence of signs respectively .The follow-up period was 6 months following the operations in both groups that was considered for final analysis.

Statistical methods

Statistical analysis and data management were done using SPSS version 28 (IBM, Armonk, New York, United States). Age, the only quantitative variable, was assessed for normality using direct data visualization methods and the Shapiro-Wilk test. It was summarized as mean and standard deviation. Categorical data were presented as numbers and percentages. Independent t-test was used for comparing the age between the studied groups. Fisher’s exact test or the Chi-square was used to compare between the categorical data. Kaplan –Meier analysis was done for failure rates. Log-rank test was used to compare failure curves. All statistical tests were two-sided. P values that were < 0.05 were considered to be significant.

RESULTS

Results of 64 child with a symptomatic complex type of congenital nasolacrimal duct obstruction came to ophthalmology department, Zagazig university hospitals were enrolled in our study. As regard the demographic data of the studied groups, There was no statistically significant difference between the studied groups regarding age (P value was 0.990) and gender was (P value was 0.448) as demonstrated in table (1).

We compared the failure rates in both groups at various follow-up periods one week, one month, three months, 4 months (one month post removal of the silicone tube) and six months (three months post removal). Failure rates were significantly higher in the second group than in the first group at one week (40.6 percent vs. 15.6 percent, P = 0.026), we found that the results of both groups remained constant at the first and third month postoperative in which the failure rates in group II vs group I were (56.3 percent vs. 15.6 percent, P 0.001), and the results were also the same at the fourth and sixth month postoperative in which the failure rates in group II vs group I were (68.8% vs 15.6 %) (Table 2, Figure 1).

Kaplan –Meier analysis was done for failure rates. It revealed that the median time to failure in group II was 30 days with a 95% confidence interval ranging from 5 to 55 days, while the median time to failure was not reached in group I. Additionally, failure rate curves significantly differed between the studied groups with higher failure rate in group II than in group I (Log-rank P < 0.001) (Figure 2).

Table (1) :Demographics in the studied groups

	Group I (n = 32)	Group II (n = 32)	P-value
Age (years)	2.2 ±1.1	2.2 ±0.9	0.990
Sex			
Males	12 (37.5)	15 (46.9)	0.448
Females	20 (62.5)	17 (53.1)	

Data were presented as mean ±SD or number (percentage)

Table (2) :Failure rates in the studied groups at different follow-up times

	Group I (n = 32)	Group II (n = 32)	P-value
At one week			
Failed	5 (15.6)	13 (40.6)	0.026*
Improved	27 (84.4)	19 (59.4)	
At one month			
Failed	5 (15.6)	18 (56.3)	<0.001*
Improved	27 (84.4)	14 (43.8)	
At 3 months			
Failed	5 (15.6)	18 (56.3)	<0.001*
Improved	27 (84.4)	14 (43.8)	

At 4 months (one-month post removal)			
Failed	5 (15.6)	22 (68.8)	<0.001*
Improved	27 (84.4)	10 (31.3)	
At 6 months (three -months post removal)			
Failed	5 (15.6)	22 (68.8)	<0.001*
Improved	27 (84.4)	10 (31.3)	

Data were presented as number (percentage); * Significant

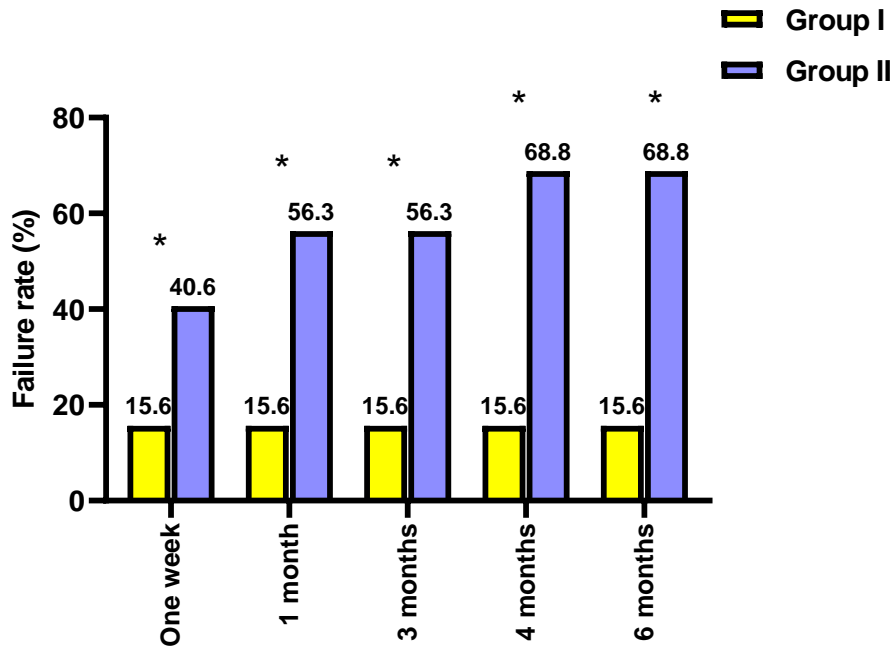


Figure (1): Failure rates in the studied groups at different follow-up times

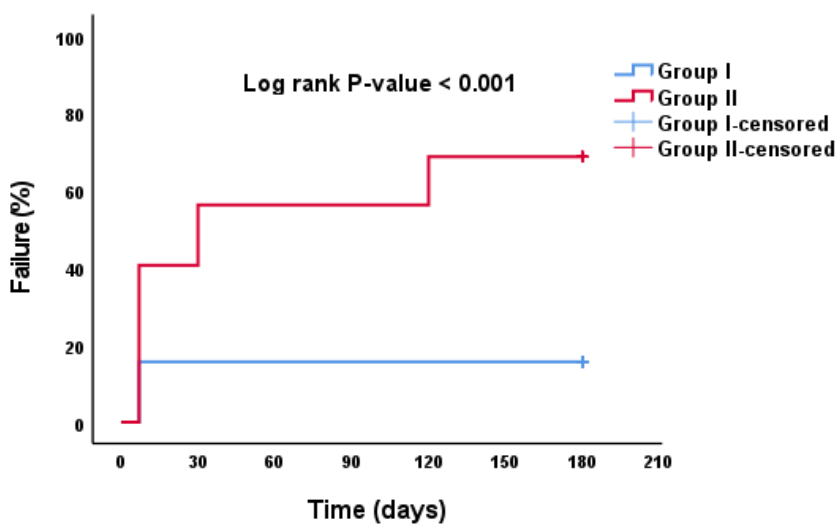


Figure (2) :Kaplan –Meier analysis for failure rates in the studied groups

DISCUSSION

Congenital obstruction of the nasolacrimal duct can affect up to 30 % of children which is a frequent disorder[5] However, just 1 to 6 percent of these children experience symptoms[3, 4]. Between 80% and 96% of these children will have a spontaneous resolution of the congenital obstruction by the age of one year [4, 5]

Two types of congenital obstruction of the nasolacrimal duct can be present either simple or complex which is detected intraoperatively. In cases with complex obstruction in the current study, the obstruction was found in the distal portion of the nasolacrimal duct, and it presented significant resistance during passage of the probe.

One of the common methods for treating cases of CNLDO is by probing and syringing. The reported success rate for the procedure was highly variable and ranges from 54.7% to 97% which is depending upon the age of the patient at the time of probing and syringing [7, 9]

In our study we found that success rate in group I treated with primary silicone intubation was 84.4% and remained constant over follow up period of 6 months while the success rate was decreased in group II treated with probing over the follow up period.

To our knowledge our study is the first one that compares silicone intubation with probing in treatment of the complex type of congenital obstruction of the nasolacrimal duct.

The majority of studies has found a drop in probing success in old children and has correlated probing success with age at the time of probing [7, 9, 20, 21] Honavar et al.,[14] and Maheshwari[22]observed a high failure rate in older kids with complex obstruction that is comparable with our findings, where the failure rate in the second group (probing) was 40.6 percent at 1 week postoperative. Although both groups in our study had similar average ages at the time of surgery, the failure rate between them was significantly different, and the P value of 0.026 suggests that complex blockage,

particularly in older children, is a reason for primary silicone intubation.

Kashkouli et al.[16] also mentioned that complex CNLDO had higher failure rates. They demonstrated that the cure rate in membranous types was 90.2%, whereas the complex CNLDO only had a cure rate of 33.3% in both late and early probing (P 0.0001).

Children between 18 and 48 months of age were treated for CNLDO by silicone intubation with the aid of nasal endoscopy by Orhan et al. They reported a success rate of 100% for a follow-up period between 4 and 24 months[23]. Repka et al[24] reported a success rate about 90% in children 6 to 45 months old who had never had nasolacrimal surgery before. Our study's success rate for the first group (the intubation group) at one week was 84.4 percent, which is comparable to the results of Andalib et al[25] who reported 86.2 and 89 percent success rates for monocanalicular and bicanalicular silicone intubation in children under the age of seven.

The success rate in the first group (intubation group) at the 1-week (84.4%) and remain the same (84.4%) during the postoperative follow-up visits indicating that early successful cases of intubation remain the same during the follow up period which was 6 months at which the success rate was found to be (84.4%).

Ali et al,[6] reported in their long cohort study that at the final follow up period, the anatomical success was noted in 58% while the functional success was noted in 51% in cases of complex CNLDO. On the other hand, The anatomical success was noted in 97.8 % while the functional success was noted in 94.7% in cases of simple CNLDO (p < 0.001).while the success rate in the current study in the second group (probing) was at the 1-week (59.4%), at 1st month postoperative decrease to (43.8 %) then decrease again to (31.3%) at 4 and 6 months postoperative which indicates that even early successful cases of probing for complex cases of CNLD may end in failure.

On the other hand, according to Kashkouli et al.[16] the results of NLDO probing during the 1st

week of follow-up are highly suggestive of the final result, there was no discernible difference between the final cure rate at the third month's follow-up and the cure rate at the first weeks follow-up (83.4%). At the 6 week and 1-year follow-ups, Kushner discovered that 21 of the 23 patients had the same outcome[18]

These findings suggest that primary silicone intubation is the preferred method of treatment for complex CNLDO, and it appears that the type of obstruction—rather than the patient's age—determines whether probing is successful.

The current study's limitations included the absence of nasal endoscopy, patients of varying ages, and a wide age range between the studied groups (1- 4) years.

CONCLUSION: Primary silicone intubation is recommended in cases of complex congenital NLDO because it produces better results than probing alone and has a longer success rate.

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