

Bacterial Flora Associated with Chronic Suppurative Otitis Media

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Abstract

A total of two hundred ears of CSOM cases in different age groups & sexes were subjected to bacteriological and clinical studies in the Department of Microbiology & ENT, Patna Medical College & Hospital. The ears were further subdivided into group I where ear swabs were studied for aerobic organisms and cultural & sensitivity pattern. In group II 50 swabs were studied for anaerobic organisms and culture and sensitivity pattern. The commonest organisms isolated in group I were *Staphylococcus aureus* followed by *Pseudomonas aeruginosa* while pepto-streptococci species were found in group II. Ciprofloxacin was found to be the drug of choice for most of the organisms followed by Norfloxacin, cefexime, Cefoperazone & Gentamycin.

Keywords: CSOM, Bacterial Flora, Ear Infection.

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INTRODUCTION

Chronic suppurative otitis media (CSOM) is a name given to long standing inflammatory disease affecting mucoperiosteal lining of the middle ear. It is a destructive and persistent disease with irreversible consequences & can proceed to serious complications. CSOM is one of the most common diseases seen in general practice as well as ENT OPD. It is still one of the common causes of hearing impairment. It is a disease of multiple aetiology and is well known for its persistence and recurrence in spite of treatment. Its importance lies in its refractiveness to treatment and chronicity, leading to complications. Bacterial culture & treatment also needed prior to surgery.

MATERIALS AND METHODS

This study was conducted in the Departments of ENT & HNS & Microbiology, Patna Medical College Patna. A total of 200 ears of patients suffering from chronic suppurative otitis media were included in this study.

Medical history was recorded including previous history of URTI, ear discharge and its duration, hearing status, previous ear surgery & trauma. Presence of systemic diseases as diabetes mellitus and allergy were noted. Complete physical & ENT examination were carried out. The cases in the I & II groups who were on antibiotics (oral or systemic) were either excluded from this study or were advised not to

take antibiotics for two weeks prior to undergoing culture & sensitivity tests.

Swabs for culture and sensitivity, were taken from the discharging ear under strict precautions with the swab stick not touching the skin of external auditory canal. For aerobic atmosphere cultures were set up overnight for 18-24 hours at 37°C using Blood agar and MacConkey's agar medium. For Anaerobes, Robertson cooked meat medium (RCM) was used and was layered with sterile liquid paraffin to ensure better anaerobic conditions. It was incubated at 37°C for 48 to 72 hours. Subsequently subculture was done in blood agar containing Gentamycin (3%) and incubated 37°C in modified McIntosh field's pattern type of anaerobic culture jar for 48-72 hours, under strict anaerobic conditions using Gaspack system. The isolates were identified by the colony characteristics and biochemical reactions. Plates showing no growth after 48 hours were considered negative. Sensitivity testing for antibiotic were done by disc diffusion method called Kirby-Bauer method [1].

The isolated organisms were tested against different panels of antimicrobials. In group I swabs were taken from ear of CSOM patients for aerobic organisms and sent for culture & sensitivity. In group II 50 swabs were taken from every 4th case for anaerobic organisms also, and sent for culture and sensitivity.

Table-1: Bacteriological findings

Organisms	Group I	Group II
Staph aureus	72(36%)	24(48%)
Staph. Albus	3(1.5%)	-
B haemolytic streptococci	3(1.5%)	-
Pseudomonas species	32(16%)	8 (16%)
E coli	5 (2.5 %)	-
Proteus species	6(3%)	-
Klebsiella species	2(1%)	-
Enterobacter species	2(1%)	-
Citrobacter species	4(2%)	-
Peptostreptococci species	-	16(32%)
Bacteroid species	-	33(66%)

In this study microbial sensitivity were performed against aerobic and anaerobic organisms. The pathogenic isolates were tested against Ampicillin, Cotrimoxazole, Gentamycin, Norfloxacin, Ciprofloxacin, Cefoperazone, Erythromycin, Netilmicin, and Cefadroxil. Ciprofloxacin, Norfloxacin and Cefoperazone inhibited the greater number of strains.

Antibiotic were given according to the Swab results of culture and sensitivity. The topical medications were also used in form of ear drops.

RESULTS

250 Swabs from 200 ears of chronic suppurative otitis media were studied. The age ranges between 2 to 60 years. The presenting symptoms were ear discharge, irritation, and pain and hearing loss. The bacteriological finding of each group is shown in table I.

In group I as shown in Table II 190 (95%) ears had positive cultures, 10 (5%) cases showed no growth and 129 (64.5%) cases had pure growth. 72(36%) Staph-aureus, 32 (16%) Pseudomonas, 5(2.5%) E-coli, 6(3%) Proteus, 3(1.5%) a Haemolyticus, 3(1.5%) Staphalbus. Double & triple coexisting pathogens were seen in 61 (30.5%) ears. Granulations were found in 19(9.5%) ears, Cholesteotoma was found in 7(3.3%) ears, Post Aural Abscesses and Fistula in 3(1.5%) ears & Polyp in 2(1%) ears.

In group II as shown in tale III 48 (96%) ears had positive cultures out of 50 ears. 4 (8%) ears showed anaerobic growth only, and 44 (88%) ears had mixed

growth of aerobes and anaerobes. Out of 4 ears of anaerobic growth 3(75%) had Mono Microbial and 1(25%) had Poly microbial growth.

DISCUSSION

Chronic Suppurative Otitis Media defined as a chronic discharge from the middle ear through a perforation of the tympanic membrane, Suppurative refers to active clinical infection. I Perforation without discharge can be an inactive stage of the infection.

The study of the organisms commonly of the organisms commonly associated with chronic suppurative otitis media is necessary to enable the otologist to plan a general pattern of treatment for the average patient with a discharging ear and ear should dry prior to Ear Surgery.

This study was primarily undertaken to determine the kind of flora which is prevalent I the middle ear of the patients suffering from chronic suppurative otitis media and also to know the sensitivity of the organisms isolated to various antimicrobial drugs. The relative disappearance of acute suppurative otitis media with the advent of the antimicrobials and the frequent presence of chronic suppurative otitis media and its poor response to the routine treatment are the factors which are responsible for this undertaking.

Group I: 200 ears of patients suffering from Chronic Suppurative Otitis Media (CSOM).

Group II: Swabs were taken from 50 ears for anaerobic organisms also and sent for culture and sensitivity.

Table-II: Associated factors

No Growth	4%
Anaerobic Growth	8%
Aerobes and Anaerobes	88%

Upper respiratory tract infection

105 (52.6%) patients had history of recurrent upper respiratory tract infections in this study in the form of rhinitis; sinusitis and tonsillitis Gulai *et al.* [2]

observed upper respiratory infection in the majority of cases.

Nasal allergy: According to the present study 20 (10%) cases had nasal allergy. Finding of nasal allergy in cases of CSOM included in this study is a coincidental finding. Although allergic otitis media is known clinical entity. Type of perforation in tympanic membrane: In the present study, out of 129 ears swabs with the pure growth central perforation were seen in 110 cases and attic or marginal perforation in 19 cases. In mixed growth cases out of 61 cases central perforation were seen in 46 cases and attic or margined perforation in 15 cases. Baruah *et al.* [3] observed central perforations in 72.5% and attic/marginal perforation in 15.4% cases.

The predominant organisms in the present study were *Staphylococcus aureus* in 62 ears and *Pseudomonas* species in 28 ears in safe and *Staphylococcus aureus* 10 ears and *Pseudomonas* species 4 ears in unsafe CSOM. So it appears that there is no specific predilection of infecting organisms with the type of pathology.

In the present study, cholesteatoma was seen in 4 (2%) cases in which growth of *staphylococcus aureus* was seen. Granulations were seen in 15(7.5%) cases and out of these 8 (4%) cases showed growth of *staphylococcus aureus* and 2 (1%) cases showed growth of *pseudomonas* species. In 4(8%) cases of Post aural fistula *staphylococcus aureus* was cultured in 3(1.5%) cases and *Pseudomonas* in 1 (.5%) case.

Type of organisms

The predominance of gram positive cocci over the gram negative bacilli has been observed in present study. These finding are similar to those of Rao & Reddy [4] & Taneja [5]

Out of 200 swabs positive culture were obtained in 190 cases (95%) for aerobic organisms and out of 50 swabs for anaerobic organisms positive culture was obtained in 4 cases (8%). In the present study anaerobes isolated were 8% indicating that anaerobic bacteria were not commonly responsible for chronic suppurative otitis media.

Browning *et al.* [6] indicated that the elimination of anaerobic bacteria from aerobic ears does not necessarily render them inactive.

It has been found by Karma *et al.* [6] that anaerobe and aerobes are often found together. The aerobe creates an environment, in which these anaerobes can grow in mixed infection by lowering the local oxygen concentration (Redox potential).

Antibiotic sensitivity pattern

In this study antimicrobial sensitivity tests were performed against both aerobic and anaerobic organisms. The pathogenic isolate were tested against Ampicillin, Ciprofloxacin, Cefexime, Gentamycin,

Norfloxacin and Cefoperazone inhibited the greater number of strains. *Staphylococcus aureus*, the commonest organism was sensitive to Ciprofloxacin 49 (68.05%), Norfloxacin and cefexime in 43 (59.72%), Cefoperazone 42 (58.33%), Gentamycin in 40 (55.55%) and 4 (5.55%), strains were resistant to all antibiotics tested. *Pseudomonas aeruginosa*: The next commonest organism was mainly sensitive to Ciprofloxacin in 30 (93.75%).

Proteus species: was mainly sensitive to Gentamycin, Norfloxacin, Ciprofloxacin and Cefoperazone in 6 (100%).

E. Coli: was mainly sensitive to Gentamycin, Norfloxacin Ciprofloxacin.

Staph. Albus: sensitive to all drugs tested.

Citrobacter species: was sensitive to only Cefoperazone drug.

Enterobacter species: was sensitive to Gentamycin.

The marked resistance of all the organisms to different antibiotics were probably due to repeated use of antibiotic in a haphazard manner.

Our data indicates that the most common organism involved in CSOM is *Staphylococcus aureus* then *Pseudomonas*. This is in agreement with Anifasi *et al.* [7] of Zimbabwe and previous study in Saudi Arabia by Zakzouk & Mahjoob.

CONCLUSION

The wide over use of broad spectrum antibiotics for treatment of CSOM should be discouraged and limited to prevent or reduce the emergence of resistant organisms.

12 (4.8%) of the cultured swabs showed no growth of organisms, therefore the indiscriminate use of systemic antibiotic is of limited values.

In present study *Staphylococcus aureus* was found to be the commonest organisms 72 (36%) cases followed by *Pseudomonas* in 32 (16%) cases and *proteus* species.

In safe and unsafe ears closely similar type of organisms were isolated. The commonest organisms i.e. *Staphylococcus aureus* was sensitive to Ciprofloxacin followed by Cefoperazone, Norfloxacin and Gentamycin. Most of the organisms were sensitive to Ciprofloxacin Norfloxacin, Cefexime, Cefoperazone, Gentamycin and Ciprofloxacin was most effective against 98 (75.56%) cases followed by Norfloxacin.

Strains of *Staphylococcus aureus*, 1 strain of *Pseudomonas aeruginosa* and 1 strain of *E. coli* were resistant against the antibiotics tested.

Therefore, it is suggested that culture and sensitivity should be done in all cases of CSOM for aerobic and anaerobic organisms and indiscriminate use of antibiotic should be discouraged. Ciprofloxacin, Norfloxacin and Gentamycin should be kept as first line of the management, as anaerobic bacteria are commonly associated with CSOM cases.

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