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A Study of the Bacteriological Profile of Chronic Suppurative Otitis Media in Peripheral Institute

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Abstract: In the world of otorhinolaryngology chronic suppurative otitis media is one of the most commonly encountered diseases. The present prospective study was conducted at peripheral institute in North India towards clinico-microbiologic evaluation of chronic suppurative otitis media. Aerobic bacteria are mainly responsible for active csom so we had main focus on them in the present study. An attempt was made, to have a glimpse of the current antibiotic sensitivity pattern, with special reference to ciprofloxacin. Main aim of the present study is to see the types of aerobic bacteria involved in CSOM, in our region. In our study we collected aural swabs from 100 different ears, from 94 patients who had complaint of ear discharge, continuous or intermittent, with a non- intact tympanic membrane for 12 weeks or more. Swabs were sent to microbiology laboratory for culture and sensitivity tests. Bacteria could be isolated in 73 cases and 27 swabs were culture negative. The commonest bacteria isolated was *Staphylococcus aureus* (41),followed by *E. coli* (12), proteus (8) and klebseilla (2) pseudomonas(2).Twenty two patients had bilateral ear discharge of which 16 had staphylococcus aureus in both ears,three had proteus in both ear swabs, one grew proteus in one ear and no growth in the other, and one patient showed absolutely no aerobic bacteria in any of his ear swabs. Among the culture positive cases (n = 73) *S. aureus* in 41 cases. gram negative bacteria were isolated in (n = 32) cases. Among 100 patients number of male and female patients was 50 and 44, respectively. Pseudomonas, *E. coli*, Bacilli proteus and *S. aureus* were the predominant bacteria involved in CSOM. Out of the 73 positive isolates ciprofloxacin was sensitive against 55 isolates i.e.75.3%., intermediately sensitive in 14 and resistant in only 4 isolates. It is concluded in our study that, gram positive bacteria especially staphylococcus aureus is the commonest bacteria involved in CSOM in this part of north India. Ciprofloxacin is an important drug in the management of active CSOM as it is cheap, less ototoxic and widely available as topical preparations.

Index Terms -Aerobic bacteria · CSOM .Culture and sensitivity · Ciprofloxacin.

I. INTRODUCTION

Suppurative otitis media with its symptoms and complications may be a catastrophe for the nicely structured ear. It is a privilege for an E.N.T. surgeon to preserve, repair and take utmost care of the structure and function of this wonderful organ, in whatever condition it is presented. It is a challenge especially in children to prevent the progress of acute suppurative otitis media to a chronic disease i.e. C.S.O.M. [1].

In a WHO/CIBA Foundation workshop [2] in 1996 it was defined that Chronic suppurative otitis media is a stage of disease in which there is chronic infection of the middle ear cleft, i.e., eustachean tube, middle ear and mastoid, and in which a non-intact tympanic membrane (e.g., perforation or tympanostomy tube) and discharge (otorrhoea) are present for at least 2 weeks or more.

Those cases in which there is only central perforation of tympanic membrane without any discharge, they are referred to as inactive CSOM. There are two main varieties of CSOM viz. mucosal (or tubotympanic or safe) type of CSOM and squamous (or atticoantral or unsafe) CSOM. Active tubotympanic CSOM which was known as active mucosal chronic otitis media (COM) for sometime but the international symposium on recent advances in otitis media, in 1999 preferred the term chronic suppurative otitis media (CSOM) to COM which would mean 'a chronic perforation with chronic otitis media [3].

CSOM requires remarkable patient management, especially in the children of poorer socio-economic strata, as they do not or can not access adequate and persistent treatment for this chronic affliction [4].

Prevalence of CSOM is more in the poor countries. It is also common among the poorer sections of the developed countries. The incidence is highest among people with low hygiene or with over- crowding and malnutrition. In most cases the disease started in childhood when the Eustachian tube is incompetent. Also more bouts of acute otitis media were seen in infants with

many siblings in crowded day care facilities where the mother stopped breast feeding early and parents were smoking. Premature and low birth weight babies in lower socio-economic groups were more vulnerable to CSOM [1].

Also variety of host factors, genetic disorders like Down syndrome, immune deficiencies or paresis, ciliary disor- ders, cleft palate have been implicated in the causation of CSOM [1].

In this study we collected aural swabs from 100 ears, in 94 patients, and subjected to culture and sensitivity test in order to detect the aerobic bacteria involved in the chronic suppurative otitis media and the drug susceptibility of selected isolated bacteria.

I. Materials and method

Collection of Samples-

Informed consent of patients were taken. Only patients presenting with chronic or recurrent ear discharge and on clinical examination found to have discharging ears with central perforation of the tympanic membrane were selected for the study.

Samples were collected before administering any anti- biotic therapy and from those patients who had not given any history of recent medication for their ear disease. There were 94 patients who were enrolled in this study. Samples from 100 discharging ears were collected at the out patient's department (OPD) of Ear Nose and Throat, civil hospital Nagrota Bhagwan and civil hospital Jwalamukhi.

Specimens for pus culture were collected, under illu- mination, by swabbing the discharging ears with a sterile cotton swab and sent to the microbiology laboratory. Samples collected were inoculated in nutrient agar and Mackonkey medium and incubated for 24 to 48 h at 37°C in the lab. On visible growth of bacterial colonies, microscopic and various chemical and enzymatic tests were then conducted to identify the bacteria. An attempt was made to do sensitivity tests, by Kibri Bour disc diffusion method for commonly available and used drugs, especially ciprofloxacin.

Patients were divided into six age groups: (I) Group A: less than 10 years; (II) Group B: 11–20 years; (III) Group C: 21–30 years; (IV) Group D: 31–40 years; (V) Group E: 41–50 years; (VI) Group F: 51–80 years.

Observations

Out of total 94 patients, 50 (53.19%) were male and 44 (46.80%) were female patients. Group A had 28.72% (27) patients, group B 31.91% (30), group C 17.02%(16), group D 5.31%(5), group E 7.44%(7), group F 9.57%(9) patients. This is the group wise distribution of all the 94 patients who participated in this study. Among the positive cases (n = 73) there were 34 cases in group A, 21 cases in group B, 11 in group C, 5 in group D, 1 in group E, 1 in group F.

A significant observation is that 73 patients out of the 94 patients, who presented with CSOM, were below age of 30 years though it is seen in this study that no age is absolutely immune to this disease. The commonest bacteria isolated was *Staphylococcus aureus* (31),followed by *E. coli* (12), proteus (8) and klebseilla (2) pseudomonas(2).

It is observed that 41 out of the 73 bacterial isolates, approximately 56%, were of staphylococcus aureus in CSOM. Out of the 73 positive isolates cipro- floxacin was sensitive against 55 isolates i.e.75.3%., intermediately sensitive in 14 and resistant in only 4 isolates Therefore, on an average, majority of the cases in which ciprofloxacin were tested it was found to be effective.In 2 pseudomonas cases in whom ciprofloxacin was tested it was almost 100% effective.

Discussion

The chronic otitis media (COM) is defined as a permanent perforation of the tympanic membrane, which does not close by itself, and an inflammatory reaction in the mucosa of the middle ear. Two main forms of COM are distinct: the chronic suppurative otitis media and the cholesteat- omatous COM. Bacterial infection is often the cause of exacerbation and treatment failure in CSOM [5].

In the present study 97 patients of different age groups presenting with the complaints of continuous or intermit- tent ear discharge for at least 3 months and who on otos- copy revealed central perforations of their tympanic membrane, without any sign of cholesteatoma, were selected. One hundred aural swabs were collected in the ENT out patients department in Indira Gandhi Memorial Hospital (IGMH), Agartala. These aural swabs were col- lected in sterile test tubes, with sterile cotton swabs, under direct illumination. Culture sensitivity tests, especially against ciprofloxacin, for only the aerobic bacteria were tried in the Microbiology Laboratory of the IGMH. As all the antibiotic discs were not always available and because of man power shortage ciprofloxacin sensitivity could be tested in 35 out 53 bacterial isolates. However, that is the reason of keeping the antibiotic sensitivity test as a sec- ondary goal. The anaerobic and fungal cultures could not be done because of lack of facilities. As we do not have an animal house, like many of the other civil hospitals, fresh blood could not be arranged for preparing blood agar.

Out of the 100 swabs 53 yielded positive cultures, on nutrient agar and Mackonkey medium, for different aerobic bacteria and 47 was culture negative. There were no fungal isolates on these media. The commonest bacteria isolated were *Pseudomonas aeruginosa* followed by *S. aureus*,

E. coli and proteus. This is not different from many other studies, conducted worldwide, in which the commonest organisms implicated in CSOM were *P. aeruginosa*, *S. aureus*, proteus and other enteric bacteria. The present study revealed that 79.24% isolates were gram negative aerobic bacteria, as was found in other studies [6]. A review of studies of microorganisms implicated in CSOM of at least 2 weeks duration found that in children, as in adults, the most commonly isolated organism is *P. aeru- ginosa*. *Pseudomonas aeruginosa* is an opportunistic extracellular pathogen which thrives in the warm damp external auditory meatus of CSOM patients [7].

Fig. 1 Ciprofloxacin sensitivity among bacterial isolates

Bacteria	Total cases tested	Sensitive (S)	Intermediate (S)	Resistant
S. aureus	41	29	8	4
E. coli	12	8	4	0
Proteus	8	8	0	0
Klebsiella	2	2	0	0
P. aeruginosa	2	2	0	0
Mixed	8	6	2	0

A significant observation is that 73 patients out of the 94 patients, who presented with CSOM, were below age of 30 years though it is seen in this study that no age is absolutely immune to this disease, So it is clear that children and adolescents constitute the maximum patient population of CSOM.

Quinolones, especially ciprofloxacin was found to be effective in eradicating majority of the gram positive and negative bacteria, in which it was tested. In fact in this study it is seen that a cheaper drug like ciprofloxacin is almost 100% successful as far as *P. aeruginosa* is concerned. A randomized controlled trial of 0.3% ciprofloxacin drops against framycetin, gramicidin and dexamethasone drops for CSOM in a paediatric Australian Aboriginal population found a significantly higher rate of elimination of ear discharge in the ciprofloxacin group [9]. It can be concluded that ciprofloxacin ear drops can be tried as a first line of treatment in CSOM, in this part of India, though emergence of ciprofloxacin resistant pseudomonas and staphylococcus in CSOM are being reported in other parts of the Asian continent [10].

A significant 27% swabs did not grow any aerobic bacteria and they were culture negative; probably indicat- ing that an attempt to establish infrastructure for anaerobic and fungal culture as well as allergic diagnostic tests should be made. However, with all the draw backs and resource crunch in our civil hospital we were successful in having a glimpse of the aerobic bacteria involved in CSOM and efficacy of ciprofloxacin in the management of CSOM could also be tested to a significant extent. E.N.T. xpecialists have realized that allergic otitis media super- imposed on CSOM is a definite and not uncommon clinical entity, the permanent central perforation of tympanic membrane allowing dusts, moulds and pollens to easily enter and sensitize the middle ear mucosa [11]. Also in some studies anaerobes and fungus were isolated in small to significant number of patients [12].

It is concluded that gram positive aerobic bacteria especially staphylococcus aureus is significantly associated with CSOM, in this part of north India and ciprofloxacin is a preferable tool in the treatment of CSOM because of its lower cost, less ototoxicity and ubiquitous availability as topical and oral preparations.

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