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Importance of Microbiological Examination in Patients with Recurrent Dacryocystitis: A Case Series

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Abstract: ***Background: Dacryocystitis is typically treated empirically but rising antimicrobial resistance and shifting pathogen patterns underscore the importance of microbiological evaluation. Objectives: To illustrate the importance of culture and sensitivity testing on management and outcomes in recurrent dacryocystitis. Methods: Three cases of recurrent dacryocystitis underwent incision/drainage or exploration with microbiological culture. Antibiotic regimens were adjusted based on sensitivity profiles prior to definitive dacryocystorhinostomy (DCR). Results: Cultures grew Pseudomonas aeruginosa (two cases) and methicillin-resistant Staphylococcus aureus (one case). Targeted antibiotic therapy led to infection control; all patients achieved successful DCR without recurrence. Conclusion: Routine microbiological work-up in dacryocystitis, especially recurrent or chronic cases, enables accurate pathogen-directed therapy, improves surgical outcomes.***

Keywords: Dacryocystitis; Microbiological evaluation; Culture and sensitivity; Dacryocystorhinostomy; MRSA; Pseudomonas aeruginosa

1. Introduction

Dacryocystitis is an inflammation of the lacrimal sac, usually results from nasolacrimal duct obstruction (NLDO). The obstruction of lacrimal system may lead to stasis of tears which create a fertile environment for secondary bacterial infection or chronic inflammation. [1] Bacterial aetiologies comprise between 6 and 95% of all dacryocystitis presentations. If not treated appropriately and promptly, there is risk of progression of the infection resulting in orbital cellulitis, abscess, meningitis and cavernous sinus thrombosis.[2]

Due to the widespread use of broad-spectrum antibiotics and changes in the environment, the types of bacteria causing chronic dacryocystitis are constantly evolving. [3]. In the late 20th century, the majority of bacteria isolated in both acute and chronic dacryocystitis were gram-positive, with over 60% of the pathogens identified as gram-positive.[4] However, in recent years, an increasing number of gram-negative organisms and methicillin-resistant *Staphylococcus aureus* (MRSA) have been isolated in lacrimal sac infections.[5] Knowing the microbiological profile of dacryocystitis and the antibiotic sensitivity pattern helps in choosing the most effective antibiotic treatment. Since the types of bacteria causing infection can vary by region, understanding the local microbiological trends is important.[6]

Indiscriminate use and widespread prescription of antimicrobial agents may result in the emergence of resistant strains. Identifying the causes of dacryocystitis would contribute to the choice of effective treatment and would help to reduce the unnecessary usage of antimicrobial agents.[7]

2. Case Reports

Case Report 1:
A 32-year-old female presented with swelling at the inner corner of the left eye accompanied by mild epiphora for the past 2 years. The swelling was initially small and had progressively increased in size over time. There was no history of trauma, surgery, or previous episodes of dacryocystitis; however, occasional mucopurulent discharge was noted, suggestive of infection. On examination, a nontender, subcutaneous mass of dimension approximately 2cm × 1cm × 1 cm was observed at the medial canthus.

The regurgitation test was positive, with purulent discharge expressed on pressure over the lacrimal sac. Lacrimal syringing revealed nasolacrimal duct obstruction. Best-corrected visual acuity was 6/6 in both eyes, and the remainder of the ophthalmic examination was unremarkable. The patient was initially started on a course of antibiotics and anti-inflammatory medications and the swelling subsided. Although symptoms initially subsided, the patient presented again after two months with recurrent swelling and discharge. An incision and drainage procedure was performed, and pus was sent for culture and sensitivity testing. The culture report revealed *Pseudomonas aeruginosa* as the causative organism. Based on sensitivity results, the patient was started on oral levofloxacin along with anti-inflammatory therapy.

SINO	Organism Isolated	Growth
1	PSEUDOMONAS AERUGINOSA	

Antibiotics	???CultureResultView.MIC???	1
AMIKACIN	4	S
CEFEPIME	2	S
CEFOPERAZONE / SULBACTAM	<=8	S
PIPERACILLIN / TAZOBACTAM	8	S
CIPROFLOXACIN	0.12	S
LEVOFLOXACIN	0.5	S
CEFTAZIDIME	2	S

Microscopy Sample received: Lacrimal sac abscess swab Risk of developing resistance to the sensitive antimicrobials, therefore advised to repeat culture after 3-4 days of initiation of therapy. If a patient is not improving clinically, repeat culture is advised. Pseudomonas aeruginosa is intrinsically resistant to Penicillin, 1st and 2nd generation cephalosporin, ceftriaxone, Ampicillin, Amoxyclav, Ertapenem, Ampicillin-sulbactum, Tetracycline, Co-Trimoxazole, Tigecycline and chloramphenicol. KINDLY CORRELATE CLINICALLY.

Comments Manual Culture & Antibiotic susceptibility test is NABL accredited.

Once the infection was controlled, the patient was planned for an external dacryocystorhinostomy (DCR) with placement of a nasolacrimal stent to address the underlying nasolacrimal duct obstruction and prevent further recurrence.

Case Report 2:

A 46-year-old female presented with a history of recurrent swelling over the left medial canthal area for the past several months. On examination, there was a firm, non-tender swelling consistent with a lacrimal sac mucocele. The patient reported intermittent epiphora and swelling, which recurred despite prior medical management.

Given the recurrent nature of the swelling, the patient underwent lacrimal sac Incision and Drainage, and a sample was sent for microbiological examination. Culture and sensitivity testing revealed *Pseudomonas aeruginosa* growth, which was sensitive to ciprofloxacin. Based on the sensitivity profile, the patient was started on systemic and topical antibiotics targeting *Pseudomonas*.

After initial infection control, an endoscopic dacryocystorhinostomy (DCR) was performed under targeted antibiotic coverage. The postoperative period was uneventful, and the patient was followed up regularly. At 3 months, a repeat conjunctival swab was sent for microbiological assessment, which returned negative for bacterial growth.

Subsequently, the patient was scheduled for cataract surgery in the same eye. The surgery was performed uneventfully, and the patient was continued postoperatively on topical ciprofloxacin eye drops as prophylaxis. The patient recovered well, with no recurrence of lacrimal swelling during follow-upto 1 year

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SINO	Organism Isolated	Growth
1	PSEUDOMONAS AERUGINOSA	

Antibiotics	???CultureResultView.MIC???	1
AMIKACIN	4	S
AZTREONAM	4	S
CEFEPIME	0.5	S
CEFTAZIDIME	2	S
PIPERACILLIN / TAZOBACTAM	<=4	S
IMIPENEM	1	S
LEVOFLOXACIN	<=0.12	S
MEROPENEM	0.5	S
CIPROFLOXACIN	<=0.06	S

Microscopy A count of >1,00,000/ml in clean catch midstream urine sample is considered as significant bacteriuria. Pseudomonas aeruginosa is intrinsically resistant to Penicillin, 1st and 2nd generation cephalosporin, ceftriaxone, Ampicillin, Amoxyclav, Ertapenem, Ampicillin-sulbactum, Tetracycline, Co-Trimoxazole, Tigecycline and chloramphenicol. KINDLY CORRELATE CLINICALLY.

Comments Manual Culture & Antibiotic susceptibility test is NABL accredited.

Case Report 3:

A 29-year-old female presented with recurrent swelling over the left medial canthal region for the past 8 months, associated with intermittent epiphora and discharge. On examination, there was a firm, non-tender swelling in the lacrimal sac area, with mucopurulent regurgitation on pressure.

The patient underwent incision and drainage and the aspirated material was sent for microbiological analysis. Culture and sensitivity revealed methicillin-resistant *Staphylococcus aureus* (MRSA). Based on the sensitivity profile, the patient was started on systemic and topical antibiotics, which led to resolution of the acute infection.

Once infection control was achieved, the patient underwent endoscopic dacryocystorhinostomy (DCR) under appropriate antibiotic coverage. The postoperative course was uneventful, and the patient remained symptom-free with no recurrence of swelling or discharge during follow-upto 1 year.

Therapeutic Intervention :
A small sample of discharge from punctum or lacrimal sac was collected.
The sample will be sent for microbiological culture and antibiotic sensitivity testing.
Based on the result, the most appropriate antibiotic will be prescribed preoperatively and postoperatively.
If surgery is required, this will be planned once the infection is under control.

Follow Ups and Outcomes:
Patient was followed up post op day 1 , 1 week, after 3 months and the silicone tube was removed after 6 weeks.

3. Discussion

Dacryocystitis mostly occurred with bacterial infections [8, 9], and might damage the normal structure of lacrimal duct [10]. The mainstays of treatment are broad spectrum oral antibiotics, warm compresses, and relief of nasolacrimal duct obstruction by dacryocystorhinostomy. Considering to the main cause of this disease which is a bacterial infection, bacterial identification and their antibiotic resistance have special importance for treatment and preventive treatment of dacryocystorhinostomy. [11]

In our series, *Pseudomonas aeruginosa* and methicillin-resistant *Staphylococcus aureus* (MRSA) were isolated. This is consistent with recent studies showing a changing microbiological spectrum. Chi et al. reported *Staphylococcus aureus* and Gram-negative bacilli, particularly *Pseudomonas*, as frequent isolates with increasing antimicrobial resistance[1]. Agrawal and Shah also observed a higher prevalence of Gram-negative organisms in acute dacryocystitis, while resistant *Staphylococcus* species predominated in chronic cases.[6] The detection of MRSA in our study underscores the importance of microbiological evaluation, as empirical first-line antibiotics may be ineffective. Mitra et al. highlighted the high prevalence of biofilm-forming MRSA in chronic dacryocystitis, contributing to recurrence and treatment challenges.[8]

Control of infection before dacryocystorhinostomy (DCR) is vital to reduce perioperative complications. All our patients underwent culture-directed antibiotic therapy before definitive surgical management. This approach aligns with Duggal et al., who demonstrated that DCR performed after stabilization of infection, even in acute settings, yielded favorable outcomes.[11]

Overall, our findings support the routine use of microbiological evaluation in recurrent dacryocystitis. Identifying resistant organisms such as MRSA and *Pseudomonas* enables targeted antibiotic therapy, reduces recurrence, and ensures better outcomes with Dacrocystorhinostomy of subsequent surgical procedures.

4. Conclusion

Dacryocystitis is usually caused by bacterial infection due to blockage of the tear duct. Treating it only with routine antibiotics may not always work, as resistant bacteria like *Pseudomonas* and MRSA are becoming more common. Our study shows that doing a microbiological test (culture and sensitivity) is very important to find the exact germ and select the right antibiotic. Controlling the infection before performing dacryocystorhinostomy (DCR) helps in better surgical outcomes and prevents recurrence. Regular culture reports also help hospitals to build antibiotic guidelines and promote safer treatment.

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