Microbiological aspects of chronic suppurative otitis media in Ramadi city

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الخلاصة:

احريت هذه الدراسة في مستشفى **الرمادي** في مدينة الرمادي حيث تم اخذ المسحات من 72مريضا كانوا يعانون من التهاب الاذن الوسطى القيحي المزمن، اجريت عملية زرع العينات في اوساط زرع هوائية ، لا هوائية اختبارية ولا هوائية. اجري بعد ذلك فحص الحساسية للمضادات الحيوية للعزلات البكتيرية باستعمال طريقة انتشار الاقراص القياسية (طريقة كيربي باور) ام تظهر 4(5.5٪) عينات نمو جرثوميا توزعت كالتالي 78 (89.7٪) عزلة بكتيرية و 9 (10.3٪) عزلة فطرية كانت الزوائف الزنجارية 26(30٪) تمثل غالبية البكتيريا المعزولة وتاتي بعدها بصورة متعاقبة المكورات العنقودية الذهبية 19(21.8٪)البكترويد فراجلس 12(13.8٪) الكبسيلا 8(9.2٪) المتقلبات 4 (4.6٪) وبكتريا اخرى لقد كانت نسبة الحساسية للسبروفلوكساسين عالية جدا مقارنة بالمضادات الحيوية الاخرى وياتي بعدها الجيل الثالث للسيفالوسبورين والامينوكلايكوسايد لذلك فان استعمال خليط مضادات البكتريا اللاهوائية مع مضادات البكتريا الهوائية ومضادات الفطريات له اهمية بالغة في علاج هذه الالتهابات

Abstract:

Objective: to determine the microbiological causative agents of chronic suppurative otitis media (CSOM) among patients in Ramadi city and antimicrobial susceptibility surveillance pattern to the most frequently used antimicrobial agents. Patients and Methods: Seventy-two patients visited E.N.T. Unit of Saddam General Hospital in Ramadi were clinically diagnosed with CSOM. The specimens were obtained directly from the ear under direct vision and cultured under aerobic, facultative anaerobic, and anaerobic condition. Antimicrobial susceptibility tests were performed by using standardized Kirbey-Bauer disk diffusion test. *Pseudomonas aeruginosa* ATCC 27853, *Staphylococcus aureus* ATCC 25923 were used as internal quality control isolates.

Results: Out of 87 isolates, A bacterial isolates obtained in 78(89.7%) isolates. Among the bacterial causative agents, the most common bacteria isolated were *Pseudomonas aeruginosa* in 30%, followed by *Staphylococcus aureus* in 21.8%, anaerobic *Bacteroides fragilis* in 13.8%, *Klebsiellae pneumoniae* in 9.2%, *Proteus vulgaris* in 4.6% and others. A total of 9 (10.3%) fungal isolates, *Aspergillus niger* was 5.7%, and *Candida albicans* in 4.6%. The above cultured isolates were found either single or in mixed culture form, no growth was obtained in 4(5.5%) cases. Ciprofloxacin sensitivity ratio was the highest among other antimicrobial agents.

Conclusions: *Pseudomonas aeruginosa* was the predominant bacteria isolated from patients with CSOM followed by *Staphylococcus aureus,* anaerobic *Bacteroides fragilis* and the fungi respectively. Ciprofloxacin was the potent antimicrobial In vitro, through the high inhibition ratio to most of the bacteria followed by third generation cephalosporins and aminoglycosides. The use of systemic anti-anaerobic drugs combined with an anti-aerobic drugs is worthy of a clinical trial, on the other hand the addition of an antifungal to the preparation of local antibiotics may be beneficial.

Key words: Chronic suppurative otitis media Bacteria Fungi Antimicrobial

Introduction

Chronic suppurative otitis media (CSOM) is characterized by painless otorrhea and deafness greater than three months in duration [1], it is usually classified into two main groups: tubotympanic and atticoantral diseases. The principle symptoms of CSOM are hearing loss and aural discharge. A wide range of organisms, both aerobic and anaerobic may be isolated from cases of CSOM. The proportions of different organisms isolated vary from study to study. Anaerobes and aerobes are often found

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Table 1.The isolated microorganisms from ear discharge specimens of patients suffering from chronic suppurative otitis media.

Microorganism	No. of isolates	Percentage (%)
1-Bacteria		
A: Gram positive	78	89.7
- Staphylococcus aureus	19	21.8
- Strepococcus Pneumoniae	3	3.5
- Peptostreptococcus spp.	3	3.5
B: Gram negative		
- Pseudomonas aer uginosa	26	30
- Proteus vulgaris	4	4.6
- Klebsiellae pneumoniae	8	9.2
- Haemophilus influenzae	3	3.5
- Bacteroides fragilis	12	13.8
2-Fungi	9	10.3
- Aspergillus niger	5	5.7
- Candida albicans	4	4.6
3-No growth	4	5.5
Total	87	100%

together has been suggested this is because the aerobic organisms create an environment in which the anaerobes can grow in mixed infections by lowering the local oxygen concentration [12]. As the presence of resistant microorganisms to commonly used antimicrobial agents is an international problem [13]. the antimicrobial susceptibilities need to be evaluated periodically to guide clinician in choosing the appropriate medications. Thus, this study had been undertaken to determine the microbiological causative agents of CSOM and the antimicrobial susceptibility to the most frequently used antimicrobial agents among patients in Ramadi city.

Patients and methods

Seventy two patients visited E.N.T. unite of Saddam General Hospital in Ramadi during the period from June- October 2002 .These patients were clinically diagnosed with CSOM, the specimens were collected by introducing a cotton ear swab and rotating it in the external auditory canal. The ear swabs were delivered immediately and cultured within one hour. The ear swabs were inoculated on 1. Two plates of blood agar for aerobic and anaerobic culture. 2. Chocolate agar plate. 3. MacConkey's agar plate and 4. Sabourad's agar plate for 24 hours . If negative the anaerobic and Sabourad's cultures were incubated for a further 24 hours. All isolates were bacteriologically identified and confirmed by biochemical test following methods mentioned by Baron, Peterson, Finegold [14]. The antibiotics susceptibilities testing was performed by the standardized Kirbey-Bauer disc diffusion method using the Muller Hinton agar. Antibiotic discs with the following potencies were used: Ampicillin (lOmcg) , Cloxacillin (5mcg), ampiclox (lOmcg), gentamicin (lOmcg), tobramycin (30mcg), cefotaxime (30mcg), ceftazidime (30mcg), ceftriaxone (30mcg), co-trimoxazole (25mcg), vancomycin (30mcg), ciprofloxacin (5mcg), cephalexin (30mcg), piperacillin (lOOmcg) and rifampicin(30mcg). If the organism was sensitive to two or more antibiotics no more test were carried out, otherwise more test were performed.

Results: The age of the patients ranged between 1- 75 years (mean age 30.6). The female to male ratio was 1.4:1. Bacterial isolates encountered in 78(89.7%) and fungal isolates occurred in 9(10.3%). The aerobic isolate 63(72.4%) was more predominant than anaerobes 15(17.3%). The most common aerobic isolates were *Pseudomonas aeruginosa* 26(30%), *Staphylococcus aureus* 19(21.8%), *Klebsiellae pneumoniae* 8(9.2%), *proteus vulgaris* 4(4.6%), and to less extent *Streptococcus pneumoniae* 3(3.5%) and *Haemophilus influenzae* 3(3.5%). The most common anaerobic isolates were *Bacteroides fragilis* 12(13.8%) and to less extent *Peptostreptococcus* 3(3.5%) (see table1).Among the 9 fungal isolates, 5(5.7%) were *Aspergillus niger* and the remaining 4(4.6%) were *Candida albicans.*

Out of 72 patients, 4(5.5%) specimens showed no growth of microorganisms (see table 1).With regard to antimicrobial susceptibility test; *Pseudomonas aerugenosa* were found to be sensitive to ciprofloxacin (96%), ceftazidime (88%), tobramycin (82%) and gentamicin (78%), on the other hand it was resistant to ampicillin (100%), cephalexine (96%), co-trimoxazole (94%) and ampiclox (93%), while *Staph. aureus* was sensitive to vancomycine (96%), ciprofloxacin (93%), ceftazidime (89%), Rifampicin(84%), ceftriaxone (83%), cefotaxime(82%), Co-trimoxazole (78%) and cloxacillin (75%), but it

Table 2. Susceptibility percentages of isolates to the antibiotics used in Kirbey Bauer method

Antimicrobial agents	Pseudomonas aeruginosa	Staphylococcus aureus	Klebsiellae pneumoniae	Proteus vulgarise	Haemophilus Influence
Ampicillin	0.0%	5.0%	3%	8%	53%
Cloxacillin		72%			
Ampiclox	7.0%	75%	18%	21%	58%
Gentamicin	78%	53%	81%	85%	28%
Tobramycin	82%	58%	85%	79.5%	33%
Cefotaxime	76%	82%	72%	79%	88%
Ceftazidime	88%	89%	76%	89%	89.8%
Ceftri axone	74%	83%	78%	82%	83%
Co- trimoxazole	6%	78%	22%	44%	22%
Vancomycin		96%			
Ciprofloxacin	96%	93%	90.5%	97.8%	91%
Cephalexin	4%	12%	14%	32%	25%
Piperacillin	12%		22%	29%	62%
Rifampicin		83%			

was resistant to ampicillin (95%), and cephalexin(88%). Further, *Klebsiellae pneumoniae* were found to be sensitive to ciprofloxacin (95.5%), tobramycin (85%), gentamycin (81%) and ceftriaxone (78%), but they were resistant to ampicillin(97%), cephalexin(86%) ampiclox(82%), and co-trimoxazole (78%). *Proteus vulgaris* was sensitive to ciprofloxacin (97.8%), ceftazidime(89%), gentamicin (85%), ceftriaxone (82%), and cefotaxime (79%), but it was resistant to ampicillin (92%), ampiclox (79%), piperacillin (71%), and cephalexin (68%). *H. influenzae*showed sensitivity to Ciprofloxacin (91%), Ceftazidime (89.8%), cefotaxime(88%), and ceftriaxone (83%), but resistant to Co-trimoxazole(78%), cephalexin (75%), gentamicin (72%), and tobramycin (67%) (see table 2).

Discussion:

A wide range of microorganisms, both aerobic and anaerobic may be isolated from cases of CSOM, those organisms vary from study to study, with the presence of resistant microorganisms to commonly used antimicrobial agents is an international problem. The antimicrobial susceptibility testing was performed to a limited number of commonly used antibiotics due to reduce the laboratory expense. If the isolate was resistant to all of them, sensitivity test for further antibiotics would be performed. This limited the number of microorganism tested for their sensitivity to some antibiotics. All the cultures in the present study were obtained from the external canal. This method had been criticized by some investigators to be inadequate and misleading^, despite the fact, other still advocate it^. Our study demonstrated that *pseudomonas aeruginosa* 26(30%) was the commonest bacteria isolated from the specimens followed by *Staphylococcus aureus* 19(21.8%). This result is consistent with the results demonstrated by other studies[1,7,9,10]. It is well known that *Pseudomonas aeruginosa* do not normally inhabit the upper respiratory tract, and these organisms were considered as secondary invaders from the external canal, entering the middle ear in the perforated tympanic membrane following an acute episode of otitis media[6]. However, other researchers believe that *pseudomonas aeruginosa* causes diseases, the predominantly in human beings with altered host defenses, the defect leading to Pseudomonal infection of the middle ear is not known[**]. However, observation from others suggest that Eustachian tube dysfunction impairs middle ear defense, and the perforation is as a result rather than a cause of Pseudomonal otitis medi[12].

others suggest that Eustachian tube dysfunction impairs middle ear defense, and the perforation is as a result rather than a cause of Pseudomonal otitis medi[12].

Our study revealed that anaerobic bacteria were important component of the isolated microorganism in CSOM. This was in agreement with the those results observed by other researchers[5,8,11]. Of these anaerobes, *Bacteroides fragilis* was the commonest isolates 12(13.8%). Rotimi and associates[*], showed that *Bacteroides fragilis* was the commonest anaerobic bacteria and the second single most common bacteria generally present

in CSOM, therefore the use of systemic anti-anaerobic drugs in combination with an anti-aerobic drugs is worthy of a clinical tria . Our study showed that 9(10.3%) isolates represent fungal infection, this near to the results ofAl-Faris and *et al.* , this may be due to irrational use of local ear medication , therefore the addition of an antifungal to the preparation of local antibiotics may be beneficial No growth was observed in 5.5% of the ear swabs in the present study, this finding appeared in other studies^'''. There is no single antimicrobial agent which can be used to treat CSOM caused by varieties of organisms identified. With regard to antimicrobial susceptibility, ciprofloxacin was the potent antimicrobial *in vitro* through the high percentage of sensitivities 97.8%, 96%, 93%, 91% and 90.5% for *Proteus vulgaris, Pseudomonas aeruginosa, Staph. aureus, , H. influenzae and Klebsiellae pneumonae* respectively. This result is in agreement with those obtained by Altuntas, *et* a . The next group regarding potency *in vitro,* was third generation cephalosporins and aminoglycosides. On the other hand, the antimicrobial agents that carried high resistant rate were ampicillin and cephalexin.The study concluded that *Pseudomonas aeruginosa* was the predominant bacteria isolated from patients with CSOM followed by *Staphylococcus aureus,* anaerobic *Bacteroides fragilis* and the fungi respectively. Ciprofloxacin was the potent antimicrobial agent *in vitro,* through the high inhibition ratio to most of the bacteria followed by third generation cephalosporins and aminoglycosides. The use of systemic anti-anaerobic drug combined with an anti-aerobic drug is worthy of a clinical trial, on the other hand the addition of an antifungal to the preparation of local antibiotics may be beneficial.

References:

1-Canter RJ .Acute suppurative otitis media. In: Scott-Brown's otolaryngology. By: John BB. Butterworth Heinemann. 1997; 3: 1-11.

2-Mills RP . Management of chronic suppurative otitis media. In: Scott-Brown's otolaryngology. By: John BB. Butterworth Heinemann. 1997; 3: 101-9.

3-Al-Faris EA , Abdulghani H , Mukhdomi GJ , Kambal A , Al-Muhaimeed HS . Microbiology and antimicrobial sensitivity of suppurative otitis media . Saudi Med Jour. 1998 ; 19: 417-20.

4-Baron EJ, Peterson LR, Finegold SM. Bailey and Scott's Diagnostic Microbiology. Toronto: Mosby Company 1994; ^edition: 389-400.

5-Erkan M, Asian T, Sevuk E, Guney E . Bacteriology of chronic suppurative otitis media. Ann-Otol-Rhinol-Laryngol. 1994; 103: 771-74.

6-Rajil KGS, Unuykrishan P, Nayar RC, Dutt S, Macaden R. Reliability of conventional ear swabs in tubotympanic chronic suppurative otitis media.J Laryngol Otol. 1990; 104: 460-62.

7-Ashoor A , Maksoud MRA. Clinical and Bacteriological Study of Chronic Suppurative Otitis Media in school boys of the Eastern Province ofSaudia Arabia. Saudi Med J 1984 ; 5: 167-70.

8-Rotimi VO, Okeowo PA, Olabiyi DA, Banjo TO. The bacteriology of chronic suppurative otitis media.EastAfrMedJ.1992; 69: 394-97.

9-Greval RS, Ram S . Bacteriological patterns of chronic suppurative otitis media in Ludhiana. Indian-J-Med-Sci. 1996; 50: 192-95.

10-Reo BN, Reddy MS. Chronic suppurative otitis media, a prospective study. Int J Oral Head Neck Sur. 1994; 3: 72-77.

11-Attallah MS. Microbiology of chronic suppurative otitis media with cholesteatoma. Saudi Med J . 2000; 21: 924-27.

12-Antonelli PJ, Juhn SK, Goycoolea MV, Giebink GS. Pseudomonas otitis media after Eustachian tube obstruction. Otolaryngol Head Neck Surg. 1992; 107:511-15.

13-Gooch WM, Gan VN, Gorder WT, Khurana CM, Andrews WP . Clarithromycine and cefaclor suspensions in the treatment of acute otitis media in children. Pediatr Infect Dis J . 1993; 12: 128-33.

14-Zakzouk SM, Mahgoub S. Otitis media in Saudi Arabia:bacteriological and clinical study. Saudi Med J . 1980; 1: 317-22.

15-Altuntas A, Asian A, Eren N, Unal A, Naica Y. Susceptibility of microorganisms isolated from chronic suppurative otitis media to ciprofloxacin . Eur-Arch-Otorhinolaryngol.1996; 253: 364-66.