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ORIGINAL ARTICLE

TREATMENT OF CHRONIC SUPPURATIVE OTITIS MEDIA IN ERA OF INCREASING ANTIBIOTIC RESISTANCE

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ABSTRACT: Conservative medical management of chronic suppurative otitis media (CSOM) is an important step in achieving a dry ear which is a prerequisite for the definitive surgical management of non-cholesteotomatous CSOM. Like other chronic diseases, CSOM can limit an individual's employability and quality of life. The microbial profile, antibiotic sensitivity & resistance pattern of CSOM has been changing according to geographical variation and various differences in patient population. A prospective, randomized open study of 110 patients was conducted to isolate aerobic & anaerobic organisms and their sensitivity & resistance patterns to various antibiotics among the patients suffering from non-cholesteotomatous CSOM at a charitable tertiary healthcare center located in Navi Mumbai. Pseudomonas aeruginosa was most common aerobic organism isolated (37.7%) followed by Staphylococcus aureus (31.5%). Linezolid was found to be most effective drug followed by Amikacin, Streptomycin, and ciprofloxacin. A periodic review of microbiological profile of and antibiotic sensitivity & resistance pattern of the isolates is important for effective management of CSOM.

KEYWORDS: non-cholesteotomatous CSOM, CSOM, Antibiotic Sensitivity, Antibiotic Resistance, Pseudomonas Aeruginosa, Staphylococcus Aureus.

INTRODUCTION: Chronic suppurative otitis media (CSOM) is defined as chronic inflammation of a part or whole of middle ear cleft that may present with recurrent ear discharges or otorrhoea through a tympanic membrane perforation.[1] Conservative medical management of CSOM is an important step in achieving a dry ear which is a prerequisite for the definitive surgical management of non-cholesteatomatous CSOM. Like other chronic diseases, CSOM can limit an individual's employability and quality of life. The complications of CSOM have been reduced to a greater extent because of the invention of antibiotics. In many developing countries, including India, the prevalence of CSOM is more than 3% and the incidence of CSOM is increasing because of the poor hygienic practices and lack of health education. The prevalence rate is 46 and 16 persons per thousand in rural and urban population respectively also being the single most cause of hearing impairment in rural population of India.[2] The microbial profile, antibiotic sensitivity & resistance pattern of CSOM has been changing according to geographical variation and various differences in patient population. Due to increased and irrational use of broad-spectrum antibiotics, resistance in the bacterial isolates has become very common. In most cases, the causative organism(s) is not isolated before treatment is initiated and the choice of antibiotics is based on the efficacy against the most common pathogens reported in several published studies.

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The update on incidence and antibiogram of the etiological agents for CSOM would be helpful in therapy and better management of the patients. This study analyzes the causative organisms and their sensitivity & resistance patterns to various antibiotics among the patients suffering from non-cholesteotomatous CSOM who attended ENT Department of our hospital, a charitable tertiary healthcare center located in Navi Mumbai.

METHODOLOGY: A prospective, randomized open study was conducted for a period of 1 year after Institutional Ethics Committee approval. A total of 102 patients suffering from non-cholesteotomatous CSOM were selected from the Department of Otorhinolaryngology. After detailed history and examination of patient, ear discharge was collected under aseptic conditions using two pre-sterilized swab. The first swab was used to make a smear on a clean grease free glass slide. The smear was tested for bacterial differentiation by Gram staining and direct microscopy. Then with a sterile loop the swab will be plated on Blood agar, MacConkey's agar and Chocolate agar which were then incubated at 37°C for 24 hours. The isolates were identified by using colony morphology and standard biochemical tests.[3,4] After isolation of the individual organism, the aerobic isolates were tested for antibiotic sensitivity by disk diffusion method on Muller Hinton agar. Based on the extent of the zone of inhibition, the sensitivity pattern of the particular organism was interpreted in accordance with Central Laboratory Standards Institute (CLSI) guidelines.[5]

The second swab used for anaerobic culture was inoculated in Robertson's cooked meat (RCM) broth and incubated at 37°C for 72 h. On 3rd day, sub-cultures from RCM were made on 5% BA and Neomycin BA (Neomycin at a working concentration of 70µg/ml). A metronidazole disc (5µg) was placed at the junction of secondary and tertiary streaking area, opposite to primary well of inoculation. Dynox anaerobic jar based on Marshal's chromous absorption principle was used for anaerobic culture.[6] The jars were closed and incubated at 37°C for 72 h and thereafter, examined for the zone of inhibition around the metronidazole disk. An aerotolerance test on CA was set up to rule out facultative anaerobes.

Demographic analysis of the causative organisms was done. All dehydrated media, reagents and antibiotic discs were procured from Hi-Media Laboratories Pvt. Ltd., Mumbai, India. The data was analyzed by using Statistical Package for Social Sciences (SPSS) version 11.

RESULTS: Out of total 110 ear swabs processed, microbial growth was seen in 106 (96.36%) while 4(3.63%) samples showed no growth. In 87 (82.07%) samples mono-microbial growth was seen whereas 19(17.92%) samples showed poly-microbial growth. The mean age of the patients was 35.5 yrs. Females (51.91%) & males (49.09%) were almost equally affected as the sex ratio Female: Male was 1.03: 1. Aerobic flora was seen in all 106 samples in which 148 aerobic isolates were grown, 8 cases were associated with anaerobic flora along with aerobic flora and 3 types of (Bacteroids fragilis, Bacteroids melanogenicus & Peptostreptococcus) anaerobes were isolated. Results of sensitivity testing are Amikacin (95.28%), ceftriaxone/cefixime (83.02%), ciprofloxacin (87.74%), Linezolid (98.11%), and streptomycin (92.45%) showed maximum activity to most of the isolated.

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DISCUSSION: CSOM is one of the most preventable cause of hearing loss in developing countries like India.[7] And a reason of serious concern, particularly in children, because it may have long-term effects on early communication, language development, auditory processing, educational process, and physiological and cognitive development. In adults, CSOM causes moderate to severe conductive or mixed hearing loss, which can affect their social, economic and productive work life & human resourses.

Analysis of the total 110 cases revealed that mono-microbial growth was obtained in 98(89.1%) samples, 8(7.2%) samples yielded polymicrobial growth, whereas, 4(3.6%) samples showed no growth. In 4 cases no bacterial isolates were seen which might be as a result of prior antibiotic use. Similar studies conducted in different parts of Indian subcontinent show variable results. Poorey and Iyer[8] from Madhyapradesh, India, in their study on 100 samples found mono-microbial growth from 82, mixed growth from 10, and no growth in 8 samples whereas, Aslam,[9] et al. from Pakistan in their study on 142 samples revealed that 76% of them were monomicrobial and 24% were mixed cultures. In a study done at a tertiary care Hospital at Deharadun, Uttarakhand[10] out of 88 bacterial cultures, multiple micro-organisms were isolated in 17(19.3%) swabs while, a single bacterium was present in 71(80.7%). Analysis of 204 cases in a Tertiary Care Hospital of Uttarakhand State,[11] India revealed that mono-microbial growth was obtained in 118(57.84%) samples, 68(33.33%) samples yielded polymicrobial growth, whereas, 18(8.82%) samples showed no growth.

In our study, Pseudomonas aeruginosa was most common aerobic organism isolated (37.7%) followed by Staphylococcus aureus (31.5 %). Sharma S, et al from Nepal and Loy AH, Tan AL, Lu PK from Singapore also report the predominance of Pseudomonas aeruginosa (36.4% & 33.3%) followed by Staphylococcus aureus (30.2% & 33.3%). Pseudomonas aeruginosa does not usually inhabit the upper respiratory tract. The presence of Pseudomonas aeruginosa in the middle-ear cannot be ascribed to an invasion through ET and it should be considered as secondary invader gaining access to the middle-ear via a preformed defect in TM. Klebsiella pneumoniae and Escherichia coli were isolated from 8.5% and 3.8% cases respectively, and these findings were tandem to the reports by Mansoor[12], *et al*. & Rajat Prakash,[13] et al.

In our study, the anaerobic organisms isolated were Bacteroids fragilis, Bacteroids melanogenicus & Peptostreptococcus. The anaerobic organisms are usually detected in cases with extensive cholesteatoma or granulation tissue.[14] Out of total 106 samples anaerobic organisms were isolated only in 8 samples (9 isolates) attributing to our selection of only non-cholesteotomatous CSOM cases.

All aerobic isolates were subjected to Antibiotic Sensitivity Test and sensitivity & resistance patterns were studied. Pseudomonas aeruginosa was found to be susceptible to Amoxycillin, Streptomycin, Amikacin & Ciprofloxacin (Figure 1), whereas Staphylococcus aureus was susceptible to Streptomycin, Amikacin, Linezolid, Cefipime & Ceftriaxone (Figure 2). Against all organisms Linezolid was found to be most effective drug followed by Amikacin, Streptomycin, ciprofloxacin (Figure 3) which was almost similar to reports by other authors.[12,15,16] Comparision of different studies suggest that microbial profile and AST pattern of CSOM has been changing over the period of time due to geographic variations, difference in patient population & socioeconomic status. Indiscriminate, haphazard & irrational use of antibiotics, poor compliance,

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incomplete therapy and negligence on patient part are the factors responsible for emergence of resistance towards certain antibiotics like Azithromycin.

CONCLUSION: The study of microbial profile and their antibiotic sensitivity determines the prevalent bacterial organisms causing CSOM. Along with the study of national and international trends of resistance for any antibiotic, it is important to gather local information on antibiotic sensitivity & resistance pattern in order to form policies/guidelines in individual health centers / hospital settings. Pseudomonas aeruginosa was the most common isolate followed by Staphylococcus aureus in non-cholesteotomatous CSOM patients at our charitable, tertiary healthcare centre located in Navi Mumbai. The judicious use of antibiotics following antibiotic sensitivity tests is essential to provide an appropriate clinical response and to limit the emergence of drug resistant isolates. A periodic review of microbiological profile, antibiotic sensitivity & resistance pattern of the isolates is imperative for effective management of CSOM & prevention the emergence of resistant strains.

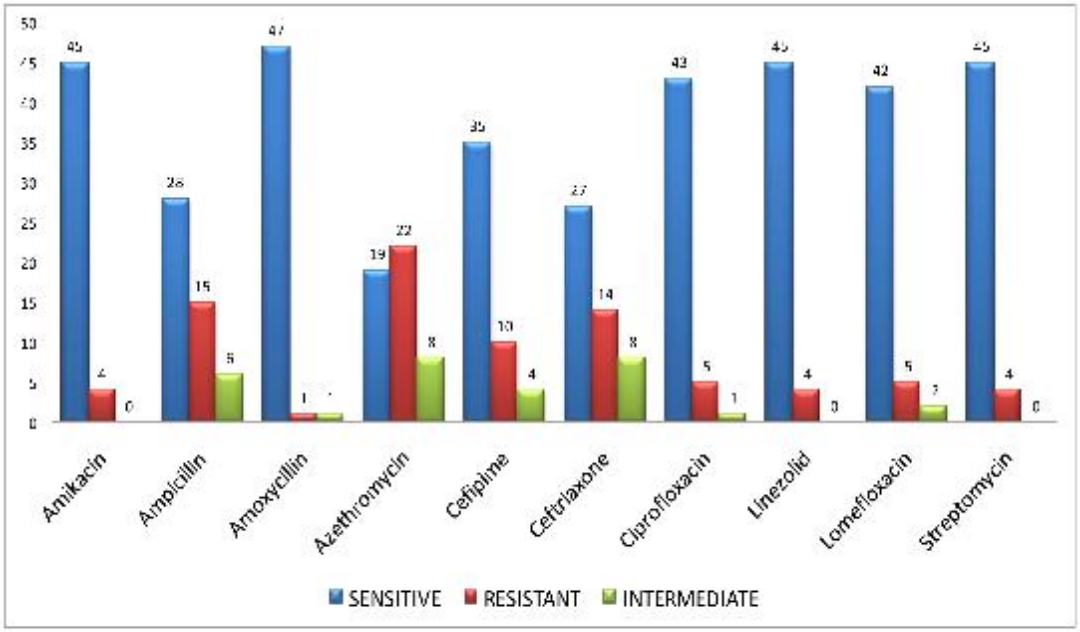

Figure 1 : Graphical representation of sensitivity/resistance pattern of Pseudomonas aeruginosa

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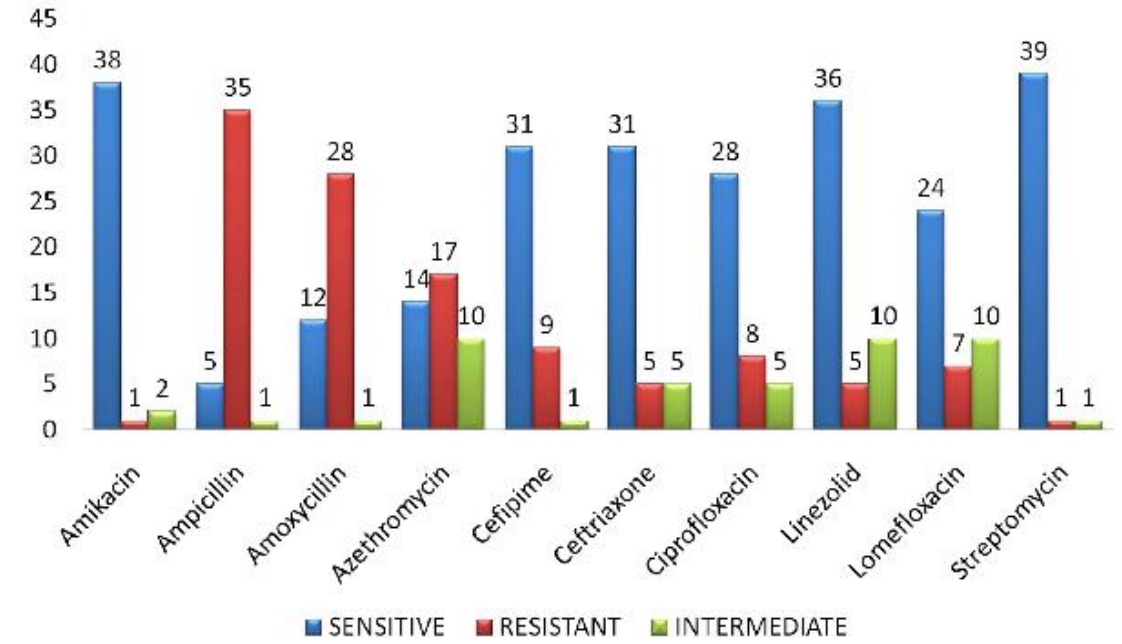

Figure 2 : Graphical representation of antibiotic sensitivity/resistance pattern of Staphylococcus aureus

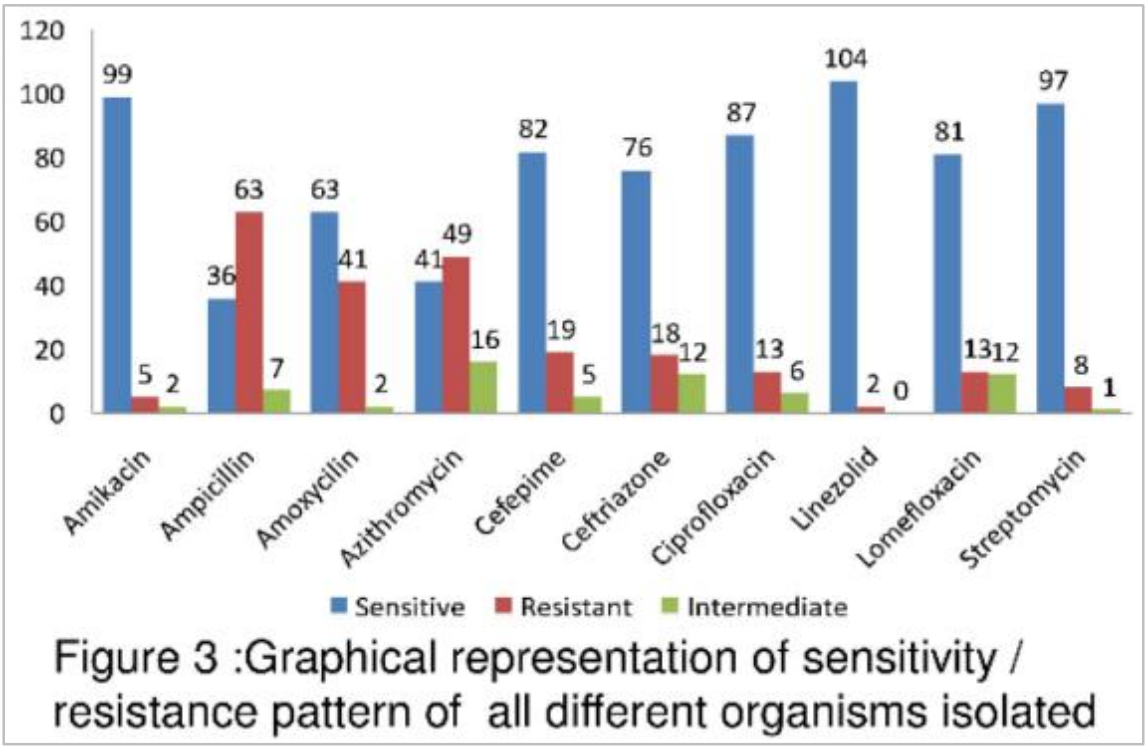

Figure 3 :Graphical representation of sensitivity / resistance pattern of all different organisms isolated

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