International Journal of Medicine Research
ISSN: 2455-7404; Impact Factor: RJIF 5.42
www.medicinesjournal.com
Volume 1; Issue 1; March 2016; Page No. 106-109

Chronic suppurative otitis media in children: Review

Dr. Ravi Kumar D, Dr. Pundareekaksha Rao P

Assistant Professor, A.V. College & Hospital, 242 – B, Trichy road, Sulur, Coimbatore, Tamilnadu, India

Abstract
Chronic Suppurative Otitis Media is one of the common ear disease in young children, has been associated with frequent and severe complications. Chronic Suppurative Otitis Media (CSOM) is the most disabling form of otitis media. Children with Acute Otitis Media with perforation will develop Chronic Suppurative Otitis Media. The incidence is increasing in the developing countries due to poor hygiene, malnutrition and lack of health education. Both gram positive and gram negative organisms are responsible for infection of middle ear. Many more previous studies showed Pseudomonas aeruginosa is to be the most common pathogen from CSOM cases. Complications of CSOM including tympanic membrane perforation, hearing loss, ossicle lesions, facial palsy, mastoiditis, labyrinthitis, petrositis, meningitis, thrombophlebitis etc. Mortality and hearing loss due to otitis media are primarily related to the complications of CSOM. Aspiration of inflammatory exudates, ear cleaning, topical antibiotics, topical antiseptics, systemic antibiotics have been effective in controlling the disease. Mastoidectomy, tympanoplasty are permanent cure for CSOM. So, early detection of disease and health educational training, awareness programs on of the disease for school going children and parents is needed to reduce the prevalence of the disease.

Keywords: Chronic Suppurative Otitis Media, Pseudomonas aeruginosa, Mastoidectomy, Tympanoplasty, Awareness programs

1. Introduction
Chronic Suppurative Otitis Media (CSOM) is defined as chronic inflammation of middle ear cavity that may present with recurrent ear discharges through a tympanic perforation [1]. The WHO defined CSOM as "Otorrhoeas through a perforated tympanic membrane present for at least two weeks" [2]. Chronic Suppurative Otitis Media is the most disabling form of otitis media [3, 4]. Otitis media is a spectrum of disease, which includes, Acute Otitis Media without perforation, Acute Otitis Media with perforation, Otitis Media with effusion and Chronic Suppurative Otitis Media. Acute Otitis Media without perforation is presented as Bulging tympanic membrane with or without ear pain. Acute otitis media with perforation is having recent discharge through perforated tympanic membrane with or without ear pain. Otitis media with effusion is asymptomatic persistent middle ear effusion confirmed by pneumatic otoscopy or tympanometry. Chronic Suppurative Otitis Media represents the most important cause of moderate conductive hearing loss in many developing countries [4].
CSOM has received considerable attention, not only because of its high incidence and chronicity, but also because of issues such as drug resistance and ototoxicity with both topical and systemic antibiotics [5]. It is seen in all the continents of world and is more prevalent in developing countries. It is more common in the lower socioeconomic group [6]. The incidence of CSOM is increasing in the children of developing countries due to poor hygiene, malnutrition and lack of health education. Rakesh kumar study shows that among 115 patients most of the patients were between age group 11-20 years (39.13%). And CSOM was found to be more common in male patients (61.73%) than in female (38.26%) patients [7]. High prevalence of CSOM in children may be attributed to the fact that they are more prone to upper respiratory tract infections [8].

2. Discussion
Chronic Suppurative Otitis Media is a long standing inflammation of mucoperiosteum of middle ear cleft [9]. CSOM was defined by task force of forth International Symposium of Otitis Media held in June 1987 in Bal Harbour, Florida as the condition "Refer to a chronic discharge from middle ear through perforation of tympanic membrane." CSOM is also called Chronic Active Mucosal Otitis Media, Chronic Oto-Mastoiditis, and Chronic Tympano Mastoiditis. It is associated with intermittent, continuous, mucopurulent or purulent ear discharge, hearing impairment and tympanic membrane perforation. Presence of fluid attenuates sound transmission which may result in hearing loss (Paparella 1986). The evidence of sensorineural hearing loss in chronic suppurative otitis media is much more recent. Paparella, Brady and Hoel (1970) reporting on the decade-audiograms in 279 ears out of more than 500 studied from patients with chronic suppurative otitis media, observed significant sensorineural hearing loss particularly at higher frequencies both in unilateral and bilateral disease. Such a loss was attributed to diffusion of toxic products from inflammation into the scala tympani via the round window membrane causing temporary or permanent threshold shifts of bone conduction, confined initially to the basal turn but capable of spreading to the apical turns.
Chronic Suppurative Otitis Media is traditionally classified into two i.e. Tubotympanic and Atticoantral. Tubotympanic disease was considered 'safe' from complications while the atticoantral type was considered to be a 'dangerous' form of the disease in view of the risk of intracranial suppuration. Tubotympanic disease is characterized by the presence of a central perforation, size vary from a pinhole to a large subtotal defect confined to the pars tensa. It having anterior pulsatile discharge varies from mucoid to mucopurulent. It is not unusual to find a large polyp

in the external auditory meatus. On examination, ear presents a dry central perforation with a pale thin middle ear mucosa. Presence of a cholesteatoma is a main feature of Atticoantral type. The most useful symptom for diagnosis is otalgia (ear pain). Children may also display symptoms of an upper respiratory tract infection, abnormal ear tugging, fever, otorrhoea, hearing loss, irritability and not settling at night (pain increases when supine) [10].

Acute Otitis Externa and Acute Otitis Media can produce both ear pain and ear discharge. However, tragal pain is found in Otitis Externa, mastoid pain in Otitis Media. The discharge in Otitis Externa is less profuse and foul-smelling and there is no mucus, as can be tested with a cotton mop by the tendency to form mucus threads. Fever is also higher in Otitis Media than in Otitis Externa [11]. CSOM produces painless mucoid otorrhoea without fever, unless accompanied by Otitis Externa or complicated by an extra cranial or intracranial infection.

Adequate illumination through a head mirror or head light, Otoscope or Otomicroscope etc are required to diagnosis. Perform complete examination of the ear canal, tympanic membrane and, if the perforation is large enough, the middle ear. Inspection of the affected ear with a head mirror helps to evaluate the type of discharge in respect of its colour, consistency and odour. On Otoscopic examination, the tympanic membrane is Bulge due to effusion with a loss of normal landmarks, show areas of intense erythema and/or a yellow discoloration, Loss of translucency (dull or opaque) and reduced mobility. In Tubotympanic type, the site and size of the perforation, the state of the remainder of the tympanic membrane, and the nature of the middle ear mucosa are noted. In atticoantral type, it may reveal the presence of a crust, polyp or granulations obscuring cholesteatoma in the attic.

Pneumatic otoscopy has good sensitivity (94%) and specificity (80%) for the detection of middle ear effusion, using myringotomy findings as the gold standard, when performed by experienced clinicians. During test if middle ear fluid is present, the tympanic membrane will either move sluggishly or not at all. Tympanometry is used to estimates the admittance or impedance and estimates the ear canal volume. Tympanometry involves insertion of the earpiece into the external ear canal to establish an air tight seal [12]. The best results are obtained when B curves (flat tympanograms) are used as the cut-off for middle ear effusion (81% sensitivity and 75% specificity) [17].

Aspirate the discharge from the middle ear and submit for culture and sensitivity studies. Both gram positive and gram negative organisms are responsible for infection of middle ear [12]. Rakesh kumar study shows that, The most common organisms for CSOM are seudomonas aeruginosa (46.08%); Staphylococcus aureus (33.19%); Proteus species (6.95%); Escherichia coli (3.47%); Coagulase negative Staphylococcal species (5.21%); Klebsiella species, (2.60%); and Citrobacter (1.73%).[7] Loy *et al.* reported Staphylococcus aureus as the major causative agent [13]. Many more previous studies showed Pseudomonas to be the most common bacteria isolated from CSOM cases [5, 14-16]. The causative bacteria are infrequently found in the skin of the external canal, but may proliferate in the presence of trauma, inflammation, lacerations or high humidity [18]. These bacteria may then gain entry to the middle ear through a chronic perforation [19].

Examination of the nose, pharynx and postnasal space is useful to assess the state of the upper respiratory tract in tubotympanic disease. The postaural region may reveal a scar from previous surgery. X-rays of general lateral view of the skull is beneficial to assess the extent of the disease to the affected mastoid. Carry out pure tone and speech audiograms to assess the type and extent of any hearing impairment.

3. Complications of CSOM

Complications of otitis media may be divided into intratemporal and extratemporal. The intratemporal complications are including tympanic membrane perforation, conductive or sensorineural hearing loss, ossicle lesions, facial palsy, mastoiditis, labyrinthitis and petrositis. Extratemporal complications are subdivided into intracranial (abscess of the central nervous system, meningitis, thrombophlebitis of lateral sinus and otic hydrocephalus) and extracranial complications (retroauricular, zygomatic and Bezold abscess) [20]. The most common ICC are Meningitis, Cerebral abscess, Extradural abscess and Thrombophlebitis of lateral sinus (TLS) [21].

ICC secondary to Chronic Suppurative Otitis Media normally occur by the extension of the mucoperiosteum inflammatory process to the head cavity, developing in the brain, lateral sinuses and epidural, subdural and subarachnoid spaces. In most cases, ICC extends through bone dehiscence on the tegmen tympani or in the antrum; through vascular canals directly to the lateral sinus [22].

CSOM produces mild to moderate conductive hearing loss in more than 50% of cases. This results from disruption of the eardrum and ossicles assembly (conductive hearing loss) or from hair cell damage by bacterial infection that has penetrated the inner ear (sensory hearing loss), or both (mixed hearing loss) [23, 24]. Because of its long duration and greater severity compared with acute otitis media, and because most children need louder auditory stimuli than adults to perform optimally [25], CSOM in children is likely to inhibit language and cognitive development.

Contiguous or haematogenous spread of infection to the brain produces similar, permanently disabling and potentially fatal complications [26]. In 1990, about 28,000 deaths all over the world and largely among developing countries were due to otitis media [27, 28]. Mortality and disabilities due to otitis media are primarily related to the complications of CSOM [29], particularly brain abscess [30].

4. Management

The main aims of management are the control of infection and the closure of the tympanic perforation. Topical antibiotics, topical antiseptics, systemic antibiotics, and ear cleaning (‘ear toilet’) have been investigated in randomized clinical trials [4]. Ear cleaning can be achieved using tissue spears (dry mopping) or by irrigating the external ear. Several topical antiseptic agents have been in use and their therapeutic effects have been attributed to the acid medium they provide, since most microbes prefer an alkaline medium (Fairbanks, 1984). Aspiration of inflammatory exudates, under the operating microscope is probably the most popular method. Arsi Saad suggested with his study use of local frequent ear toilet as an effective treatment modality. Study showed that medical management in children with dry mopping and topical antibiotics was effective in controlling otorrhea and minimizing the referrals for surgery. It also guided with careful selection of local and systemic antibiotics. While topical antibiotics are superior to oral antibiotics, the role of oral antibiotics in additional to topical antibiotics is uncertain [12].

Appropriate antimicrobial drugs should be prescribed after proper diagnosis of the causative organism and its antimicrobial susceptibility pattern. Staphylococcus aureus was more sensitive to linezolid and vancomycin and majority of gram negative isolates were sensitive to meropenem [7]. Variation in sensitivity to antibiotics may have other mechanisms of resistance such as impermeability of outer membrane and or active efflux mechanism and there may be geographical variations [31]. The resistance pattern of the microorganisms usually keeps changing. If chronicity is possible or if the perforation is very small, the child should be treated with topical and oral antibiotics (as for AOM with perforation). For children with established CSOM, topical antibiotics alone are recommended [32].

Mastoidectomy or tympanoplasty are permanent cure for CSOM. If the perforation does not close and the discharge doesn't recur after conservative treatment, tympanoplasty is performed to restore hearing. If the perforation doesn't close and the discharge recurs, a mastoidectomy is performed to eradicate the infection. Tympanoplasty involves closure of the tympanic perforation by a soft tissue graft with or without reconstruction of the ossicular chain. Mastoidectomy involves removing the mastoid air cells, granulations and debris.

Some studies on vaccination show that it can prevent acute otitis media also. A meta-analysis of the efficacy of inactivated influenza vaccine found that it was effective in preventing acute otitis media in healthy children aged over 2 (Manzoli *et al.* 2007). An analysis of research studies for the purpose of developing an Italian guideline for the prevention of acute otitis media concluded that influenza vaccination can be useful in preventing a first episode of the disease in otherwise healthy children [33]. Evidence regarding the effectiveness of the pneumococcal conjugate vaccine (7vPCV) in reducing otitis media episodes is mixed (Eskola *et al.* 2001; Grijalva *et al.* 2006; Jansen *et al.* 2009; Taylor *et al.* 2012). Vaccines aimed at a broader range of pneumococcal strains have now been developed (Barry *et al.* 2012).

5. Conclusion

From the above review we can conclude that the mortality and hearing loss are danger complications of CSOM. Antibiotics have a role in children with persistent infected discharge through a perforated tympanic membrane. The incidence of CSOM is increasing in the children of developing countries due to poor hygiene, malnutrition and lack of health education. The children caretaker must be taught, how to perform aural toilet at home because Cleanliness must be maintained. So, early detection of disease and health educational training, awareness programs on of the disease for school going children and parents is needed to reduce the prevalence of the disease.

6. References

1. Acuin J. Global burden of disease due to chronic suppurative otitis media: Disease, deafness, Deaths and DALYs Chronic Suppurative Otitis Media-Burden of illness and Management Options. Geneva: World Health Organization. 2012, 9-23.
2. World Health Organization prevention of deafness and hearing impairment. Geneva: Document. 1986, A39/14.
3. Rosenfeld RM, Bluestone CD. Evidence-based otitis media. 2nd ed. Hamilton: BC Decker Inc. 2003.
4. Acuin J. Chronic suppurative otitis media. BMJ Clinical Evidence. 2007; 02:507.
5. Malkappa KS, Kondapaneni S, Supam BR, Chakraverti K T. Study of bacterial isolates and their antibiotic susceptibility pattern in Chronic Supperative Otitis Media. Indian Journal of Otology. 2012; 18(3):136-139.
6. Sanjay K, Sharma R, Saxena A, Panndey A, Gautam P, Taneja V. Bacterial Flora of Infected Unsafe CSOM. Indian Journal of Otology. 2012; 18(4):288-211.
7. Rakesh Kumar P, Srivastava M, Sharma S, Rishi 5 PS, Nirwan5 K, Hemwani *et al.* Isolation and antimicrobial sensitivity profile of bacterial agents in chronic suppurative otitis media patients at nims hospital, Jaipur. IJPBS. 2013; 3(4):265-269.
8. Argeudas A, Loaiza C, Herrerra JF, Mohs E. Antimicrobial therapy for children with chronic suppurative otitis media without cholesteatoma. J Pediatr Infect Dis. 1994; 13:872-82.
9. Dr. Abhinav D Wankar, Dr. Sanjiv Golhar. To Determine Prevalence of Chronic Suppurative Otitis Media with Reference to Unsafe Otitis Media in Primary School Going Children of Rural Setup of Wardha District. Global Journal of Medical research: J Dentistry and Otolaryngology. 2014; 14(1).
10. Shaikah N, Hoberman A, Kaleida P, *et al.* Diagnosing otitis media - otoscopy and cerumen removal. N Engl J Med. 2010; (20):e62.
11. Brobby GW. The discharging ear in the tropics: a guide to diagnosis and management in the district hospital. Tropical Doctor. 1992; 22(1):10-13.
12. Hasantha Gunasekera, Peter S Morris, Peter Mc Intyre and Jonathan C Craig. Management of children with otitis media: A summary of evidence from recent systematic reviews. Journal of Paediatrics and Child Health. 2009; 45:554-563.
13. Loy AH, Tan AL, Lu PK. Microbiology of chronic suppurative otitis media. Singapore Med J. 2002; 43:296-9.
14. Indudharan R, Haq JA, Aiyar S. Antibiotics in chronic suppurative otitis media: a bacteriologic study. Ann Otol Rhinol Laryngol. 1999; 108:440-5.
15. Kumar S, Sharma R, Saxena A, Pandey A, Gautam P, Taneja V. Bacterial flora of infected unsafe CSOM. Indian J Otol. 2012; 18:208-11.
16. Goyal R, Aher A, De S, Kumar A. Chronic suppurative otitis media - A Clinico-Microbiological study. Indian J Otol. 2009; 15:18-22.
17. Takata GS, Chan LS, Morphew T, Manqione-Smith R, Morton SC, Shekelle P. Evidence assessment of the accuracy of methods of diagnosing middle ear effusion in children with otitis media with effusion. Pediatrics. 2003; 112:1379-87.
18. Mawson S, Pollack M. Special role of Pseudomonas aeruginosa in chronic suppurative otitis media. Ann Otol Rhinol Laryngol Head and Neck Surg. 1988; 97(130):10-13.
19. Kenna M. Etiology and pathogenesis of chronic suppurative otitis media. Arch Otolaryngol Head Neck Surg. 1988; 97(2):16-17.
20. Piza MRT. Complicações e seqüelas das otites médias. In: Otorrinolaringologia – princípios e práticas. Costa SS, Cruz LM, Oliveira JÁ.
21. Maurício S. Miura1, Rita C. Krumennauer, José F.

Lubianca Neto. Intracranial complications of chronic suppurative otitis media in children. Rev Bras Otorrinolaringol. 2005; 71:639-43.
22. Kuczkowski J, Mikaszewski B. Intracranial complications of acute and chronic mastoiditis: report of two cases in children. International Journal of Pediatric Otorhinolaryngoly. 2001; 60(3):227-37.
23. Browning GG, Gatehouse S. Hearing in chronic suppurative otitis media. Ann Otol Rhino Laryngol. 1989; 98:245-250.
24. Chao WY, Wu CC. Hearing impairment in chronic otitis media with cholesteatoma. J Formos Med Assoc. 1994; 93(10):866-869.
25. Nozza RJ. Audiologic considerations: beyond the threshold. Ann Oto Rhino Laryngol. 1990; 99:34-36.
26. Kenna M. Incidence and prevalence of complications of otitis media. Ann Oto Rhino Laryngol. 1990; 99(7) (Suppl. 149):38-39.
27. Investing in Health Research and Development. Report of the Ad Hoc Committee on Health Research Funding Relating to Future Intervention Options. Geneva, World Health Organization. 1996.
28. Murray CJL, Lopez AD. Deaths by age, sex and cause (thousands), In: Murray CJL, Lopez AD. Global Burden of Disease. Geneva, World Health Organization. 1996, 433-468.
29. Berman S. Otitis media in children. N Eng J Med. 1995; 332(23):1560-1565.
30. Chotmongkol V, Sangsaard S. Intracranial complications of chronic suppurative otitis media. Southeast Asian J Trop Med Pub Health. 1992; 23(3):510-513.
31. Shrestha BL, Amatya RCM, Shrestha I, Ghosh I. Nepalese Journal of ENT Head and Neck Surgery Microbiological Profile of Chronic Supperative Otitis Media. 2011; 2(2).
32. Macfadyen CA, Acuin JM, Gamble CL. Systemic antibiotics versus topical treatments for chronically discharging ears with underlying eardrum perforations. Cochrane Database Syst Rev. 2006, 1.
33. Marchisio P, Bellussi L, *et al.* International Journal of Pediatric Otorhinolaryngoly. 2010; 74(11):209-1216.