

## Congenital nasolacrimal duct obstruction: Clinical, microbiological and management in a tertiary health care centre in central India- A descriptive study

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### Abstract

**Introduction:** Congenital nasolacrimal duct has accounts for 6 % of newborn infants with various treatment. Microbiological studies to identify the type of species involved in Lacrimal Sac infection secondary to Congenital Nasolacrimal Duct Obstruction (CNLDO) have been extensively reported.

**Aims and Objective:** to assess microorganisms causing congenital nasolacrimal duct obstruction. To see efficacy of probing as compared to silastic intubation.

**Materials and Methods:** A total 100 patients were enrolled in the study. The patients came with epiphora and mucous discharge. Inclusion criteria for the study was patients presenting with CNLDO (Presence of atleast one sign of NLDO: Epiphora, increased tear lake, and/or mucopurulent discharge), Age upto 9 years.

**Exclusion Criteria:** Punctual or canalicular abnormality, H/o previous surgery, H/o faciomaxillary trauma, cleft lip/ cleft palate or any facial deformity, acute dacryocystitis, previous history of probing. Sample size was 100 patients.

**Results:** Haemophilus influenzae and streptococcus pneumonia were the most common microorganisms (n= 56, 40.5%; n= 37, 26.8% respectively) followed by moraxella catarrhalis (n=19, 13.7%), staphylococcus aureus (n=17, 12.3%), pseudomonas aeruginosa (n=9, 0.65%).

**Discussion:** Congenital nasolacrimal duct obstruction results in stagnation of fluid within the lacrimal sac area which causes secondary bacterial infection. The prevalence of CNLDO with no growth shows the sole effect of congenital anomaly on the degree of tightness.

**Conclusion:** The mocobiological study of CNLDO may have a value in predicting the obstruction.

**Keywords:** Acute dacryocystitis, Congenital nasolacrimal duct Obstruction.

### Introduction

Lacrimal apparatus consists of the lacrimal gland, the accessory glands and the lacrimal passage. Lacrimal passage consists of lacrimal puncta, lacrimal canaliculi, lacrimal sac and nasolacrimal duct. Obstruction of lacrimal passage may occur at any level: punctum, canaliculus, lacrimal sac and NLD. Congenital nasolacrimal duct has accounts for 6 % of newborn infants with various treatment.<sup>1</sup> Spontaneous resolution seen in 80-96% infants by one year.<sup>2</sup> Conservative treatment is consider effective in first year of life which includes frequent lacrimal sac massage and topical antibiotics.<sup>3</sup> Surgical probing or silastic intubation performed to overcome unresolved obstruction.<sup>4</sup> Nasolacrimal duct (NLD) obstruction, whether congenital or acquired, predisposes lacrimal drainage system (LDS) to secondary bacterial infection due to stagnation of the tear secondary bacterial infection due to stagnation of tear within LS.<sup>5</sup> Microbiological studies to identify the type of species involved in Lacrimal Sac infection secondary to Congenital Nasolacrimal Duct Obstruction (CNLDO) have been extensively reported.

### Aims and Objective

1. To assess microorganisms causing congenital nasolacrimal duct obstruction.
2. To see efficacy of probing as compared to silastic intubation.

### Materials and Methods

The study was conducted with the objective of comparing the clinical presentation of CNLDO in urban and rural population, Isolation and culture sensitivity of different microorganisms that are causing CNLDO, to compare the medical and surgical management outcome. It was a prospective, interventional study conducted for 2 years at Acharya Vinobha Bhave Rural Hospital Sawangi, Wardha.

**Inclusion Criteria:** for the study was patients presenting with CNLDO (Presence of atleast one sign of NLDO: Epiphora, increased tear lake, and/or mucopurulent discharge), Age upto 9 years.

**Exclusion Criteria:** Punctual or canalicular abnormality, H/o previous surgery, H/o faciomaxillary trauma, cleft lip/ cleft palate or any facial deformity, acute dacryocystitis, previous history of probing. Sample size was 100 patients. Approval for the study was obtained from Ethical Committee of Institution. The type of study was prospective, interventional study. All statistical analysis was carried out with software SPSS version 2.0. A total 100 patients were enrolled in the study. The patients came with epiphora and mucous discharge in Ophthalmology out patient department or referred from other department were counselled about the study. Those parents willing to participate in the study were properly counselled and consent was taken in writing. Of these 100 patients, 40 were males and 60

were females. Patients age ranged from 3 weeks to 2 years (mean 1.2 years). All patients were randomly selected of which 40 patients undergone eye irrigation and only 25 patients undergone. Of these patients who were referred with chief complaints of epiphora and mucous discharge, congenital nasolacrimal duct obstruction was diagnosed when resistance is felt, there was reflux of saline and mucous discharge on irrigation with saline or recurrence of symptoms in spite of the use of topical antibiotic solution and massage over the sac. Tight obstruction was considered when the surgeon had difficulty passing probe #1 to achieve patency of LDS or the use of smaller probe size to bypass the obstruction. For confirmation of congenital nasolacrimal duct obstruction irrigation with saline was performed immediately before probing. In irrigation group, specimens for culture of nasolacrimal reflux was obtained by irrigation of sac with saline. Choice of antibiotics was done on basis of culture and sensitivity results. All procedures were performed by a single ophthalmologist. Irrigation was successful in eliminating preoperative symptoms (epiphora, discharge, increased tear lake) had disappeared with a normal dye disappearance test (DDT) and patent Jones primary test.

## Results

Specimens were collected from 121 LDS in 100 patients with CNLDO with a mean age of 1.2 years. Of these 121 LDS specimens 15(14.8%) showed no growth. LDS with no growth had 100% successful probing (n=15). Culture positive LDS had 62.2% successful probing (n=66) and 26.5% successful silastic

intubation (n= 40). On comparing CNLDO which had positive culture results to those with no growth, the odds ratio was 3.28. It was not upto a level of significance ( $p=0.143$ ; 95% CI [4.37-25.63]. Microorganisms identified were 138 in total; 108 single microorganism in 108 cultures, two species in 9 cultures and three species in four cultures. Gram – negative organisms were more as compared to gram positive in LDS specimen (n=62, 62%; and n=38, 38% respectively). Table 1 shows the prevalence of different microorganism species with the success rates of probing and silastic intubation. Results of probing were superior as compared to silastic intubation. The odds ratio and corresponding confidence intervals per single and total specific microorganism infection (mixed species) showed similar values with insignificant changes. Overall probing was significantly better in results as compared to silastic intubation as seen in the Table 1.

Haemophilus influenzae and Streptococcus pneumonia were the most common microorganisms (n= 56, 40.5%; n= 37, 26.8% respectively) followed by Moraxella catarrhalis (n=19, 13.7%), Staphylococcus aureus (n=17, 12.3%), Pseudomonas aeruginosa (n=9, 0.65%). Most bilateral cases showed the same culture results with an exception of patient. One patient had Haemophilus Influenzae on one side and Streptococcus pneumonia on other side, with simple NLD obstruction on both sides. The most effective local antibiotics for microorganisms organisms were bacitracin and neomycin (Table 2).

**Table 1: Shows the prevalence of different microorganisms species as well as success rate of both probing and silastic intubation. Both number indicates the number of procedures carried out**

Type	Total Number	Success No. (%)	
		Probing	Intubation
Haemophilus influenzae	56	26	30
Streptococcus pneumonia	37	24	13
Moraxella catarrhalis	19	10	09
Staphylococcus aureus	17	09	08
Pseudomonas aeruginosa	09	05	04
	138	74 (53.6%)	64 (46.3%)

**Table 2: Shows comparison of different studies dealing with microbiological profile of CNLDO**

Study	No. of LDS	No. of growth	Gm+ve	Gm –ve	Common pathogens	Risk for failure	Pthogen specific risk of failure	Success Rate	Antibiotic Sensitivity
Kuchar et al	50	30	49.3	50.7	Streptococcus Pneumonia (35.4%) Hemophilus Influenza (19.6%)	N/A	N/A	N/A	Yes (Bacitracin & Neomycin)
Usha et al	238	17	57	43	Streptococcus pneumonia (32.7%) Hemophilus influenza (31.3%)	N/A	N/A	N/A	Yes (Ofloxacin)

Gerkowicz et al.	81	25	70	28.8	Staphylococcus epidermis (28%) Staphylococcus aureus (22%)	N/A	N/A	N/A	N/A
MacEwen et al	151	79	35	65	Haemophilus influenza (55%) Staphylococcus aureus (35%)	No	N/A	N/A	N/A
Kim et al	50	36	56.2	43.8	Staphylococcus aureus (25%) Pseudomonas aeruginosa (15.6%)	No	N/A	Irrigation (96%) Probing (84.6%)	Yes (Ciprofloxacin)
Al-Faky et al	181	12.1	49.1	50.9	Streptococcus pneumonia (48.1%) Haemophilus influenza (39.2%)	No	Yes	Probing (76.6%) Intubation (82.1%)	Yes (Bacitracin & Neomycin)
Our Study	121	138	76	62	Haemophilus influenza (40.5%) and Streptococcus pneumonia (26.8%)	N/A	N/A	N/A	Yes (Bacitracin & Neomycin)

## Discussion

Congenital nasolacrimal duct obstruction results in stagnation of fluid within the lacrimal sac area which causes secondary bacterial infection. Sources of bacterial infection can be from normal conjunctiva, upper respiratory tract, birth canal in the neonates. The study was conducted to assess microorganisms causing congenital nasolacrimal duct obstruction. To see efficacy of probing as compared to silastic intubation. The efficacy of each procedure was assessed to see treatment in patients of congenital nasolacrimal duct obstruction as a primary modality. Previous study conducted showed only bacteriology profile in CNLDO with possible impact on the success rate in culture positive results<sup>14</sup>. On the contrary our study showed that Haemophilus influenzae and Streptococcus pneumonia were the most common microorganisms (n= 56, 40.5%; n= 37, 26.8% respectively) in CNLDO. This is similar to the results of study conducted by Kuchar et al. (19.6% and 35.4%) and Usha et. al (32.7% and 31.3%) Microbial infection initiates an immune-system response and tissue reaction caused by elaboration of different mediators that end up with fibrosis. The same was confirmed by histopathologic study of chronic dacryocystitis.<sup>16</sup> The prevalence of CNLDO with no growth shows the sole effect of congenital anomaly on the degree of tightness. Probing was as significantly better as silastic intubation in patients of congenital nasolacrimal duct obstruction with success rate of 53.7%. It is a successful primary procedure in treatment of CNLDO. Probing and silastic intubation were performed in similar age groups in LDS-infected cases with Staphylococcus aureus, which eliminates the effect of age as a risk factor. Also probing is a simple operative procedure easily performed in children under sedation of anaesthesia or sometimes under general anaesthesia in uncooperative patients.<sup>18,19</sup> In contrast to silastic intubation which is complex, time consuming, requiring more resources and often involves

complications during and after surgery. Studies have given success rate of probing to be 82% in relieving symptoms.<sup>19,20</sup> In our study the result of efficacy of probing came out to be 53.7%. Probing is a simple, quick, cost effective, dry case procedure and do not require compromise the patient for future nasolacrimal surgery.<sup>20</sup> A simple probing procedure is effective in do not producing symptomatic improvement, when limited to use in patients with complete obstruction of nasolacrimal duct and when watering is the only symptom.<sup>21</sup>

## Conclusion

The microbiological study of CNLDO may have a value in predicting the obstruction. Identification of microorganisms works as an encouraging factor for early intervention of the cases. As in whole results of probing were superior to that of silastic intubation. So we recommend probing as a primary treatment of modality in patients of congenital nasolacrimal duct obstruction. We do not recommend any procedure (probing, silastic intubation) in relation to organisms as these field needs more study with more sample size and each procedure has its own advantage and disadvantages.

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