Original Research Article

Microbial study of the lacrimal sac and its contents in patients of chronic dacryocystitis of the adult and the paediatric age group in a tertiary care hospital, Kishanganj, Bihar, India

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Abstract

Background: The disease entity of chronic dacryocystitis has numerous causes. The causes may be bacterial, fungal or mixed infections. Predominantly staphylococcus aureus and streptococcus pneumoniae and candida spp were isolated. Mixed infections and polymicrobial infections are challenging. MDR bacteria, random use of antibiotics and different corticosteroid combinations invites fungus, complicating the treatment and worsening the prognosis. Hence, early diagnosis and treatment following sensitivity report remains the key to success. **Objectives:** The current prospective study was undertaken to detect causative microorganisms and bacteriological suceptibility pattern in chronic dacryocystitis. **Methods:** The present study was conducted jointly by the Department of Ophthalmology and Microbiology of MGM medical college, Kishanganj, Bihar. Total of 100 patients – 80 adults and 20 paediatrics were taken up in the present study, during the period of one year. **Results:** It was observed that out of 100 patients 88 were culture positive. Staphylococcus aureus, CONS and streptococcus pneumoniae amongst gram positive organisms and E. Coli and Klebsiella pneumoniae amongst gram negative organisms were predominantly isolated. Anaerobic peptostreptococcus was noticed in mixed infections with gram negative aerobic organisms. Vancomycin, Teichoplanin, Quinolone groups, Cotrimoxazoles were recommended for MRSA and cephalosporin inhibitor combinations, Penems, Quinolones, and Aminoglycosides were recommended for ESBLs producing gram negative infections. Colistin, Polymyxin and combination therapies were given preference in MDR Pseudomona infections. **Conclusion:** Conservative treatment of Chronic dacryocystitis is often complicated by drug resistant organisms. Presence of anaerobic bacteria mixed with aerobic bacteria and aerobic bacteria mixed with non-albicans candida often affects therapeutic goal.

Key Word: Chronic dacryocystitis, mixed infection, Sensitivity pattern, Antibiotic protocol.

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INTRODUCTION

Dacryocystitis is a common ocular infection, There is inflammation of lacrimal sac due to obstruction of nasolacrimal duct. This may be congenital or acquired.[1] Both this types may present in the acute or chronic form. It is a significant cause of ocular morbidity.[2] Complications like orbital cellulitis, panopthalmitis and corneal ulcers may occur and all of which ultimately lead to severe visual loss. The present study was conducted in MGM Medical college and LSK Hospital, Kishanganj, Bihar jointly by the department of *Ophthalmology and Microbiology*. The aim of this study was to identify microorganisms pattern with AST and formulating treatment protocol for this tertiary care hospital at Kishanganj as mixed bacterial and bacterial-fungal infections are increasingly identified in chronic dacryocystitis patients. Multiple bacterial infections in chronic dacryocystitis was seen in16.39% of patients in one study[3].Invasive *candida* species and emergence of mould fungal infections also pose a challenge in outcome of the patients diagnosis and treatment. A study where fungus was isolated in dacryocystitis associated with dacryoliths, raised the

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question of possibilities of fungal infection which is to be evaluated.[4] Emergence of antifungal drug resistance even in the so-called susceptible *C. albicans and C. tropicalis* is a matter of worry now. Non –albicans Candida like Candida Lusitanae was isolated in chronic dacryocystitis in a study. Whether this infection was primary or occurred as a result of prolonged antibiotic therapy has to be searched out[5.]Hence immense importance should be given on proper diagnosis and AST along with antibiotic protocol formulations.

MATERIAL AND METHODS

The study was conducted during the period 1st August, 2016 to 31st July, 2017. Total of 100 patients who were clinically diagnosed to have chronic dacryocystitis, 80 adults and 20 paediatrics patients were included in this study. In the preceding year, before the study period, total of 115 patients of chronic dacryocystitis were diagnosed of which 90 were adults and 25 were children. With that assumption 100 patients were included in this study. Ethical clearance was obtained from Institutional ethics committee before conducting the study The patients presenting with pseudoepiphora, those who received treatment within 1 week of presentation to eye OPD, and those patients who were below 5 years of age were excluded from this study. Thus, the patients(both adult and pediatric) who had completed 3 weeks of antibiotic or antifungal therapy, ending at least one week before the study period with no resolution of symptoms were included in the study. The patients taking regular antibiotics or antifungal drugs during the process of sample collection were excluded from the study. The patients were subjected to work up as detailed below. Detailed history were taken regarding watering from eyes including onset, duration, exacerbations and remissions and associated ocular features like redness, stickiness and pain and so on. The ocular examination was done by *slit lamp biomicroscopy* to assess anterior segment. This was followed by syringing of both nasolacrimal ducts under topical anaesthesia with 4% xylocaine[6.]The patients who presented still with blocked nasolacrimal ducts (NLD) were subjected to general medical check up for fitness to undergo surgery under local anaesthesia Paediatrics patient underwent pre anaesthetic check up in the anaesthesiology dept. The patients were divided into two groups for the purposes of surgery. The first group included Paediatric patients and adults upto the age of 60 years. This group underwent *dacryocystorhinostomy (DCR*) surgery[7.] The second group included patients above the age of 60 years. This group underwent *dacryocystectomy(DCT*) surgery[8] The paediatrics patient underwent DCR surgery under G[9],all the adult patients underwent DCT or DCR surgery under regional block with sedation. The lacrimal sac and its content were collected in sterile vials supplied by microbiology dept. These vials were sent with requisite papers to microbiology dept. In the microbiology dept, the samples were processed and inoculated into blood agar, chocolate agar, MacConkey's agar, SDA agar and chrome agar. The tissue were minced and duly inoculated in duplicate on selected media. Samples were kept at RT and BOD. The whole procedure were done aseptically in biosafety cabinet. From the positive Culture, material were examined under KOH preparation, Gram Staining, Z-N staining for identification. Biochemical test were undertaken for identification upto species level. Antibiotic sensitivity test were done by K-B Disc diffusion method and confirmed by Vitek -2 automated system from a NABL accredited laboratory. All the result were pooled together and subjected to statistical analysis to draw appropriate conclusions.

Statistical analysis: The collected data were thoroughly screened and entered into Excel spreadsheets and analysis was carried out. The procedures involved were transcription, preliminary data inspection, content analysis, and interpretation. SPSS 11.0 was used to calculate proportions, and significance test was used in this study. One sample proportional Z test was applied and P value was calculated.

RESULTS

Total of 100 samples from 100 patients were collected and analysed.12 patients were found to be othsmear and culture negative.88 patients were both smear and culture positive. Amongst the 12 culture negative patients 4 belongs to paediatric age group,3 were adult males and 5 were adult female. Amongst the culture positive samples, *staphylococcus aureus* infection was detected in 25 patients and *CONS* in 10 patients, 12 patients yielded *streptococcus pneumonae*. *E.Coli and Klebsiellae pneumoniae* detected in 10 and 7 patients respectively and 3 patients yielded P*seudomonas aeruginosa*. Mixed bacterial infections detected in 4 patients. Amongst this four patients, in 2 patients *Staph aureus and Moraxella catarrhalis* were identified and in remaining 2 patients *E coli*and *Peptostreptococcus anaerobicus* were detected. Fungi were isolated among 17 patients of which 13 were positive for *candida* species, 3 were positive for *aspergillussp*, 1 was positive for *curvularia spp*. Microorganisms of mixed infections cases were subjected to AST individually as per Gram Positive or Gram Negative panels. Gram positive bacterial infections were commonest. *MRSA* strain detected in 30 patients out of 47. VISA in 4 cases and VRSA in 1 case was detected. ESBLs were noticed among 15 patients out of 20 patients. All 3 patients of *Pseudomona* infections were POS and COS MDR strains.

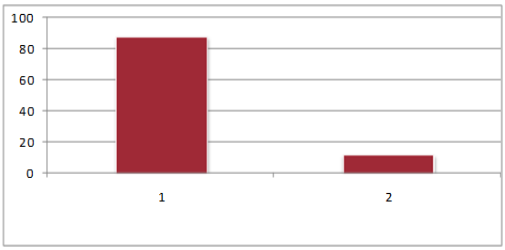

Figure 1: Showing ratio of culture Positive and culture Negative patients.

Table 1: Results of Smear and culture

		Z value (Proportional Z test)	P value
Culture and smear positive	**88%**	**7.6**	<0.0001 **Statistically significant**
Culture and smear negative	**12%**		
Total	**100%**		

Table 2: Frequency study-Age group wise -distribution of smear and culture negative patients.

Paediatric patients	**04**
Adult males	**03**
Adult females	**05**
Total	**12**

Table 3: Showing NOs of bacterial and fungal isolates (Out of total smear and culture positive patients) total smear and culture positive patients)

		Z value (Proportional Z test)	P value
Bacterial isolates	**71**	**5.6**	<0.0001 **Statistically significant**
Fungal isolates	**17**	**5.8**	<0.0001 **Statistically significant**
Total	**88**		

Table 4: Proportion among the bacterial isolates

		Z value (Proportional Z test)	P value
Single isolate	**67**	**7.7**	<0.0001 **Statistically significant**
Mixed infection	**04**	**7.6**	<0.0001 **Statistically significant**
Total	**71**		

Table 5: Proportion among the single bacterial isolates.

		Z value (Proportional Z test)	P value
Staph aureus	**25**	2.1	<0.0001 **Statistically significant**
CONS	**10**	**5.9**	<0.0001 **Statistically significant**
Strep pneumoniae	**12**	**5.4**	<0.0001 **Statistically significant**
E coli	**10**	**5.9**	<0.0001 **Statistically significant**
Klebsiella pneumoniae	**07**	**6.5**	<0.0001 **Statistically significant**
P aeruginosa	**03**	**7.5**	<0.0001 **Statistically significant**
Total	**67**		

Table 6: Proportion among the mixed bacterial isolates.

Staph aureus and moraxella	**02**
E Coli and peptostreptococcus anaerobicus	**02**
Total	**04**

Table 7: No of drug resistant strain amongst Gram positive organisms.

MRSA	**28**
VISA	**04**
VRSA	**01**
Total	**33**

Table 8: No of drug resistant strain among gram negative organisms.

Category	**no**
ESBL	**13**
MDR pseudomonas	**03**
Total	**16**

Table 9: Frequency of Drug resistance among bacterial isolates..

Total drug resistant strains	**49**
Total bacterial isolates	**71**
Percentage of drug resistant strains	**69.01%**

When age wise distribution was seen, amongst the culture positive patients, 16 were in paediatric age group(6 males and 10 females) and amongst the rest adults, 27 were males and 45 were females. It was observed that ,amongst the bacterial isolates 36 were positive for *staphylococcus aureus*(10 male adults,20 female adults,2 male children and 4 female children).22 culture were positive for *streptococcus pneumoniae*(9 male adults,10 female adults,1 male child and 2 female child).7 culture positive went in favour of *Klebsiella pneumonia*(3 male and 4 female adults).3 culture positive sample identified as *pseudomona aeruginosa*(1 male and 2 female child) Of the culture positive cases, in paediatric age group 1 male and 2 female child were positive for fungus. *Non-albicanscandida* spp was isolated in 1 female and male child and one female child was positive for *aspergillus flavus*. In case of adult fungal culture positive cases 3 males and 8 females were positive for *candida spp*. while 1 male and 1 female were positive for *aspergillus flavus* spp. 1 female was positive for curvularia sp.

Table 10: Frequency of agewise distribution of fungal isolates

Children	03
Adults	14
Total	**17**

Table 11: No of different fungal isolates in children.

Fungal strain	**male**	**female**	**total**
Non albicans candida	**01**	**01**	**02**
Aspergillusspp	**00**	**01**	**01**
Grand total	**01**	**02**	**03**

Table 12: No of different fungal isolates in adult.

Fungal isolates	**male**	**female**	**total**
Candida albicans	**01**	**02**	**03**
Candida non albicans	**02**	**06**	**08**
Aspergillusflavus	**01**	**01**	**02**
Curvulariaspp	**00**	**01**	**01**
Grand total	**04**	**10**	**14**

In the Antibiotic sensitivity test staphylococcus aureus was found to be sensitive to *gatifloxacin, chloramphenicol and tobramycin, Vancomycin, penems* and intermediate sensitive to *erythromycin*and *Gentamycin. Streptococcus pneumonia* was uniformly sensitive to *tetracycline, chloramphenicol* and *gatifloxacin* and*tobramycin, erythromycin and penicillin*. *Klebsiella pmeumoniae* were sensitive to ciprofloxacin and Intermediate sensitive to *tobramycin*. *Pseudomona aeruginosa* showed sensitivity to colistin and polymyxin B only. The organism *peptostreptococcus* is anaerobic hence sensitivity test was not conducted. Moraxella was found sensitive to *co -trimoxazole.*

DISCUSSION

It was observed in this study that staphylococcus aureus was the predominant amongst the gram-positive cocci *while E. Coli and klebsiella pneumoniae* was predominant amongst gram negative bacilli. These findings were statistically significant (vide table5). This finding is in accordance with previous studies[10,11]. Children were more affected by P*seudomonas aeruginosa* perhaps on account of their low immunity as compared to adults. This finding was also statistically significant (vide table 5). The incidence of Drug resistant bacterial isolates in this study was 69.01%.This could have been due to irregular therapy by the patients and therapy by quacks in a region of low literacy rate and low awareness. However mixed bacterial infection was noted in 4 out of 71 isolates(5.63%),which was statistically significant(vide table 4). Amongst the fungi the predominant species was *candida non-albicans* followed by *aspergillus* species and *curvularia sp*. This was also in accordance with previous findings[12.]But the presence of *curvularia sp* is rare finding. The affected persons were females. Poor local hygiene and wearing of nose- stud could be contributory factors for these findings. The high incidence of fungal dacryocystitis (19.32%) in this region is significant. A previous study reported an incidence of 16.39% mixed bacterial infection[3] In our study it was 5.63%. Thus our study has found a preponderance of fungal infections in chronic dacryocyst it is. This could have many fold reasons. Poor hygiene, infrequent bathing, hot humid climate, wearing kajol and nose-stud in females (which are seldomly opened and cleaned) and lack of general awareness, misuse of steroids, very high fungal spore burden in air during harvesting seasons, contributes to such high incidence of fungal infections of the lacrimal sac. The high prevalence of fungal infections in this region as revealed by the present study is thus unique.

CONCLUSION

100 patients, 20 paediatric and 80 adults were operated for chronic dacryocystitis and the lacrimal sac or its remnants were subjected to microbiological study. Twelve cases were smear and culture negative. 88 cases were smear and culture positive-25 due to staph aureus,12 due to streptococcus pnemoniae,7 due to klebsiella pneumonia,3 due to pseudomona aeruginosa, 10 due to CONS and 10 due to E.coli. Mixed infection were seen in 4 patients. Psedomonas aeruginosa was found exclusively in the paediatric age group. Vancomycin, Teicoplanin, Tobramycin, Quinolone groups and co trimoxazole were recommended for MRSA and 3rd gen cephalosporins and cephalosporin-inhibitor combinations, Penems, Quinolones and aminoglycosides were recomeded for ESBL producing Gram negative infections. Colistin, polymyxin and combination therapies were given preferences in MDR infections specially for Pseudomona spp. The incidence of drug resistant bacterial isolates was 69.01%, which is a high figure. So, proper patient education and monitoring is very important. Amongst the fungi, out of 17 culture positive cases, candida non-albicans was the predominant species followed by Aspergillus. However, curvularia spp. were found to effect 1 adult females. This is a rare finding in the North east Bihar region, and has not been reported in the past, to the best of our knowledge. All these data emphasize the need of awareness building, improvement of diagnostic microbiology facilities to face the ensuing challenge. Newer antifungal drugs like Voriconazole can be tried in resistant fungal infections.

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