Research Paper

Volume : 4 | Issue : 6 | June 2015 • ISSN No 2277 - 8179

Aerobic Bacteriology of Chronic Suppurative Otitis Media(Csom)-A Hospital Based Cross Sectional Study

Microbiology

KEYWORDS : CSOM, Bacteriology, Antibiotic sensitivity.

Divya vaishnavi.G M.Sc Department of Microbiology Kamineni institute of medical sciences Narketpally ,Nalgonda Dist.-508254,Telangana

ABSTRACT

Chronic suppurative otitis media is one the most common conditions in ENT practice. Its importance lies in its chronicity and dreaded complications .The frequent presence of CSOM in general practice and poor response to routine treatment make the evaluation of bacteria flora important.The aim of the study is to isolate and identify the etiological agents causing CSOM and determination of their antimicrobial susceptibility pattern. In this study, one hundred clinically diagnosed cases of CSOM with chronic ear discharge with no prior antibiotic consumption were considered, whose ear swabs were collected and cultured for bacteria. Standard methods of isolation and identification were done followed by Antibiotic susceptibility testing by Kirby- Bauer disc diffusion method. Staphylococcus aureus was the most dominant including isolates of Methicillin resistant Staphylococcus aureus, followed by Pseudomonas aeruginosa. Antibiotic sensitivity pattern shows ciprofloxacin to be the most effective drug, followed by gentamicin and amikacin.

Introduction :

Chronic Suppurative otitis Media (CSOM) is a disease of multiple etiology and is well known for its persistence and recurrence, despite treatment. CSOM is a destructive disease with irreversible sequelae and can proceed to serious intra and extra-cranial complications.[1] It is an infection of the middle ear that lasts for more than three months and is accompanied by tympanic membrane perforation.[2]

CSOM was found to be the single main cause of conductive deafness and was responsible for 60.27% cases (Mann. et al 1976).[3] It was found to be the most common disease in all age groups specially childhood and is more prevalent in developing countries.[4]

The indiscriminate and haphazard use of antibiotics and poor follow up of the patients have resulted in persistent low grade infectional changes in the microbiology of the disease, the advent of new antimicrobials, anti-inflammatory and anti-histamine agents make the evaluation of bacterial flora of CSOM important.[5] The study of the micro-organisms commonly associated with CSOM and their in vitro antibiotic sensitivity pattern is very important for the clinician to plan a general outline of treatment for the patient with CSOM.[6]

The present study was undertaken to study the aerobic microbial flora involved in causation of CSOM. The antibiotic susceptibility pattern has also been studied. All this has been done with a purpose to acquire data on the pattern of CSOM infections prevalent in our hospital and to suggest the therapeutic guidelines in the light of present findings.

Subjects and Methods:

A total of one hundred patients with CSOM attending outpatient department and those admitted in ENT wards from March 2012 – November 2012 with a history of chronic ear discharge were studied. Patients who were not on prior antibiotic treatment either systemic or local were considered. Two sterile ear swabs were used to collect ear discharge from CSOM patients. One swab was used for performing Grams stain and second was for culture. Samples were cultured on both Blood agar and MacConkey agar. The specific identification of bacterial pathogens is done based on their microscopic morphology, staining characteristics, cultural and biochemical properties using standard laboratory procedures. Antimicrobial susceptibility of the bacterial isolates to the commonly used antibiotics was done by Kirby-Bauer disc diffusion method as per the recent CLSI guidelines.[7]

Results:

Out of 100 samples from patients included in the study, 96(96%) were culture positive and 4(4%) no growths were obtained. Gram negative organisms (58.1%) were more common than Gram positive organisms (41.66%), however most commonest organism isolated was Staphylococcus aureus (41.6%) including 5(5.2%) isolates of Methicillin resistant Staphylococcus aureus, followed by Pseudomonas spp. (33.3%), Klebsiella spp. (11.4%), Proteus spp.(10.41%), E. coli (3.1%).Detailed list of isolates from CSOM samples are depicted [Table.1].

The antibiotic susceptibility pattern among the Gram positive organisms showed that, MSSA was sensitive to most of the drugs like Erythromycin(46%), Cotrimoxazole(50%), Ciprofloxacin(72%), Gentamicin(83%), Amikacin(75%), Cefuroxime(100%) and Cefoxitin(100%). However, resistance to Erythromycin(100%), Gentamicin(100%), Cefuroxime(100%) and Cefoxitin(100%) were reported amongst MRSA.[Table. 2].

Antibiotic sensitivity of Gram negative isolates showed more sensitivity to Ciprofloxacin(91.44%),Gentamicin(88.54%), Amikacin(77.76%), Ceftazidime(60.28%) Cefaperazone(58.9%) , and least sensitivity to Cotrimoxazole(40.55%), Piperacillin(30.76%) and Ampicillin(27.65%) [Table. 3].

Discussion:

CSOM is a condition of the middle ear that is characterized by persistent or recurrent discharge through a chronic perforation of the tympanic membrane. When untreated may pose great risk of irreversible complications. Such complications range from persistent otorrhoea, mastoiditis, labyrinthitis, and facial nerve paralysis to more serious intracranial complications.[8]

In the present study out of 100 samples processed 96(96%) specimens were positive and 4(4%) were negative for culture which is comparable with the study of Nandy A. et al[5],Gupta V. et al[9], Asif AlamGul .etal[4].However the culture results were variable in case of Gulati et al.[10]22(22%) and AminuA.Bakari et al.[11]22(22.68%) they found high percentage of sterile samples. Negative cultures may be attributed to non bacterial growth, Anaerobic growth, prior antibiotic therapy, presence of antimicrobial enzymes which are lysozymes alone or in combination with Immunoglobulins that suppress the bacterial growth.[6,12,13]

In present study the monomicrobial etiology was 82(82%) and polymicrobial was 14(14%). The present study is in correlation with, Asif AlamGul (2004)[4]and SrivastavaV.K.etal(1979)[14]who also found predominance of pure cultures over mixed cultures. However Vijaya(1998)[15] reported only 51%. Availability and use of tropical and systemic broad spectrum antibiotics in the period before consultation was probably responsible for lower incidence of mixed cultures.

Our results show that Staphylococcus aureus was the predominant organism 40 (41.66%) followed by Pseudomonas spp. 32

(33.3%), Klebsiella spp. 11 (11.4%), Proteus spp. 10(10.41%)E. coli 3 (3.1%).This was in correlation with the study of Singh M. et al[12], Rama rao M.V. et al[16], Vijaya.D.et al[15] Patricia N. Ayson. et al.[17], Irfan Ali Mirza.et al.[18].However workers likeLoy A.H.C. et al. (2002)[19],ShaziaParveen. S. et al.[20],Ballal M. et al[21], have found Staphylococcus aureus as the second most common organism causing CSOM. The next predominant organism in the present study was Pseudomonas species 32(33.3%). However some workers like Ballal M. et al. (1992)[21],Saurabh V. et al. (1999)[22],Loy A..C. (2002)[19], Irfan Ali Mirza.et al (2008)[18] and Shazia(2012)[20] have found Pseudomonas spp. as the predominant organism causing CSOM. The next most common organism was Klebsiella spp. 11 (11.4%) in the present study. Some workers have got variable results. However Aminu A. Bakari.et al (2010)[11]have reported Klebsiella as the predominant organism causing CSOM [Table 4].The frequency of Staphylococcus aureus in the middle ear infections can be attributed to their ubiquitous nature and high carriage of resistant strains in the external auditory canal and upper respiratory tract. The organisms like Pseudomonas spp. and Proteus spp. are considered mostly as secondary invaders from external auditory canal gaining access to the middle ear via a defect in tympanic membrane resulting from an acute episode of otitis media. Organisms like E. coli and Klebsiella spp. become opportunistic pathogens in the middle ear when resistance is low.

Antibiotic sensitivity was carried out for 96 isolates by Kirby-Bauer disc diffusion method by using antibiotic discs. In the present study 87.07% of organisms were sensitive to ciprofloxacin, followed by gentamicin (42.46%), The most effective drugs in the present study were ciprofloxacin, gentamicin and amikacin. Similar sensitivity pattern was reported by

Gulati et al. (1997)[10]However Hiremath S.L. et al. (2001)[13]Nandy A. et al.(1991)[5] have found gentamicin as the most effective drug [Table 5].

Conclusion:

The knowledge of antibiogram of bacteria not only prevents thadministration of unwanted antibiotics but also prevents the development of antibiotic resistance, which is one of the major problems to the clinician. This certainly will help in achieving-dry ear and prevention of Complications.

TABLE 1

GROWTH OF VARIOUS ORGANISMS AMONG POSITIVE CASES(n=96)

Organisms Isolated		No.	%
Gram positive organisms	Methicillin sensitive Staphylococcus aureus	35	36.4%
	Methicillin resistant Staphylococcus aureus	5	5.2%
Gram negative organisms	Pseudomonas aeruginosa	32	33.3%
	Klebsiella spp.	11	11.4%
	Proteus mirabilis	6	6.2%
	Proteus vulgaris	4	4.1%
	Escherichia coli	3	3.1%
	Total	96	100%

TABLE 2

PERCENTAGE OF ANTIBIOTIC RESISTANCE PATTERN IN GRAM POSITIVE ORGANISMS (n=40)

ORGANISMS ISOLATED	P(%)	E(%)	Cx(%)	Cot(%)	Cxm(%)	Cip(%)	G(%)	Ak(%)
MSSA(no.=35)	100%	54%	0%	48.5%	0%	28%	17%	25%
MRSA(no.=5)	100%	100%	100%	20%	100%	20%	20%	100%

P:Penicillin; E:Erythromycin; Cx: Cefoxitin; Cot: Cotrimoxazole; Cxm:Cefuroxime; Cip: Ciprofloxacin; G: Gentamicin; Ak:Amikacin;

TABLE 3

PERCENTAGE OF ANTIBIOTIC RESISTANCE PATTERN IN GRAM NEGATIVE ORGANISMS(n=56)

ORGANISM	Amp(%)	Pc(%)	Cip(%)	Ak(%)	G(%)	Caz(%)	Cfp(%)	Cot(%)
Pseudomonas aeruginosa (no.=32)	-	75%	15.6%	34%	21%	46%	21.8%	-
Klebsiella spp (no.=11)	81.8%	65.6 %	27.2%	27.2%	36.3%	27.2%	27.2%	54.5%
Proteus mirabilis (no.=6)	66.6%	66.6 %	0%	0%	0%	33.3%	50%	33.3%
Proteus vulgaris (no.=4)	75.0%	100%	0%	50%	0%	50%	75%	50%
Escherichia coli (no.=3)	66.6%	100%	0%	0%	0%	33%	33%	100%

Amp: Ampicillin; Pc: Piperacillin; Cip: Ciprofloxacin; Ak: Amikacin; G: Gentamicin; Caz: Ceftazidime:Cfp: Cefaperzone; Cot:Cotrimoxazole

TABLE 4

COMPARISION OF ORGANISMS ISOLATED AMONG THEIR STUDIES

S.No	Author	year	Staphylococcus aureus	Pseudomonas aeruginosa	Klebsiella spp.	Proteus spp.	Escherichia coli
1	Singh M. et al[12]	1972	48.70%	7.10%	4.90%	25.50%	0%
2	Aminu A. Bakari et al[11]	2010	9.30%	8%	41.30%	1.30%	29.30%
3	Vijaya.D. et al[15]	1998	19.90%	7.28%	18.44%	3.80%	0%
4	Rama rao M.V. et al[16]	1980	31.70%	23.00%	13.70%	22.90%	0%
5	Patricia N. Ayson. et al[17]	2006	50%	33.30%	0%	9.50%	0%
6	Irfan Ali Mirza. et al[18]	2008	39.50%	0%	1.50%	1.50%	0.20%
7	Loy A.H.C. et al[19]	2002	33.30%	34.40%	7.80%	2.20%	2.20%
8	ShaziaParveen. S. et al[20]	2012	21.62%	29.72%	6.70%	8.10%	13.50%
9	Ballal M. et al[21]	1992	30.40%	31.90%	12.40%	11.50%	0%
10	Saurabh V. et al[22]	1999	19.52%	35.71%	6.19%	21.90%	0%
11	BayehAbera. et al [23]	2013	24.40%	18%	2.80%	26.50%	17.70%
12	Present study	2012	41.66%	33.30%	11.40%	10.41%	3.10%

Volume : 4 | Issue : 6 | June 2015 • ISSN No 2277 - 8179

TABLE 5
COMPARISION OF ANTIBIOTIC SENSITIVITY PATTERN AMONG CSOM ISOLATES

S.No	Study series	Year	Amp	Cot	G	Ak	Cip	Cpz
1.	Nandy A. et al.[6]	1991	14.8%	4.5%	86.4%	-	-	-
2.	Gulati et al.[30]	1997	12.5%	-	72%	41.67%	73.61%	-
3.	Saurabh.V. et al.[22]	1999	7.14%	-	56.35%	67.46%	41.27%	-
4.	Hrimath S.L. et al.[33]	2001	13.47%	16.67%	56.35%	67.46%	41.27%	-
5.	Poorey[24]	2002	-	57%	77%	87%	83%	78%
6.	Sateesh K.M. et al.[5]	2012	-	36.63%	67.63%	82.38%	76.63%	75.84%
7.	Present study	2012	58.66%	51.05%	85.77%	76.38%	87.07%	70.43%

REFERENCE

1. Malkappa SK, Kondapaneni S, Surpum R.B, Chakravarthi T.K. Study of aerobic bacterial isolates and their antibiotic susceptibility pattern in chronic suppurative otitis media. Indian Journal of Otology 2012;18(3): 136-139. | 2. R.K.Sanjana, Y.L. singh, N.S. reddy. Aerobic bacteriology of CSOM in Nepal. Journal of medical sciences-Nepal,2011;7(2):1-8 | | 3. Mann S.B.S, Grewal B.S, Manisingh M, Mehra Y.N, and Arora M.M.L: Indian J. Otolaryngeol. 28-35 ,1976. | | 4. Asi-falamgul, Liaqatali, EajzRahim ,Shakeelahmed. Chronic suppurative otitis media , Pseudomonas aeroginisa, microbiology and sensitivity. Professional med j sep2007 ;14(30 411-415. | | 5. Nandy A, Mully PS, Sivarajan K. Chronic suppurative otitis media – A bacteriological study. Indian Journal of Otolaryngology 1991; 43(3):136-138. | | 6. Greval RS, Ram Shobha. Bacteriological patterns of chronic suppurative otitis media in Ludhiana. Indian Journal of Medical Sciences 1996; 50(6):191-95. | | 7. National committee for Clinical Laboratory Standard. Performance Standards for Antimicrobial susceptibility Testing. Wayne, PA, USA:NCCLS:2001 .p. M100-S1. | | 8. Fatima AA, Assiry S, Siraj MZ. Microbiological evaluation and aspects on management of chronic suppurative otitis media in Riyadh. Indian JoTAL 1998;4:115-20. | | 9. Gupta Abhay, Agarwal SR. A study of prevalence of cholesteatoma in complications of suppurative otitis media. IJO & HNS 1998;50(2):140-145. | | 10. Gulati, Sudesh Kumar. Investigative profile in patients of chronic suppurative otitis media. Indian Journal of Otology 1997; 3(2):59-62. | | 11. Aminu A. Bakari, Adeyi A. Adoga, Olushola, A.Afolabi, Aliyu M. Kodiya, | Babagana M. Ahmad. Pattern of chronic suppurative otitis media. Media Journal | of medicine in Tropics 2010; 12: 22-25. | | 12. Singh N, BhaskarRadha. Microbiological study of otitis media. Indian Journal of Otology 1972; 24(4):161-163. | | 13. Hire-math SL, Kanta RC, Yeshwanath rao M, Vasantha Kumar CM. Aerobic bacterial isolates of CSOM and their antibiotic sensitivity pattern. The Indian Practitioner 2001; 54(7):486-489. | | 14. Srivastava VK, Agarwal SK, Malik G. Chronic suppurative otitis media in children. Indian Journal of Paediatrics1979; 46(3&1):363-367. | | 15. Vijaya D, Nagarathnamma T. Microbiological study of chronic suppurative otitis media. Indian J Otol 1998;4:172-4. | | 16. Rama Rao MV, Jayakar PA. Bacteriological study of chronic suppurative otitis media. Indian Journal of Medical Association 1980; 75:30-33. | | 17. Patricia N. Ayson, Jan Eero G. lopez, Erasmo Gonzalo DV Leanes. Chronic | suppurative otitis media: Bacteriology and drug sensitivity pattern. Philipp J Otolaryngol Head Neck Surg 2006;21(1,2):20-23. | | 18. Irfan Ali Mirza, Liaquat Ali, Liaquat Ali, Muhammad Arshad. Microbiology of Chronic suppurative otitis media. Pakisthan armed forces medical journal 2008;12(4):1-6. | | 19. Loy AHC, Tan AL, Lu PKS. Microbiology of chronic suppurative otitis media in Singapore. Singapore Med J 2002; 43(6):296-299. | | 20. ShaziaParveen .S, Janardhan Rao R. Aerobic bacteriology of chronic suppurative | otitis media. J. Microbiol. Biotech Res. 2012; 2(4): 586-589. | | 21. Ballal M, Jyothirlatha, Kishor J, Rajan R, Shivananda PG. Chronic suppurative otitis media – A bacteriological and mycological study. Indian Journal of Otolaryngology and Head and Neck 1992; 1(1):10-13. | | 22. SaurabhVarshney, Pratima Gupta. Bacteriological study of chronic suppurative | otitis media. Indian Journal of Otology 1999; 5(2):87-91. | | 23. BayehAbera, MulugetaKibret. Bacteriology of antimicrobial susceptibility of otitis media. Ethiopia. J. Health Dev. 2011;25(2): 161-167. | | 24. V.K.Poorey, AratiIyer. Study of bacterial flora in chronic suppurative otitis media and its clinical significance. Indian Journal of Otolaryngology and Head and Neck 2002;54(2):91-95.