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Original Research Article

A clinicobacteriological study of dacryocystitis in children

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ABSTRACT

Background: Congenital Dacryocystitis occurs due to the congenital blockage of the nasolacrimal duct, which results from incomplete canalization of the nasolacrimal duct. It is a significant cause of ocular morbidity in children. When not treated early, complications such as recurrent conjunctivitis, acute on chronic dacryocystitis, lacrimal abscess and fistula formation can occur. It is also a threat to the integrity of the eye by becoming the source of infection to orbital cellulitis and panophthalmitis. In the era of antibiotic resistance, the microbiological workup of congenital dacryocystitis is very useful for subsequent treatment. Aim of the study was to determine the microbial profile of congenital dacryocystitis and the appropriate antimicrobial agents based on the sensitivity pattern of the isolated microorganisms.
Methods: A total of 25 clinically diagnosed cases of dacryocystitis in children less than 5 years of age attending the outpatient department were included in the study. 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: Culture positivity was noted as 56% in this study. It is observed that Gram-positive bacteria were the predominant isolates of 86%. The predominant organism isolated was Streptococcus pneumoniae 43%, followed by Staphylococcus aureus 29%, Staphylococcus epidermidis 14% and Pseudomonas aeruginosa 14%. All Gram-positive organisms were highly sensitive to Gatifloxacin and least sensitive to Ciprofloxacin. All Gram-negative organisms were highly sensitive to Tobramycin and least sensitive to Ciprofloxacin and Gentamicin.
Conclusions: *Streptococcus pneumoniae* was the common pathogen in congenital dacryocystitis. Gatifloxacin and Tobramycin are the most effective drugs. Microbial culture and sensitivity should be performed in all dacryocystitis cases. This would contribute to the choice of appropriate and effective antimicrobial agents.

Keywords: Chronic dacryocystitis, Epiphora, Microbiology, Nasolacrimal duct obstruction

INTRODUCTION

Inflammation of the lacrimal sac is known as dacryocystitis which usually occurs due to obstruction in the nasolacrimal duct. It has bimodal distribution affecting children less than 1 year and adults over 40 years of age.[1] It is a significant cause of ocular morbidity in children and adults. This disease is more common in patients with poor personal hygiene.[2] 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.[3,4]

Dacryocystitis can be classified as congenital and acquired. Congenital Dacryocystitis occurs due to

congenital blockage of the nasolacrimal duct, which results from incomplete canalization of the nasolacrimal duct especially at the valve of Hasner. It is also known as dacryocystitis neonatorum.[5] It is usually presented with epiphora in newborn develops seven days after birth. Later purulent discharge may develop resulting in matting of eyelashes. It is clinically diagnosed by a positive regurgitation test - when pressure is applied over the lacrimal sac area, there may be a mucoid or mucopurulent regurgitation through the puncta. Swelling over the sac area may appear.

Management of cases up to 6-8 weeks of age includes massage over the lacrimal sac area. It should be done at least 4 times per day. This should be followed by the installation of antibiotic drops. This method can cure 90% of infants.

When not treated early, complications such as recurrent conjunctivitis, acute on chronic dacryocystitis, lacrimal abscess and fistula formation can occur.[6] Untreated dacryocystitis will not undergo spontaneous resolution.[1]

There is a change in etiological agents causing dacryocystitis over time. In the era of antibiotic resistance, the microbiological workup of congenital dacryocystitis is very useful for subsequent treatment. So, knowing the range of the microorganisms causing dacryocystitis and their antibiotic sensitivity pattern in recent times may help in choosing the appropriate antimicrobial therapy. This approach, in turn, will prevent complications of dacryocystitis due to infection.

Aim of the study was to determine the microbial profile of congenital dacryocystitis and the appropriate antimicrobial agents based on the sensitivity pattern of the isolated microorganisms.

METHODS

This cross-sectional study was carried out in a tertiary care hospital in the department of paediatrics. This study was conducted from November 2014 to August 2015. A total of 25 clinically diagnosed cases of dacryocystitis of paediatric age group attending the outpatient department were included in the study.

Inclusion criteria

Children less than 5 years of age presenting with persistent epiphora from the first week of birth and regurgitation of serous, mucoid or mucopurulent material on pressure over the lacrimal sac area or on lacrimal syringing, presenting with pain, redness and swelling in the region of lacrimal sac were included in the study.

Exclusion criteria

The patients with the above symptoms who had received either topical or systemic antibiotics for the past week during their visit to the hospital were excluded from the study.

All cases of pseudo epiphora and epiphora caused by conditions other than nasolacrimal duct obstruction were excluded from the study. The samples were collected with the help of an ophthalmologist and sent for microbiological analysis.

A salient history was obtained from the patients before the collection of samples. Under strict aseptic precautions, samples were collected in two sterile swabs. Serous, mucoid or mucopurulent discharge obtained by syringing of the lacrimal sac or obtained on pressure over the lacrimal sac area was collected.

One swab was used for direct gram staining. The next swab was inoculated onto MacConkey agar plate, Blood agar plate and was incubated at 37ºC and on to chocolate agar plate and incubated at 5-10% CO_2 atmosphere at 37ºC for 24 hours. After 24 hours of incubation, the culture plates were observed for growth, the morphology of colonies and were subjected to Gram staining. If Gram staining shows Gram-positive cocci, catalase test, coagulase test and other standard biochemical reactions and tests were done. If Gram staining shows Gram-negative bacilli, catalase test, oxidase test, motility by hanging drop method and other standard biochemical reactions and tests were done.

If there was no growth at 24 hours, the plates were further incubated for another 24 hours. If no growth was observed after 48 hours of incubation the culture was considered as negative for aerobic bacterial growth. All the bacterial isolates obtained were subjected to antimicrobial susceptibility testing by using the Kirby-Bauer disc diffusion method.

Statistical analysis was done by using Statistical Package for Social Sciences (SPSS) version 20.0. Pearson Chi-square(X2) statistics were carried out, p-value <0.05 is considered as statistically significant.

RESULTS

In this study 25 paediatric cases diagnosed as congenital dacryocystitis were included. All the cases were clinically presented with tearing and mucopurulent discharge from the eye. Only 16% of cases presented with fever and 20% of cases presented with swelling over the lacrimal sac region (Figure 1).

Culture positivity was noted as 56% in this study and in 44% of cases, the culture was negative for bacterial growth. It was noted that there was no mixed growth in culture-positive cases. It is observed that gram-positive bacteria were predominant isolates (Figure 2).

Among the bacterial isolates, 86% were gram-positive bacteria and 14% were gram-negative bacteria (Figure 3).

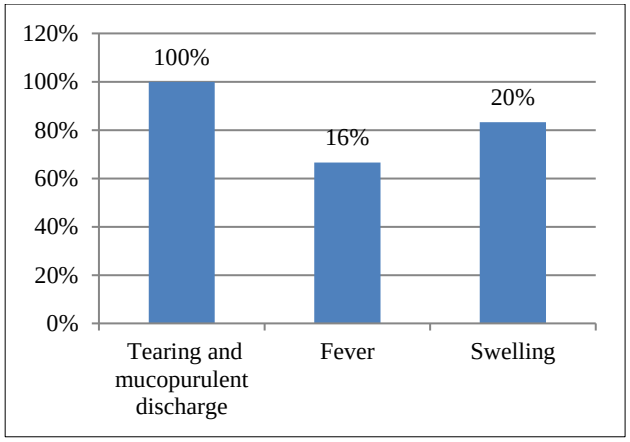

Figure 1: Distribution of sign and symptoms.

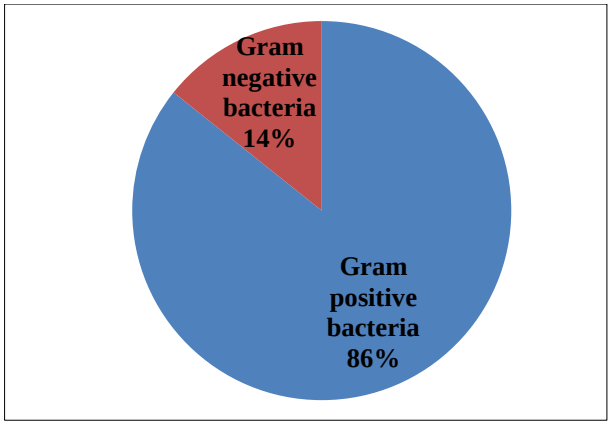

Figure 3: Distribution of gram positive and negative bacterial isolates.

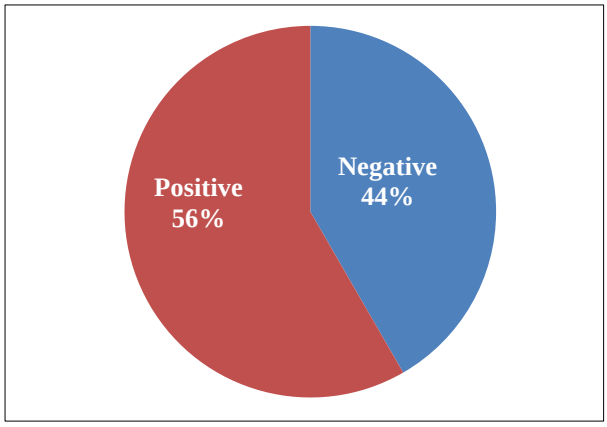

Figure 2: Distribution of culture positivity.

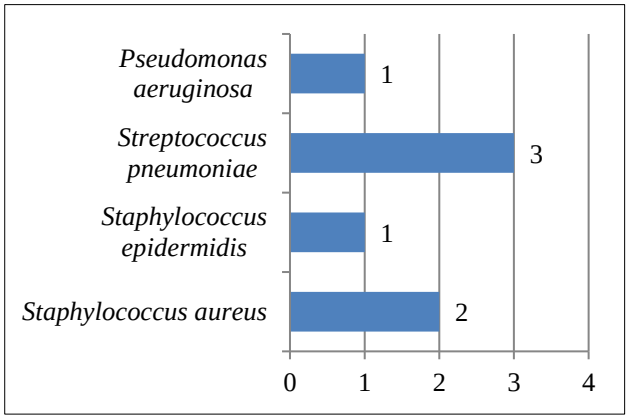

Figure 4: Distribution of bacterial isolates.

Table 1: Antibiotic sensitivity pattern of gram-positive bacterial isolates.

Antibiotic	*Staphylococcus aureus*	*Staphylococcus epidermidis*	*Streptococcus pneumoniae*
	Sensitivity %	**Sensitivity %**	**Sensitivity%**
Cefoxitin	100	100	-
Penicillin	50	50	-
Erythromycin	75	100	66.6
Ciprofloxacin	25	50	-
Gatifloxacin	100	100	100
Amikacin	50	50	-
Tobramycin	75	100	-
Oxacillin	-	-	100
TMP-SMX	-	-	33.3

It is observed that in this study, the predominant organism isolated was *Streptococcus pneumoniae* 43%, followed by *Staphylococcus aureus* 29%, *Staphylococcus epidermidis* 14% and *Pseudomonas aeruginosa* 14% (Figure 4). It is observed that, Gatifloxacin is a highly sensitive antibiotic against all Gram-positive organisms tested. Ciprofloxacin and Trimethoprim-Sulfamethoxazole were the least sensitive antibiotics against the Gram-positive organisms tested. Methicillin resistance was not detected among Staphylococci isolates. Tobramycin, Ceftazidime and Piperacillin-tazobactam were 100% sensitive and Ciprofloxacin and Amikacin were 50% sensitive to the Gram-negative

organisms tested. Gentamicin is resistant to all Gram-negative organisms tested (Table 1 and 2).

Table 2: Antibiotic sensitivity pattern of gram-negative bacterial isolates.

Antibiotic	Pseudomonas aeruginosa
	Sensitivity %
Amikacin	50
Gentamicin	0
Tobramycin	100
Ceftazidime	100
Ciprofloxacin	50
PT	100

DISCUSSION

Dacryocystitis is one of the most common infections of the eye. It can be congenital or acquired. Congenital dacryocystitis affects both sexes equally. There are multiple factors that play a role in acquiring infection of the lacrimal drainage system. The nasolacrimal system is lined by mucous lined tract contiguous with conjunctiva and nasal mucosa that are normally colonized with bacteria.[7,8]

Lacrimal apparatus is concerned with secretion and draining of tears, which keep the cornea moist and also protects against airborne pathogens and foreign bodies. Obstruction of the nasolacrimal duct results in stasis of tears, desquamated cells and mucous secretions above the level of obstruction which creates a fertile environment for secondary bacterial infection. Dacryocystitis is mostly caused by bacteria. The bacterial agents of dacryocystitis are variable in congenital and acquired cases. However, pathogens implicated in dacryocystitis are variable from place to place depending upon the local climate conditions. So it is very important to know the pathogens region-wise in management of this condition.[9]

Pediatric acute dacryocystitis (PAD) is a clinical diagnosis characterized by tenderness and inflammation of the medial canthal region over the lacrimal sac area with marked edema and erythema of the overlying skin and the presence of mucopurulent material or discharge within the lacrimal sac with or without reflux on sac pressure.8 Epiphora from ductal obstruction may or may not precede the infection depending on the age of onset, the virulence of the organism and if secondary to acquired etiologies. It occurs mostly as a complication of congenital nasolacrimal duct obstruction. The lacrimal sac may be distended and palpable. The patients are usually irritable and do not feed well. Constitutional symptoms like fever and leucocytosis are helpful in diagnosis but are not required. In addition, dacryoceles with PAD may have a history of a bluish cystic lesion and symptoms of respiratory distress in the presence of large intranasal cysts. Pediatric acute dacryocystitis may also evolve into a moderately well-defined lacrimal abscess with a positive fluctuation sign. The abscess may drain externally with a fistula formation or rarely may have internal drainage spontaneously or secondary to lacrimal sac compression. If untreated, PAD may progress to preseptal cellulitis (PSC) characterized by edema of the upper and lower eyelids without proptosis or restriction of extraocular movements.[10]

Bacterial cultures from the purulent discharge are commonly performed. These cultures can be obtained from the regurgitated sac contents, discharging fistula or occasionally intraoperatively from the abscess cavity. Rarely nasal discharge can be the source in cases of internal drainage. Care should be exercised to avoid sample contaminations from neighboring structures.[11]

There is a change in causative organisms of dacryocystitis over time. So, knowing the range of the microorganisms causing dacryocystitis and their antibiotic sensitivity pattern in recent times may help in choosing the appropriate antimicrobial therapy. In this study, all Gram-positive organisms were highly sensitive to Gatifloxacin and least sensitive to Ciprofloxacin. All Gram-negative organisms were highly sensitive to Tobramycin and least sensitive to Ciprofloxacin and Gentamicin. The reason for resistance to Ciprofloxacin and Gentamicin might be due to the routine use of these antibiotics for all ocular infections in our population.[12]

CONCLUSION

Dacryocystitis poses a constant threat to the cornea and orbital soft tissue. There is a change in etiological agents causing dacryocystitis over time. It is a serious infection that warrants careful evaluation, immediate treatment, and close monitoring. Complications though uncommon may need a multidisciplinary approach. Management challenges in the pediatric age group are distinct but the outcomes are good if one adheres to the well laid down standard protocols. Microbial culture and sensitivity when performed in samples from all the patients having dacryocystitis are useful. This would contribute to the choice of appropriate and effective antimicrobial agents.

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REFERENCES

1. Sihota R, Tandon R. Parson's Diseases of the Eye. 22nd edition. New Delhi: Elsevier; 2015:475-478.
2. Patel K, Magdum R, Sethia S, Lune A, Pradhan A, Misra RN. A clinico-bateriological study of chronic dacryocystitis. Sudan J Ophthalmol. 2014 Jan 1;6(1):1-5.
3. Shwetha BA, Nayak V. The bacteriological study of chronic dacryocystitis. IOSR J Dent Med Sci. 2014;13:30-6.

4. Yanoff M, Duker JS. The lacrimal drainage system. Chapter-98, In: Ophthalmology, 2nd Edn. Mosby Publication. 761-769.
5. Gupta AK, Raina UK, Gupta A. Textbook of Ophthalmology. New Delhi: BL Churchill Livingstone; 1998:274-276.
6. Khurana AK. Comprehensive Ophthalmology.4th edition. New Delhi: New Age International (P) Ltd; 2007:369-372.
7. Campollataro BN, Leuder GT, Tychsen L. Spectrum of pediatric dacryocystitis: medical and surgical management of 54 cases. J Pediatr Ophthalmol Strabismus.1997;34:143-53.
8. Riser RO. Dacryostenosis in children. Am J Ophthalmol. 1935;18:1116-22.
9. Hurd AC. Congenital dacryostenosis. J Maine Med Assoc.1955;46:12-4.
10. Faden HS. Dacryocystitis in children. Clin Pediatr. 2006;45:567-9.
11. Bareja U, Ghose S. Clinicobacteriological correlates of congenital dacryocystitis. Indian J Ophthalmol. 1990;38:66-9.
12. Usha K, Smitha S, Shah N, Lalitha P, Kelkar R. Spectrum and the susceptibilities of microbial isolates in cases of congenital nasolacrimal duct obstruction. J Am Assoc Pediatr Ophthalmol Strabismus. 2006 Oct 1;10(5):469-72.

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