

# Bacteriology of Acquired Dacryocystitis In A Tertiary Care Hospital of North India

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## Abstract

The aim of the study was to identify the organisms responsible and to determine the antibiotic susceptibility pattern of the bacterial isolates from conjunctiva and nasal mucosa in case of acquired dacryocystitis in a tertiary care hospital settings in North India. A prospective study of 30 patients of acquired dacryocystitis were included in this study and age, gender, microbiological isolates from the conjunctival and nasal swabs and their antibiotic sensitivity patterns were studied in accordance with the Clinical and Laboratory Standards Institute guidelines. 30 patients clinically diagnosed as acquired dacryocystitis including 3 with bilateral involvement were studied. Majority (19) were females and largest number of patients were in the age group 31-40. Out of 33 samples, culture were positive in 17(51.6%) with 13 being gram organism. Staph albus was the most commonly isolated organism(18.2%) followed by staph aureus. Majorito the organisms isolated were sensitive to Tobramycin and other commonly used antibiotics

## Key Words

Chronic Dacryocystitis, Staphylococcus Albus, Tobramycin

## Introduction

Inflammation of the lacrimal sac is known as Dacryocystitis. (1) Dacryocystitis is a common eye disease in ophthalmic practice. The condition is usually unilateral and occurs secondary to obstruction of the nasolacrimal duct. Naso-lacrimal duct obstruction interferes with the normal flow of tears which leads to stasis and eventually colonization by bacteria. The tears and their bacterial contents are retained within the sac after which the infection and the inflammation of the sac follow known as "Dacryocystitis".

Dacryocystitis usually affects two age groups- infants and adult. In acquired dacryocystitis, obstruction may be due to an idiopathic inflammatory stenosis known as primary acquired nasolacrimal duct obstruction i.e PANDO. (2) This mostly affects the middle age and elderly women. In other cases obstruction may be secondary to trauma, inflammation, infection, neoplasm or mechanical obstruction which is termed as secondary

acquired lacrimal duct obstruction that is SALDO. (3) The important class of organism involved in dacryocystitis is bacteria. The healthy lacrimal passage are free from infective micro-organism partly due to the resistance of the mucosa itself and partly due to the bacteriostatic influence of the tears

Treatment of lacrimal duct in adult is surgery, either external or endonasal dacryocystorhinostomy or occasionally silicone intubation. The present study is an attempt to analyse the current bacteriology of dacryocystitis and to find out their sensitivity pattern to all available drugs that will guide us in the proper choice of antibiotic for the conservative management of Dacryocystitis.

## Material and Methods

This prospective study was conducted in the out patient department of upgraded Department of ophthalmology for one year in collaboration with the Department of

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microbiology. A total of 30 patients of acquired dacryocystitis were included in the study. Informed consent was obtained from each patient before his/her entry into the study.

**Inclusion Criteria**

- Patients of either sex.
- Both unilateral and bilateral cases of dacryocystitis
- Patient with previous episodes of acute dacryocystitis

**Exclusion Criteria**

- Patients who have been surgically interfered with in the past, that is, have undergone dacryocystorhinostomy.
- Patient with history of trauma to the sac area.
- Patient with an evidence of periocular neoplasm.
- Congenital dacryocystitis.

30 clinically diagnosed cases of chronic dacryocystitis were included in the study and 30 samples (including the 3 cases who had bilateral involvement) were collected either by conjunctival swabs or by applying pressure over the lacrimal sac and allowing the purulent material to reflux through the lacrimal punctum along with nasal swabs using sterile cotton swabs. The collected specimens received at the laboratory were inoculated immediately on Blood Agar and Mac-Conkey's Agar plates. Bacteriological identification was based upon the colony morphology and standard set of biochemical tests. (4) Antibiotic sensitivity was done by the Kirby-Bauer disc diffusion methods as per the clinical and laboratory standards institute guidelines. (5)

**Results**

A total of 30 cases having acquired dacryocystitis were studied. Patients between 21-60yrs of age were included in the study with a maximum number of cases (13 i.e., 43.3%) occurring in the 4th decade. The youngest patient in our study was 23years old. Over all 63.3% of our cases were over the age of 40years. (Table 1) In this study 19(63.3%) cases were females and 11 (36.7%) were male. (Table 2) 27(90%) cases had unilateral involvement and 3(10%) had bilateral involvement of the eye. (Table 3)

From these 30 patients, 33 samples were obtained and sent for culture sensitivity. Out of these, positive cultures were obtained in 17 samples constituting (51.6%) of the total sample. The majority of the isolates were gram positive organisms, isolated in 13 of the 33 samples

**Table-1. Age Distribution of Patients with Acquired Dacryocystitis**

Age Group (Years)	No. of cases (n = 30)	Percentage
21-30	4	13.3%
31-40	7	23.3%
41-50	13	43.3%
51-60	6	20%

**Table 2. Sex Distribution Of Patients With Acquired Dacryocystitis**

Sex	No. of cases (n = 30)	Percentage
Female	19	63.3%
Male	11	36.7%

**Table 3. Laterality of Disease**

Eyes Involved	No. of eyes (n = 30)	Percentage
Unilateral	27	90%
Bilateral	3	10%

(39.4%). Staphylococcus albus was the most common gram positive organism, isolated in 6 samples, representing 18.2% of the overall samples and 46.1% of the gram positive group. Staph aureus was isolated in 9.1% of the samples and accounted for 23.1% of the gram positive group. Together, staphylococci species accounted for 27.3% of the samples. Gram negative organisms were isolated in 4 of the 33 samples (12.1%) and pseudomonas aeruginosa was the most common gram negative organism (3%). (Table 4)

Normal conjunctival flora in contralateral eye of 27 cases of unilateral acquired dacryocystitis was compared to the isolates from the affected eye to ascertain the possibility of acquisition of the pathogens from the normal colonisers. Similar results were found in 9 (33.3%) cultures whereas 18 out of 27 cultures grew different organisms. Out of these similar results, 5 were sterile, 3 showed staph albus and 1 showed diphtheroids. Chi square test was applied and p value was calculated (0.17) which was statistically insignificant.

Similarly contralateral nares in 27 cases of unilateral acquired dacryocystitis were studied. 23 (85.2% samples) showed dissimilar organism and only 4 had similar organisms. Chi-square test was applied and was found to have statistically insignificant correlation.

**SENSITIVITY PATTERN**

**Table 4. Bacteriological Report On Culture Media**

Organisms	No. of eyes (n = 33)	Percentage
Staphylococcus albus	6	(18.2%)
Staphylococcus aureus	3	(9.1%)
Streptococcus pneumonia	2	(6.1%)
Diphtheroids	2	(6.1%)
Pseudomonas aeruginosa	2	(6.1%)
Proteus mirabilis	1	(3%)
Citrobacter	1	(3%)
Sterile	16	(48.4%)
<b>Total</b>	<b>33</b>	<b>(100%)</b>

**Table 5. Culture Sensitivity**

Organism	Cf	Tb	C	G	Va	Cz	Cx	T	E	Cp
A	6	8	8	8	8	7	6 (75%)	5	4	6
(8)	(75%)	(100%)	(100%)	(100%)	(100%)	(87.5%)		(62.5%)	(50%)	(75%)
B	5	6	6	6	6	4	6	4	4	4
(6)	(83.3%)	(100%)	(100%)	(100%)	(100%)	(66.7%)	(100%)	(66.7%)	(66.7%)	(66.7%)
C	3	3	3	3	3	2	2	3	2	2
(3)	(100%)	(100%)	(100%)	(100%)	(100%)	(66.7%)	(66.7%)	(100%)	(66.7%)	(66.7%)
D	2	3	3	3	3	2	3	1	2	3
(3)	(66.7%)	(100%)	(100%)	(100%)	(100%)	(66.7%)	(100%)	(33.3%)	(66.7%)	(100%)
E	1	3	0	0	2	2	3	2	2	2
(3)	(33.3%)	(100%)			(66.7%)	(66.7%)	(100%)	(66.7%)	(66.7%)	(66.7%)
F	2	2	0	2	2	1 (50%)	2	1	0	1
(2)	(100%)	(100%)		(100%)	(100%)		(100%)	(50%)		(50%)
Total 25 (% age)	19 (76.6%)	25 (100%)	20 (80%)	22 (88%)	24 (96%)	18 (72%)	22 (88%)	16 (64%)	14 (56%)	18 (72%)
A -	<i>Staphylococcus albus</i>			Cf -	<i>Ciprofloxacin, Tb - Tobramycin</i>					
B -	<i>Staphylococcus aureus</i>			C -	<i>Chloramphenicol, G - Gentamycin</i>					
C -	<i>Streptococcus pneumonia</i>			Va -	<i>Vancomycin, Cz - Cefazidime</i>					
D -	<i>Pseudomonas aeruginosa</i>			Cx -	<i>Cloxacillin, T- Tetracycline</i>					
E -	<i>Proteus mirabilis</i>			E -	<i>Erythromycin and Cp - Cefpirome</i>					
F -	<i>Citrobacter</i>									

Sensitivity pattern was determined in a total of 25 specimens which had positive cultures. The most effective single antibiotic against all organisms was tobramycin exhibiting an overall efficacy of 100%. The next most effective antibiotics were vancomycin (96%) and gentamycin (88%). Tobramycin, vancomycin, gentamycin and chloramphenicol were the most effective antibiotics against staphylococcus albus which was the most commonly isolated organism, each having 100% effectivity. This was followed by ceftazidime and ciprofloxacin and cloxacillin (75%) each. Staphylococcus aureus, the second most commonly isolated organism showed 100% sensitivity to tobramycin, chloramphenicol, gentamycin and vancomycin. (Table 5)

All the 30 patient (3 bilateral) underwent surgical treatment in the form of external

dacryocystorhinostomy. It was successful in 91% and failed in the remaining 6% of the cases.

### Discussion

Chronic dacryocystitis is a commonly encountered but often mismanaged infection. It is more common in the age group above 30 years. Lacrimal apparatus contains lacrimal gland, punctum, canaliculi, lacrimal sac, and nasolacrimal duct. Lacrimal apparatus is concerned with the formation and drainage of tears, which keep the cornea moist, protect against airborne pathogens and foreign bodies. Obstruction of the nasolacrimal duct results in stasis with accumulation of tears, desquamated cells and mucous secretions above the obstruction thus creating a fertile environment for secondary bacterial infection. (6) In pre-antibiotic era, streptococci species was a very common cause of chronic dacryocystitis.

However, after the discovery of effective antibiotics like penicillin and cephalosporins, streptococci have been replaced by staphylococci; notoriously known to acquire drug resistance. (7,8) Previous studies state that pathogens implicated in chronic dacryocystitis are more often gram positive bacteria like CONS, Staphylococcus aureus and streptococci. (9) Some studies have also reported Gram negative bacteria like Pseudomonas, Enterobacter, Citrobacter, species. (7) Environmental factor in different geographical regions may have a role in determining the microbial pattern of chronic dacryocystitis. (10)

In our study of 30 cases of acquired dacryocystitis the age of the patients ranged between 21-60 years and the mean age was 45 years. There was predominance of female (19 of 30,63.3%) compared to males (11 of 30,36.7%) amongst our patients. Out of 30 patients, 27 (90%) had unilateral and only 3 (10%) had bilateral eye involvement. Similar observation were made by Huberspitzy in 1992 who studied 150 patients consisting of 103 (68.7%) females and 47(31.3%) male. Their age ranged between 20-87 years (mean 48). Coden *et al* (11) in 1993 studied 236 patients whose age ranged between 16-92 years and the mean age was 63.9 years. There was predominance of female (76.6%) over males. Similar observation was also noted by few authors 80.9% and 61.04% (9). All the patients were in the age group of 30 and above. Similar findings were reported in other studies. (6) The spectrum and the proportion of bacterial pathogens as well as antibiotic susceptibility may differ from region to region. (9) Coden *et al* (11) and Bharati *et al* (9) reported 65.4% & 69.7% of gram positive cocci from patients with dacryocystitis respectively. In our study Gram positive organisms were found in 39.4% of the isolates. On comparison, majority of the previous studies have reported a predominance of gram positive organisms whereas gram negative organisms were isolated in 12.1% and pseudomonas aeruginosa was the most common gram negative organism (3%).

The most effective single antibiotic against all organisms was tobramycin, exhibiting an overall effectivity of 100%. The next most effective antibiotics were vancomycin (96%) and gentamycin (88%). The most effective antibiotics against the most common organism staphylococcus albus were tobramycin, vancomycin, chloramphenicol and gentamycin, each having

100% effectivity. Similar observations were observed by Coden. (11)

### Conclusion

Majority of the cases of chronic dacryocystitis are seen in females with staphylococcus albus being the predominant causative organism. Most of the cases were sensitive to the commonly used antibiotics like tobramycin, vancomycin, chloramphenicol and gentamycin showing 100% sensitivity. Correct and timely clinical diagnosis of cases of chronic dacryocystitis and accurate identification of the causative organisms and their sensitivity patterns helps in the selection of appropriate antibiotics and hence in reducing the disease burden and preventing morbidity and complications.

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