ORIGINAL ARTICLE

MICROBIOLOGIC SPECTRUM OF ACUTE AND CHRONIC DACRYOCYSTITIS

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ABSTRACT

Introduction: The aim of this study is to report the microbiological spectrum of dacryocystitis and the antibiotic sensitivity patterns of the organisms. It was a prospective study done at Department of Ophthalmology, Dr. D. Y. Patil Medical College and Hospital, Pimpri, Pune in 2015 on 42 cases of dacryocystitis.

Methodology: Patients were diagnosed with dacryocystitis and on the presence of a pus-filled lacrimal sac and peri lacrimal tissues for acute dacryocystitis. Chronic dacryocystitis patients were diagnosed by ROPLAS Test and sac syringing and were reviewed for demographic and microbiological profile.The culture results, organisms isolated, and their antibiotic sensitivity were studied.

Results: In this study 42 clinical samples were evaluated, among them 33(78.5%) were culture positive and rest were reported as no growth 9(21.5%). Among all positive growth, Staphylococcus aureus encountered as the commonest isolate (56%) followed by Streptococcus pneumoniae (2%) among the Gram-positive organisms .In the Gram-negative organisms, Escherichia coli (23%) followed by Pseudomonas aeruginosa (17%) was seen. Gram-positive organisms were commonly sensitive to flouroquinolones, penicillins and vancomycin whereas gram-negative organisms were sensitive to aminoglycosides.

Conclusion: Gram-positive and Gram-negative organisms were predominant in this study. The result has significant bearing on the treatment of patients and also when mass cataract surgeries are being performed.

Keywords: Epiphora, Dacrocystitis, Bacteriology

INTRODUCTION

The mucosa of the lacrimal sac is known to be very resistant to infection. However, this resistance is compromised by distal obstruction of the nasolacrimal duct[1] and causes infection of the lacrimal sac. Dacrocystitis might present in two forms. Acute dacryocystitis is an acute inflammation of the lacrimal sac and presents as tenderness and erythema of the overlying tissues and 23% of eyes might present with lacrimal abscess[1,2]. Chronic dacryocystitis is not only more common than acute dacryocystitis but also has several stages of presentation like epiphora, mucoid discharge, conjunctival hyperaemia and chronic conjunctivitis[1]. This different presentation may be because of geographical variation in the microbiology of acute and chronic dacryocystitis and also different nasal pathologies which seem to play a crucial role in developing dacryocystitis.[3,4]

There has been growing noise about changing trends in the microbiologic spectrum of dacryocystitis and where initial studies have shown Gram positive isolates predominantly in most studies, some recent studies suggested an increasing frequency in gram negative organisms.[5]

Knowledge of the presence of nasolacrimal obstruction and the potential organisms inoculated is therefore of paramount importance before planning any intraocular procedure because of the potential risk of endophthalmitis especially in a country like India where we still need to fill a huge lacunae in the number of cataract surgeries.

METHODOLOGY

This is a prospective study and we included patients with acute and chronic dacryocystitis who underwent microbiological evaluation presenting between 1st May 2015 to 30th June,2015 at Dr D Y Patil Medical College, Pimpri,Pune.

The study was performed with the agreement of ethics committee and in accordance with the ethical guidelines of the hospital. Written informed consents were obtained from all participants.

Patients were examined by an ophthalmologist, and cases of dacryocystitis were identified and categorized as acute or chronic, based on their history, signs and symptoms. Acute dacryocystitis was diagnosed in patients with pain, redness, and swelling in the lacrimal sac area(Fig1). Chronic dacryocystitis was diagnosed

in patients with persistent epiphora and regurgitation of mucoid or mucopurulent material on pressure over the sac area or during irrigation of the lacrimal drainage system.

All cases of pseudoepiphora and epiphora caused by diagnoses other than nasolacrimal duct obstruction, patients with any history of previous infection, maxillofacial surgery, or maxillofacial trauma and the patients who had received any topical or systemic antibiotics for the past one week during their visit to the hospital were excluded.

Procedure of Sample Collection: The collection of the samples was performed by applying pressure over the lacrimal sac and allowing the purulent material to reflux through the lacrimal punctum, or by irrigating the lacrimal drainage system with sterile saline and collecting the sample from the refluxing material. The samples were collected with sterile cotton wool swabs, ensuring that the lid margins or the conjunctiva were not touched(Fig 2**).** The first swab was used for Gram staining and potassium hydroxide mount and second was immediately inoculated into culture media like blood agar, chocolate agar, MacConkey, Nutrient agar, Sabaurauds Dextrose Agar(Fig 3). Blood agar and chocolate agar were incubated at 37°C, while SDA was incubated at 25°C. The plates were observed daily for the presence of any growth up to 7d. The isolated organisms were identified by using standard procedures. Colony characteristic was noted down. Gram staining was done to identify whether the organism grown was Gram-positive or Gram-negative. The organisms were further identified to genus and species level depending on motility and biochemical reaction. Also antibiotic susceptibility testing was done.

Antimicrobial Susceptibility Tests: The standardized Kirby-Bauer disc diffusion test of the Clinical and Laboratory Standards Institute was used for testing. The media used was Muelle rHinton agar for non-fastidious organisms. 5% Sheep Blood agar was added to Mueller-Hinton agar for fastidious organism and it was read after 16-18 hours. Inoculum turbidity was adjusted to 0.5 McFarland turbidity tube. A lawn culture was made on the surface of medium using sterile cotton swabs and antimicrobial discs were applied. The plates were incubated for 18-24 hours for non-fastidious and under 5% CO2 for 24-48 hours at 37 degree Celsius for fastidious organisms. The zone of inhibition was measured and reported as susceptible or resistant. For detection of Methicillin resistant Staphylococcus aureus, oxacillin disc (10 microGram) was used on Mueller-Hinton agar containing 2% sodium chloride.

Statistical Analysis: Chi-square (χ^2) distribution was used to test the qualitative distribution. A pvalue <0.05 was considered as a significant association between the variables which were tested.

RESULTS

The result depicts that majority of cases were in age group of 50-60 years followed by 40-50 and 60-70 i.e. 45.23%,38.11%, 16.66% respectively.(Table 1)

Table 1: Age wise distribution of study participants (N=42)

Age(years)	No.(%)
40-50	16 (38.11)
50-60	19 (45.23)
60-70	7 (16.66)

It was observed that females 27(64.3%) were more affected than males 15 (35.7%). Out of 42 patients, 33(78.6%) had positive growth and 9(21.4%) had no growth. Out of 33 positive isolates, 21(63.63%) were Gram-positive and 12(36.36%) were Gram-negative.

Table 2: Growth Pattern wise distribution of cases in study group (N=42)

Growth	No. (%)
Yes	**33 (78.6)**
Gram Positive	21 (50.0)
Gram Negative	12 (28.6)
No	**9 (21.4)**

Table 3 shows that most common organism isolated was staphylococcus aureus ,positive 18cases(55%), followed by E. Coli positive in 7 cases(21%), followed by Pseudomonas aeruginosa positive in 5 cases(15%), followed by streptococcus pneumonia positive in 3 cases(9**%)**

Table 3: Percentage of organisms isolated (N=33)

Organism Isolated	No. (%)
Staphylococcus Aureus	18 (55)
Escherichia Coli	7 (21)
Pseudomonas Aeruginosa	5 (15)
Streptococcus Pneumoniae	3 (9)

DISCUSSION

DACRYOCYSTITIS is an infection of lacrimal sac secondary to obstruction of nasolacrimal duct. In our study majority of patients were in the age group of 50-60(43.2%) followed by 40-50(38.2%), and 60-70(16.6%). Madhusudhan et al [6] 2005-10 had an average age of 46.5 years in their study. Prakash R. et al [7] in 2012 studied 86 patients of both congenital and acquired dacryocystitis. Of 86 patients majority (35%) were in the age group of 4-60 years, of which most were in between ages 31-45years.

Table 4: shows the noted antibiotic sensitivity pattern of isolates

Antibiotic	Staphylococcus Aureus	Escherichia Coli	Pseudomonas Aeruginosa	Streptococcus Pneumoniae	Total
Ciprofloxacin(5mcg/disc)	14		2	1	17
Cefuroxime	10			1	11
Gentamycin(10mcg/disc)	4	1	3	3	11
Erythromycin(15mcg/disc)	7			1	8
Cotrimazole(25mcg/disc)	6				6
Ofloxacin (5mcg/disc)	1			1	2
Azithromycin(15mcg/disc)					0
Amikacin(30mcg/disc)	2	1	1	1	5
Cefotaxim(30mcg/disc)			1		1
Vancomycin(30mcg/disc)	7			2	9
Clindamycin(2mcg/disc)	10	2		1	13
Amoxycillin(20/10mcg/disc)					0
Oxacillin(1mcg/disc)	5				5
Imipenem(10mcg/disc)		4	2		6
CAT(30/10mcg/disc)		5	4		9
Norfloxacin(5mcg/disc)		1	1		2
Ampicillin(10mcg/disc)		1	1		2
CAC(30/10mcg/disc)		2	1		3
Total	**66**	**17**	**16**	**11**	**110**

Table 5: Resistance pattern of Bacteriological isolates

Antibiotic	Staphylococcus Aureus	Escherichia Coli	Pseudomonas Aeruginosa	Streptococcus Pneumoniae	Total
Ciprofloxacin	4			1	5
Cefuroxime	8	5	2		15
Gentamycin	1	3			4
Erythromycin	10				10
Cotrimoxazole	1	1			2
Ofloxacin	1			2	3
Azithromycin					0
Amikacin		1			1
Cefotaxim		1			1
Vancomycin					0
Clindamycin	5	1		1	7
Amoxycillin	1				1
Oxacillin	9	1			10
Imipenem			1		1
CAT			1		1
Norfloxacin		3	1		4
Ampicillin	1	1			2
CAC	1	1	2		4
Total	**42**	**18**	**7**	**4**	**71**

Our study is more or less comparable to theirs having 38.2% of cases under the age group of 40-50 years. Slight variation maybe due to the geographical and living conditions of the patients and their occupation. The study was predominant by female subjects (64.3%) as compared to male subjects (35.7%). The female to male ratio was 1.8:1 which correlated with the findings of Assefa et al in which the female preponderance was 62.7%.

In the present study chronic dacryocystitis was the most frequently encountered clinical type (76.2%) followed by acute dacryocystitits (23.8%) and no case of congenital dacryocystitis. This was probably because of limitation of time and lower incidence of congenital dacryocystitis. This was more or less similar to the study carried out by Prakash et al [7] in which 63.7% cases were of chronic dacryocystitis followed by 25% of acute dacryocystitis and 11.25% of congenital dacryocystitis. The most common Gram-positive organisms isolated worldwide include Staphylococcus aureus (worldwide), Streptococcus pneumoniae (Africa), and S. epidermidis (USA). Among the Gram-negative isolates, there is a variable predominance like that of Haemophilus influenzae (Middle East), Pseudomonas aeruginosa (North India and USA), Escherichia coli (Europe), and Corynebacterium diphtheriae (China). Sun et al.[8] from China and Brook and Frazier [9] from USA, although reported Staphylococcus isolation as the most common, however, found fungus in

8% (n = 100) and 5% (n = 62) of their isolates, respectively. With Staphylococcus aureus being the commonest isolate across most studies, focus has been on the increasing incidence of community-acquired methicillin-resistant Staphylococcus aureus and the challenges it is likely to post in the future in terms of antibiotic resistance and treatment. Microbiologic spectrum of acute dacryocystitis has been studied in 23 patients by the American Society of Ophthalmic Plastic and Reconstructive Surgery ASOPRS [10], and it was found that 78.3% of the isolates were Gram-positive and 21.7% were Gram-negative. Among the Gram-positive isolates, Staphylococcus aureus was the most common organism noted, accounting for 50% of all the Gram-positive isolates. Among the Gram-negative organisms, there was no preponderance of any organism with equal incidence of isolates of Pseudomonas aeruginosa, Fusobacterium, and Stenotrophomonas maltophilia.

In our study 42 clinical samples were evaluated, among them 33(78.5%) were culture positive and rest were reported as no growth 9(21.5%). Among all positive growth, Staphylococcus aureus encountered as the commonest isolate (56%) followed by Streptococcus pneumoniae (2%) among the Gram-positive organisms and in the Gram-negative organisms, Escherichia coli (23%) followed by Pseudomonas aeruginosa (17%). As it has been also common in many of similar studies, Gram-positive bacteria accounted for higher isolation rate (63.3%) with comparability of Kebede et al. [11] reported in Addis Ababa, Ethiopia which showed 62.6% Gram-positives and 37.4% Gram-negatives and Prakash et al. [2] which showed of 94 isolates, 61 (64.89%) were Gram-positive organisms and 33 (35.11%) were Gram-negative organisms. Interestingly, the current findings and previous reports by Kebede et al. were also in line with most similar studies.[11,12] However, unlike the ASOPRS group, our Gram-negative profile was very different with Escherichia coli and Pseudomonas aeruginosa, accounting for 23% and 17% of all the Gram-negative isolates, respectively (n=12).

The antibiotic susceptibility pattern varies from region to region community. This is because of emergence of resistant strains as a result of indiscriminate use of antibiotics. In our study most of the isolates of Staphylococcus aureus were sensitive to ciprofloxacin (82.9%), followed by cefuroxime (60.9%) and clindamycin (58.5%). In case of Streptococcus pneumoniae, gentamycin shows highest sensitivity (100%) followed by vancomycin (66.6%). The sensitivity among Escherichia coli were highest for ceftazidime-tazobactum (CAT) (70.1%), followed by imipenem (64.1%). Most of the isolates of Pseudomonas aeruginosa showed utmost sensitivity to ceftazidime-tazobactum (CAT) (80%) followed gentamycin (60%). Unexpectedly a single isolate was resistant to Amoxycillin and Ampicillin, as a result, the emergence of amoxicillin and ampicillin resistance Staphylococcus aureus in this teaching hospital may pose therapeutic problems, and therefore the empirical antibiotic treatment should be avoided and rather performing antimicrobial susceptibility testing is highly needed.

In this study, the limitations were time and the number of patients. For better outcome, a larger study population should be undertaken for a longer period of time, to know the microbiology and to select effective drugs of choice for dacryocystitis.

REFERENCES

1. Ali MJ, Joshi SD, Naik MN, Honavar SG. Clinical profile and management outcome of acute dacryocystitis: two decades of experience in a tertiary eye care center. Semin Ophthalmol. 2015 Mar;30(2):118-23.
2. Ali MJ, Motukupally SR, Joshi SD, Naik MN. The microbiological profile of lacrimal abscess: two decades of experience from a tertiary eye care center. J Ophthalmic Inflamm Infect. 2013;3(1):57.
3. Mills DM, Bodman MG, Meyer DR, Morton AD., 3rd ASOPRS dacryocystitis study group The microbiologic spectrum of dacryocystitis: a national study of acute versus chronic infection. Ophthal Plast Reconstr Surg. 2007;23(4):302–306.
4. Bharathi MJ, Ramakrishnan R, Maneksha V, Shivakumar C, Nithya V, Mittal S. Comparative bacteriology of acute and chronic dacryocystitis. Eye (Lond) 2008;22(7):953–960.
5. Chaudhry IA, Shamsi FA, Al-Rashed W. Bacteriology of chronic dacryocystitis in a tertiary eye care center. Ophthal Plast Reconstr Surg. 2005;21(3):207–210.
6. Madhusudhan, Yanti Muslikan, Nabilah Ismail, Adil Hussein. Microbiological aetiology of acute dacryocystitis Sains Malaysia, Kelantan Malaysia. Journal of Acute Disease (2012):31-34
7. Prakash R., Girish Babu R.J., Nagaraj E.R., Prashanth H.V., JayashreeS. Shah A Bacteriological Study of Dacryocystitis Journal of Clinical and Diagnostic Research. 2012 May (Suppl-2), Vol-6(4): 652-655
8. Sun X, Liang Q, Luo S, Wang Z, Li R, Jin X. Microbiological analysis of Chronic dacryocystitis. Ophthalmic Physiol Opt. 2005 May;25(3):261-3.
9. Brook I, Frazier EH. Aerobic and anaerobic microbiology of dacryocystitis.. Am J Ophthalmol 1998; 125(4): 12.
10. Mills DM, Bodman MG, Meyer DR, Morton AD 3rd, ASOPRS Dacryocystitis Study Group. The microbiologic spectrum of dacryocystitis: a national study of acute versus chronic infection. Ophthalmic Plast ReconstrSurg.2007;23(4):302–6
11. Kebede A, Adamu Y, Bejiga Y. Bacteriological study dacryocystitis among patients attending in Menelik Hospital, Addis Ababa, Ethiopia. Ethiop Med J. 2010 Jan; 48(1):2933 13.
12. Mandal R, Banerjee AR, Biswas MC, Mondal A, Kundu PK, Sasmal NK. Clinicobacteriological study of chronic dacryocystitis in adults. J Indian Med Assoc. 2008;106(5):296–8