Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 06, 2023

Original research article

Aerobic bacterial profile and antibiotic susceptibility pattern of CSOM

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Abstract

The purpose of the study was to offer a guideline for the treatment of chronic suppurative otitis media (CSOM) with empirical antibiotics as well as to evaluate the aerobic bacteria that were implicated as well as their antibiotic sensitivity pattern in patients who had been diagnosed with the condition chronic suppurative otitis media (CSOM). According to our research, Staphylococcus aureus, Pseudomonas aeruginosa, Proteus species, Klebsiella species and E. coli are the most frequently occurring pathogens that cause CSOM. In order to establish a guideline for empirical antibiotic therapy, it is essential necessary to have an understanding of the local pattern of infection. This information is vitally necessary. The purpose of this research is to determine the antimicrobial sensitivity pattern of the microbes that are responsible for chronic suppurative otitis media as well as the local pattern of aerobic bacteria that are causing the condition. The treating physicians will be able to use this information to identify which antibiotics have the best chance of being effective against the particular microorganisms in question.

Keywords: Aerobic bacteria, CSOM

Introduction

Otitis media with chronic purulent inflammation, also known as chronic suppurative otitis media (CSOM), is one of the problems that are frequently seen in daily clinical practise. The World Health Organisation (WHO) defines CSOM as "Otorrhoea, i.e. ear discharge through perforated tympanic membrane present for at least 2 weeks'. However, few guidelines interpret "chronic" as symptoms persisting for more than 6 weeks [1]. In order to have a successful clinical outcome with patients who have CSOM, it is essential to have a solid understanding of the bacterial infections involved and the antimicrobials that are effective against them. CSOM continues to account for a considerable portion of overall medical costs, particularly in more economically disadvantaged segments of society. The CSOM has the potential to cause damage to the inner ear, which could result in permanent sensor ineural deafness in addition to additional extra or intracranial complications [2].

Pseudomonas aeruginosa, Staphylococcus aureus, and Enterobacteriaceae such as *Proteus* spp. and Klebsiella pneumoniae make up the majority of the bacteria that are typically found in the middle ear that is impacted by CSOM. Klebsiella pneumoniae is also a common isolate [3]. The condition is more common in underdeveloped nations, particularly in communities with low socioeconomic status. This is due to factors such as malnutrition, overcrowding, poor hygiene, inadequate health care, and frequent upper respiratory tract infections [4].

In underdeveloped nations, CSOM is a significant factor in the development of childhood hearing loss, which has the potential to be prevented. Therefore, research that can help facilitate more effective care for CSOM are in great need. In order to reduce the morbidity and mortality associated with CSOM, such as irreversible hearing loss and meningitis, it is vital to have knowledge of the local prevalence of the most prevalent etiological agent and the antibiotic susceptibility pattern associated with it. As a result, the current study was carried out with the purpose of determining the aerobic bacterial profile, the most common bacterial aetiology in our geographical area, and the antimicrobial sensitivity pattern of bacterial agents that cause CSOM.

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Aims and Objectives

1. To identify the most common aerobic bacteria responsible for causing CSOM in our geographical area.
2. To determine the antibiotic sensitivity pattern of the isolated organisms.

Materials and Methods

A total of 60 ear discharge samples which were received in Microbiology laboratory from patients who had been clinically diagnosed with CSOM between May 2023 and June 2023 and based on retrospective files.

The samples were subjected to Gram's stain and culture according to standard operative procedure. Antibiotic susceptibility testing was performed by Kirby-Bauer's disc diffusion method as per CLSI guidelines. For culture, sample was inoculated onto Blood agar, Chocolate agar and MacConkey's agar. The inoculated media were incubated aerobically at 37 °C for 18-24 hours. In case of no growth after 24 hours, the plates were further incubated for another 24 hours. If there is no growth even after 48 hours of incubation, the plates were discarded. Organisms isolated were then identified on the basis of their colony morphology, microscopy, cultural characteristics and biochemical reactions as per the standard operating procedures [5].

The antibiotic sensitivity of aerobic bacterial isolates was performed on Mueller Hinton agar (MHA) plates by standardized Kirby-Bauer disc diffusion method as per the Clinical Laboratory Standards Institute guidelines [6].

The results were interpreted as per the CLSI guidelines. The quality control for antimicrobial susceptibility testing was done with Escherichia coli (ATCC 25922), Staphylococcus aureus (ATCC 25923) and Pseudomonas aeruginosa (ATCC 27853).

In the present study, out of 254 samples, 222(87.4%) yielded growth. Highest incidence of CSOM was seen among age group of 0-25yrs. Females (56.3%) were more commonly affected than males (43.7%) showing female to male sex ratio 1: 0.7. Age and sex distribution of CSOM is shown in Table No: 1.

Table 1: Age and sex distribution of CSOM

Age	Males	Females
0-25yrs	21	19
26-50yrs	07	05
51-75yrs	04	04

S. aureus were predominantly isolated (37.9%).The distribution of various other pathogenic organisms are listed below in Table No: 2.

Table 2: Distribution of various isolates in CSOM

Microbes	No. of isolates
S. aureus	23
Pseudomonas spp.	19
Proteus spp.	09
Klebsiella spp.	04
E Coli	03
Citrobacter spp.	01

All the staphylococcus aureus isolates were methicillin sensitive. Among the oral antibiotics 70.5% of isolates were sensitive to Amoxyclav followed by Cefixime (58.8%), Ciprofloxacin (56.4%) and Co trimoxazole (52.9%). (Table No. 3)

Table 3: Sensitivity pattern of *S. aureus*

Antibiotic	Sensitivity % (total no. of *S. aureus* = 23)
Ciprofloxacin	13
Erythromycin	12
Clindamycin	16
Gentamicin	17
Amikacin	11
Amoxyclav	18
Co trimoxazole	17
Cefixime	17

Other than S. aureus, majority of the isolates were Gram negative bacilli. Among these highest isolated organism was *Pseudomonas* spp. (27.6%) and least isolated was *Citrobacter* spp. (4.9%). Antibiotic sensitivity pattern of Gram negative bacilli showed 100% sensitivity to Meropenem followed by

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 06, 2023

Piperacillin-tazobactum (94.8%). Least sensitivity is observed for Amoxyclav (47.4%). Antibiotic sensitivity pattern of other antibiotics is shown in Table No: 4.

Table 4: Antibiotic sensitivity pattern of Gram negative bacilli

Antibiotic	Sensitivity%
Amoxyclav	21
Amikacin	23
Ceftriaxone	34
Cefoperazone-salbactum	48
Cefixime	37
Cotrimoxazole	32
Aztreonam	12
Gentamicin	51
Meropenem	53
Ciprofloxacin	35
Piperacillin-tazobactum	57

Discussion

CSOM is a disorder of the middle ear that is distinguished by continuous or repetitive discharge through a chronic perforation of the tympanic membrane. This discharge can be caused by a variety of factors, including infection, inflammation, and trauma. Because the tympanic membrane has the potential to become perforated, bacteria are able to pass via the external ear canal and enter the middle ear. This is a common cause of middle ear infections. Ear discharge is almost always caused by an infection of the mucosa that lines the middle ear. This is true in the vast majority of instances. It is a disorder that manifests itself over an extended period of time and carries with it a significant risk of developing complications that cannot be remedied. Instances such as these can lead to problems including recurring otorrhoea, mastoiditis, labyrinthitis and facial nerve paralysis. They can even result in more serious results such as brain abscesses or thrombosis [7]. By doing a bacteriological diagnosis on each patient as early as is humanly possible, it is possible to guarantee that they will all receive treatment that is accurate and suitable for their condition. When choosing an antibiotic, it is crucial to take into account not only how effective it is but also the degree to which bacteria have become resistant to it, as well as whether or not it is risk-free, whether or not it carries a danger of toxicity, and how much it will cost. Other factors to consider include whether or not it is cost-effective [7]. In order to construct a protocol for empirical antibiotic therapy, it is vital to have knowledge of the local bacteria, their pattern, and the antibiotic sensitivity of the microorganisms.

In this investigation, Staphylococcus aureus was found to be the most prevalent bacterium that was isolated (37.9%), followed by Pseudomonas aeruginosa (27.6%). This finding is consistent with the findings of a study that was carried out by Neha *et al*. [8]

According to the results of our research, oral antibiotics that target Gram-positive organisms, such as amoxyclav, cefixime, ciprofloxacin, and co-trimoxazole, display the highest degree of sensitivity. The antibiotics ciprofloxacin, cefixime, and co-trimoxazole have demonstrated the highest sensitivity against Gram-negative bacteria. According to the findings of our research, the antibiotics ciprofloxacin, cefixime, and co-trimoxazole are the most widely used drugs that are sensitive to all types of isolates. As a result, microbiological culture, which takes approximately 48-72 hours for isolation and antibiotic sensitivity, is not the ideal choice for empirical treatment. These three antibiotics are the best choice for treating CSOM since they reduce the associated problems. Because they are oral antibiotics, not only are these antibiotics easy to administer, but they are also very cost effective.

Conclusion

In order to construct a protocol for empirical antibiotic therapy, it is vital to have knowledge of the local bacteria, their pattern, and the antibiotic sensitivity of the microorganisms.

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