MICROORGANISMS IN CHRONIC OTITIS MEDIA WITH EFFUSION

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ABSTRACT

A total of 100 patient with otitis media effusion obtained from patients suffering from chronic otitis media with effusions was examined for bacterial smear and culture. In mucoid effusion 82% showed positive bacterial smear, only 35% yielded positive bacterial culture. Bacterial cultures rate was higher in serous (50%) effusion. The isolation of common pathogens accounted for the remaining 42%. The high incidence of microorganisms in the middle ear effusions in the present study indicates bacterial contribution in many cases of otitis media effusion. Concerning the sterile nature of the middle ear fluid some investigators suggested that the effusions are transudates and are created by a negative pressure in the tympanum due to a malfunctioning Eustachian tube.² It was suggested that failure to isolate organisms may be partly due to the antimicrobial characteristics of effusions. The purpose of this study is to show possible role of bacteria in Middle Ear Effusions.

Key Words: Otitis Media, Effusion, Microorganisms.

INTRODUCTION

It is still unclear whether bacterial infection is one of the etiologic factors of chronic otitis Media with effusion. Although most investigators agree that middle ear effusions are sterile.¹ Scoenturia in 1958 and other have reported that about 35% of effusion yielded bacteria in culture. Concerning the sterile nature of middle ear fluid some investigators suggested that the effusion are transudate and created by negative pressure in the tympanum due

to malfunctioning of eustuchian tube.² Recent studies by numerous investigators demonstrated high level of immunoglobulin and lysozyme in middle ear effusion.³ Therefore it is conceivable that there may be organism in the effusion but their growth is inhibited by potent anti-microbial substances.

The purpose of this study is to show method of demonstrating bacteria in middle ear effusion and discuss the data in regard to possible role of bacteria in middle ear effusion.

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METHODS AND MATERIALS

The present study was under taken in patients who attended the ENT Dept. of Om Hospital Out patients department from Oct. 1995 to Oct. 1998. A total of 100 patients were included in this study, who underwent Ventilation tube insertion for the treatment. Antibiotic therapy was stopped for at least one month prior to sample collection. The ear effusions were aspirated with Myringotomy under general anesthesia. Samples were immediately sent to be laboratory for culture within two hours of collection. In order to investigate the possibility that effusions were contaminated with bacteria from the external ear canal during collection, ear canal cultures were made using two procedures before effusion collection, 1. Ear wax was obtained from 20 patients and placed in clinwax 2. Specimens were obtained from the external ear canal of 8 other patients using cotton swabs moistened with sterile saline. In this case, wax and debris were removed from the external ear canal before insertion of a sterile speculum and the swab was passed through to the membrane. These latter specimens were processed similarly to the effusions; in every case, corresponding effusions were collected and analyzed as done other study.³ All cultures were incubated at 37°C and plates were placed in CO₂ candle jars. Bacterial isolates were identified by studying the Gram stain reaction as well as biochemical and nutritional characteristics. Mucoïd effusions were diluted with saline and shaken with glass beads to break down the mucous strands. When the specimens were watery, they were transferred to a test tube and centrifuged at 1000g for 20 minutes. Studies, and two smears were made from the pellets. One smear

was stained by Gram's method for observing bacteria; the other was stained by Wright's method for enumerating blood cells. Specimens were classified into serous, mucoid and leukocytic types in accordance with the physical appearance and cell content of smears.

RESULTS

Out of 100 samples, 81% effusions showed bacteria on the smear, and only 41% yielded bacteria in culture, indicating that many effusions with positive, smears contain non-viable organisms. Mucoïd type effusions was most common. However, mucoid effusions had the lowest incidence (35%) of positive cultures, while serous type had 50% and leukocytic-type had 42%.

Usually only one but occasionally two types of bacteria were found on each smear. Bacteria were observed extracellularly and intracellularly. There were 7 different types of bacteria isolated from effusions of Otitis Media with Effusion (OME) patients. Besides the common human pathogens (*Hemophilus influenzae*, *Streptococcus pneumoniae*, Group A *Streptococcus*, *Staphylococcus aureus*), some nonpathogens such as diphtheroids, *Staphylococcus epidermidis*.

Branhamella catarrhalis were also isolated from a large number of specimens. *H. influenzae* was the most common isolate in leukocytic effusion and *S. Pneumoniae* was the most common isolate in serous effusion. Diphtheroid was the most common isolate in mucoid effusion.

Table I
Bacterial Isolates From Middle Ear Effusions

Type of Effusion	Mucoïd	Serous	Leukocytic	Total
Specimens tested	56	30	14	100
Bacteria on smear	46 (82%)	25 (83%)	10 (71%)	81 (81%)
Bacteria: culture positive	20 (35%)	15 (50%)	6 (42%)	41 (41%)

Fig 1. Bacteria isolates from culture positive cases.

DISCUSSION

This study showed approximately 41% of the effusions were bacterial culture positive, and 81% of the smears showed various organisms on gram stain. The high isolation rate in the mean but not in culture may be due to the procedure involving dilution of antimicrobial factors in effusions, which might inhibit the growth of bacteria in culture.⁴ The high incidence of bacteria positive smears may be due to the fact that pellets of centrifuged effusions were used for making smears. We also cannot completely rule out the possibility of contamination, which may be the reasons for the higher incidence of bacterial isolation. Since these organisms are also frequently observed in the external ear canal as normal flora, the possibility of contamination during specimen collection was carefully evaluated. The present study revealed that the organisms cultured from the effusions do not,

in general, correlate well with those isolated from either the external canal or ear wax. This finding would support the notion that the nonpathogenic organisms isolated from effusions are not contaminants. However, when the isolates from the surface of the tympanic membrane are examined, there is good correlation between the organisms isolated from the effusions and those cultured from the tympanic membrane. This high positive correlation (82%) of nonpathogens can be interpreted in several ways. 1) It could be due to contamination from the surface of the tympanic membrane. 2) The inflammatory process of the tympanic membrane influenced high nonpathogenic bacterial growth rate on its surface, but it is unrelated to the etiologies of the OME. 3) It is possible that the nonpathogens are related to OME and that the tympanic membrane in a pathologic condition is permeable to microorganisms. However, the concept that chronic middle ear effusions are sterile, accepted for decades by many clinicians, has discouraged attempts at culturing bacteria from effusions. When common human pathogens are isolated from chronic effusions, it is assumed that these are misdiagnosed cases of bacterial otitis media.

CONCLUSION

The high bacterial recovery rate in the present study may represent a high rate of treatment failure of acute otitis media as observed in other study.⁵ Correlating immunoglobulin levels and antibacterial enzyme (lysozyme) with the microbial isolation rate from effusions seemed to support the idea that the microbial organisms may have been involved in OME because the positive bacterial culture rate was inversely related to the levels of antimicrobial agents in the effusions;⁶ therefore, their presence in the effusions cannot be discounted as mere contaminants. H. Influenzae was the most common pathogen recovered from effusions in this study, and this organism is known to cause serous effusion in the middle ear, when infected. This

again signifies the importance of microbiological examination of OME.

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