

Bacteriology and Antibiotic Sensitivity of Patients with Congenital Nasolacrimal Duct Obstruction

Shahbaz Husain¹, Rajiv Kumar Gupta², Deepak Lakra³

ABSTRACT

Introduction: Congenital nasolacrimal duct obstruction is an annoying problem, which often affects babies with permanent closure of the Hasner membrane. The nasolacrimal sac easily becomes infected leading to acute or chronic dacryocystitis with epiphora and mucopurulent discharge. Aim of the study was to assess microorganisms causing congenital nasolacrimal duct obstruction and to determine the appropriate antimicrobial agents based on the sensitivity pattern of the isolated microorganisms.

Material and methods: A prospective longitudinal study was carried out on 59 patients of age group 0-4 years suffering from congenital nasolacrimal duct obstruction, attending the ophthalmology outpatient department at a tertiary care centre. Samples were collected from these patients and processed by standard microbiological techniques. All the bacterial isolates obtained were subjected to antimicrobial susceptibility testing by using Kirby-Bauer disc diffusion method.

Results: Cultures were positive for bacteria from 59.32% of the samples in this study. The study revealed that gram-positive organisms were most common isolate. The bacterial species most frequently cultured was *Streptococcus pneumoniae*, representing 27.12% of the isolates, followed by *Staphylococcus aureus* (15.25%) and *Staphylococcus albus* (11.86%). The most effective antibiotic against all organisms was Tobramycin (91.42%), followed by Gatifloxacin (82.85%). *Streptococcus pneumoniae* showed 93.75% sensitivity to Tobramycin.

Conclusion: *Streptococcus pneumoniae* was the common pathogen and Tobramycin was the most effective drug in congenital nasolacrimal duct obstruction. Microbial culture and sensitivity contributes to the choice of appropriate and effective antimicrobial agents.

Keywords: Congenital Nasolacrimal Duct Obstruction (CNLDO), Bacterial Isolates, Culture, Antibiotic Sensitivity

canalization of the nasolacrimal duct especially at the valve of Hasner. It is also known as dacryocystitis neonatorum.³ It is usually presented with epiphora in newborn develops seven days after birth. Later purulent discharge may develop resulting in matting of eyelashes.

Congenital nasolacrimal duct obstruction accounts for 6% of newborn infants with various treatment modalities to resolve the obstruction.⁴ Spontaneous resolution is seen in 80-96% of infants by one year of age.⁵ Conservative treatment is considered effective in first year of life which includes frequent lacrimal sac massage and topical antibiotic drops.⁶ Nasolacrimal duct (NLD) obstruction, whether congenital or acquired, predisposes lacrimal drainage system (LDS) to secondary bacterial infection due to stagnation of the tear within the lacrimal sac.⁷ Accumulation of mucoid and mucopurulent exudates causes the sac to dilate, eventually leading to a pyocele.⁸ The knowledge of the bacteriology of chronic dacryocystitis would contribute to the choice of effective antimicrobial agents.⁹

Aim of the study was to assess microorganisms causing congenital nasolacrimal duct obstruction and to determine the appropriate antimicrobial agents based on the sensitivity pattern of the isolated microorganisms.

MATERIAL AND METHODS

The present study was a prospective longitudinal study carried out in Regional Institute of Ophthalmology (RIO), Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand from September 2016 to August 2018. A total of 59 patients of age group 0-4 years suffering from congenital nasolacrimal duct obstruction were studied. Patients were selected from ophthalmic outpatient department and those admitted in the eye wards of the hospital. Approval for the study was obtained from Ethical Committee of the Institution. The present Study was conducted according to the declaration of Helsinki. Written consent was obtained

INTRODUCTION

Epiphora is one of the most common symptoms of nasolacrimal duct obstruction causing constant drivelling of tears down the cheeks. It is followed by discharge, swelling, pain and conjunctivitis. Inflammation of the lacrimal sac is termed as dacryocystitis which usually occurs due to obstruction in the nasolacrimal duct. This disease is more common in patients with poor personal hygiene.¹ Dacryocystitis is an unpleasant disease, as it causes constant watering and discharge. It is also a threat to the integrity of the eye by becoming the source of infection to orbital cellulitis and panophthalmitis.² Congenital Dacryocystitis occurs due to congenital blockage of the nasolacrimal duct, which results from incomplete

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from guardian of all the patients who were enrolled.

Inclusion criteria: Clinically diagnosed cases of congenital nasolacrimal duct obstruction (CNLDO) of the age group 0-4 years were included in the study.

Exclusion criteria:

1. Those patients who had received either topical or systemic antibiotics for the past one week.
2. Punctual or canalicular abnormality, H/o previous surgery, H/o faciomaxillary trauma or any facial deformity.
3. Age more than 4 years.

Collection of data: The materials for microbial examination were collected from patients under antiseptic and aseptic conditions. During collection of the samples it was ensured that the lid margins or the eyelashes were not touched by swab. Two sterile cotton swab sticks were taken for the purpose. Samples from the affected eye were taken either by applying pressure over the lacrimal sac and allowing the purulent material to reflux out through the lacrimal puncta or by lacrimal syringing with normal saline. Material that was collected was properly labelled with the patient's name, age, sex, type of specimen, date of collection and taken to the laboratory for gram staining, culture on 5% Sheep Blood agar, MacConkey's agar and Chocolate agar. The sensitivity of the bacterial isolates were tested by the Kirby-Bauer disc diffusion method as per the Clinical and Laboratory Standards Institute (formerly NCCLS) guidelines.

STATISTICAL ANALYSIS

Statistical analysis was done by using Statistical Package for Social Sciences (SPSS) version 20.0. A p (predictive) value of <0.05 was considered as a significant association between the variables which were tested. Microsoft word and excel were used to generate graphs, tables and charts.

RESULTS

In the present study 59 clinically diagnosed patients of congenital nasolacrimal duct obstruction of age group 0-4 years and both sexes were studied during two years period. The majority of the cases in our study were in the age group

of 0-1 year (67.80%) followed by the age group of 1-2 years (15.25%) and 2-3 years (10.17%). (Table 1)(fig 1) Congenital nasolacrimal duct obstruction was more common in males. Out of the 59 cases selected for our study, 32 (54.24%) were males and 27 (45.76%) were females.

In the present study, out of 59 cases, 35 (59.32%) cases were found culture positive and remaining 40.68% of cases were sterile. (Table 2)(fig 2)

In our series of 59 patients, most common bacterial isolate was Streptococcus Pneumoniae (27.12%) followed by Staphylococcus Aureus (15.25%). (Table 3)(Fig 3) The commonest bacterial isolate encountered was

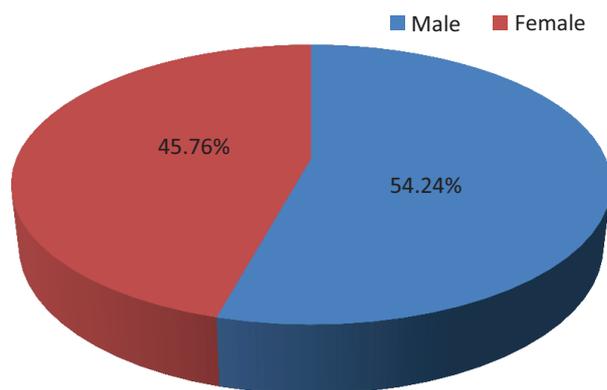


Figure 1: Sex distribution

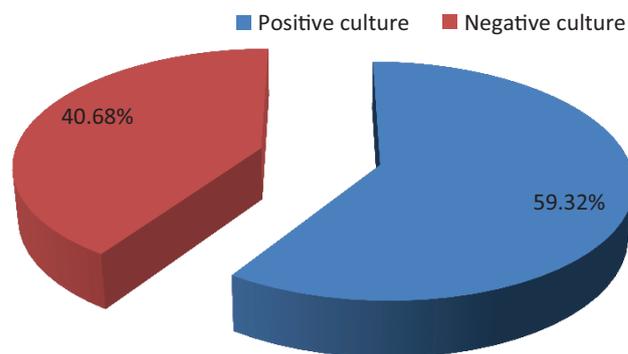


Figure 2: Distribution of culture positivity

Age	No. of patients	Percentage
0-1 Year	40	67.80
1-2 Years	9	15.25
2-3 Years	6	10.17
3-4 Years	4	6.78

Table-1: Age distribution

Organism	No. of patients	Percentage
Streptococcus Pneumoniae	16	27.12
Staphylococcus Aureus	9	15.25
Staphylococcus Albus	7	11.86
Citrobacter	2	3.39
Proteus Mirabalis	1	1.70
Sterile	24	40.68

Figure-2: Distribution of bacterial isolates.

Organism	No. of Cases	Ciprofloxacin	Tobramycin	Gatifloxacin	Moxifloxacin
Streptococcus Pneumoniae	16	11	15	14	13
Staphylococcus Aureus	9	6	8	7	7
Staphylococcus Albus	7	5	6	5	6
Citrobacter	2	2	2	2	1
Proteus Mirabalis	1	1	1	1	-
Total	35	25(71.42%)	32(91.42%)	29(82.85%)	27(77.14%)

Table-3: Antibiotic Sensitivity

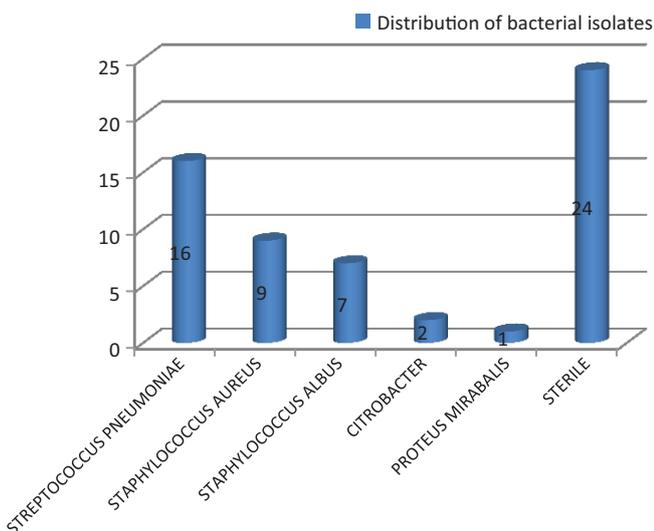


Figure-3: Distribution of bacterial isolates.

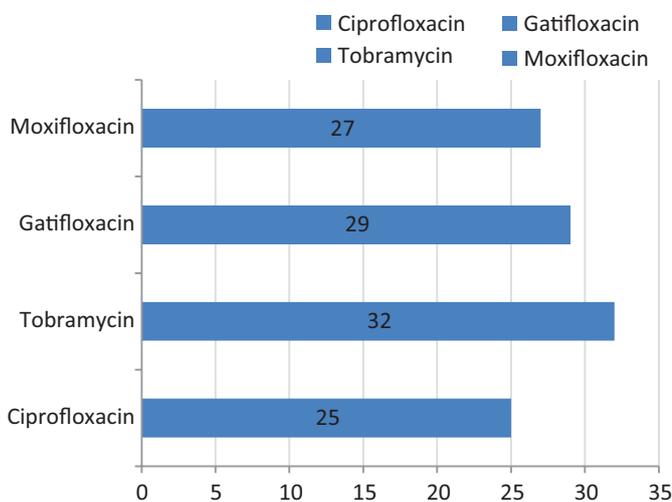


Figure-4: Distribution of Drug Sensitivity

Streptococcus pneumoniae, 16 cases (27.12%), followed by Staphylococcus aureus 9 cases (15.25%) and Staphylococcus albus 7 cases (11.86%). Out of 59 cases, 24 cases (40.68%) were sterile, were no bacteria was found.

Antibiotic sensitivity tests were done. Aminoglycosides, Tobramycin in particular, was most effective and most sensitive. Gatifloxacin was second most effective drugs among almost all bacteria in this study. Tobramycin eye drop was found to be sensitive in 91.42% of cases.

DISCUSSION

Congenital nasolacrimal duct obstruction (CNLDO) causes stagnation of fluid within the lacrimal system, which predisposes to secondary bacterial infection.¹⁰ The source of bacteria can be the normal inhabitants of the conjunctiva, the upper respiratory tract, the birth canal in case of neonate or a pathogenic organism that is usually absent under normal circumstances.^{11,12} There is a varied spectrum of its clinical presentations ranging from tenderness and erythema of the overlying tissues to a frank lacrimal abscess.¹³ The general trend in chronic dacryocystitis shows the culture positive rates ranging from 52.5% to 97.3% with isolation rates of gram-positive organisms ranging from 53.7% to 75% and

those of gram-negative organism from 25% to 37.4%.¹⁴ The majority of the cases of CNLDO were in the age group of 0-1 year (67.80%) followed by the age group of 1-2 years (15.25%), 2-3 years (10.17%) and 3-4 years (6.78%) respectively. Congenital nasolacrimal duct obstruction was more common in males (54.24%) as compared to females (45.76%). In the present study, out of 59 patients, 35 cases (59.32%) were culture positive among them most common organism was Streptococcus pneumoniae, 16 cases. This study revealed that in CNLDO, gram-positive organisms were most common bacterial isolates. Streptococcus pneumonia (27.12%) was found to be the most common Gram-positive organism, followed by Staphylococcus aureus (15.25%) and Staphylococcus albus (11.86%). 24 cases (40.68%) were sterile.

Pollard ZF in their study on a group of 25 patients of congenital nasolacrimal duct obstruction, concluded that Streptococcus pneumoniae (60%) was the most commonly occurring organism followed by Staphylococcus aureus (20%).¹⁵

Kuchar et al conducted their study on a group of congenital nasolacrimal duct obstruction patients and found 72.6% of the cultures to be positive, with Streptococcus pneumoniae (36.4%) being the leading bacterial isolates.¹⁶ Ghose et al and Usha et al also found similar results of culture and sensitivity tests in their study.^{17,18}

The most effective antibiotic against all organisms were Tobramycin (91.42%), followed by Gatifloxacin (82.85%) and Moxifloxacin (77.14%). Streptococcus pneumoniae showed 93.75% sensitivity to Tobramycin, 87.5% sensitivity to Gatifloxacin and 81.25% sensitivity to Moxifloxacin.

CONCLUSION

CNLDO is a serious problem that warrants careful evaluation, immediate treatment and close monitoring. Streptococcus pneumoniae was the common pathogen while Tobramycin and Gatifloxacin were the most effective drugs. Identification of the etiologic agent and antimicrobial susceptibility testing should be practiced to select the appropriate antimicrobial agent to treat ocular infections and prevent the emergence of drug resistant bacteria.

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