A CLINICAL STUDY OF ACTIVE SQUAMOUS TYPE OF CHRONIC OTITIS MEDIA

Otolaryngology

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ABSTRACT

Aim of the study the aetiology and clinical aspects of active chronic otitis media squamous type.

100 patients attending ENT OPD with Chronic otitis media was done at Department of ENT, INSTITUTE OF POSTGRADUATE from March 2018 to June 2019

The disease was predominant in people belonging to lower socioeconomic class having habits of pond bathing, overcrowding, poor personal hygiene, low nutritional status. The most common presenting symptom being ear discharge followed by hearing loss. Although bilateral cholesteatoma is reported in 30% of cases and unilateral cases shows almost equal distribution with left 36% and right 34% of the cases in the present study. Poster superior and attic cholesteatoma was found in 54% and 42% respectively. The average hearing loss ranged from 20-40dB. Greater degrees of conductive hearing loss were seen in patients with secondary acquired cholesteatoma. Patients with attic retraction cholesteatoma had an average loss of 20-25 dB in most of the cases. Patients with intracranial complications were accordingly treated with appropriate antibiotics and brain abscess was drained when ever required.

KEYWORDS

INTRODUCTION

Existence of Chronic Otitis Media has been documented since prehistoric times. The significance of ear discharge as potent cause of infirmity and death was perhaps recognized by Hippocrates in 460 BC who considered it secondary to suppuration of brain. It is surprising that though mankind has suffered from middle ear infection at least since Rhodesian man and it is such a common disease, still its aetiological factor are by no means clear. Though considerable knowledge of anatomy of ear had been acquired already in the 17th century. Valsalva & Contugno had early established an anatomical basis for some of its diseases and systematized knowledge of structure and function of the organ in health and disease. Chronic Squamous type of suppurative otitis media is still a major cause of acquired hearing impairment in children especially in developing countries. Global burden of illness from Chronic suppurative otitis media involves 65–330 million individuals with draining ear¹. Sixty percent of whom suffer from significant hearing impairment. Squamous type of chronic otitis media accounts for 28000 deaths and disease burden 2 million daily². Incidence of chronic suppurative otitis media squamous type varies from 0.5–2% in developed countries whereas in developing countries it varies from 3-5.7%³. In India, Chronic suppurative otitis media squamous type prevalence rate is up to 16/1000 population in urban and 46/1000 in rural areas⁴. According to WHO classification, India is classified in the highest prevalence group (>4%)⁵. Active Squamous type of Chronic Otitis Media has been defined under different aspects. From the clinical point of view Squamous type of COM is characterized by active inflammation of middle ear cleft with cholesteatoma and bone erosion. Chronologically it refers to inflammatory process of middle ear cleft which persists for more than three months. Histopathologically Squamous type of COM has been defined as an inflammatory process of middle ear cleft associated with irreversible tissue changes. This inflammatory process may even be present even though the tympanic membrane is intact and otorrhoea is absent - called as silent chronic otitis media squamous type by Paparella et al⁶. Its pathogenesis is still a matter of discussion. Squamous type of COM is the result of non resolution of acute suppurative otitis media. Acute infection that does not resolve may produce a sub acute condition with continuing otorrhoea possibly from a mastoid reservoir. COM can be grouped into two clinical types: safe type or mucosal type and dangerous type or squamous type. Safe type is so called because it carries limited risk to the patient of any serious complications. The disease is limited to mucosa and to the antero-inferior part of middle ear cleft. For this reason it is sometimes

described as tubotympanic. The incidence rate of safe type of Chronic otitis media approximately 59.3% of all COM cases and 40.7% ears unsafe variety⁷⁻⁹. Aim of the study the aetiology and clinical aspects of active chronic otitis media squamous type.

MATERIALS AND METHODS

100 patients attending ENT OPD with Chronic otitis media was done at Department of ENT, INSTITUTE OF POSTGRADUATE from March 2018 to June 2019

INCLUSION CRITERIA

1. Patients belonging to either sex aged 6 year or more
2. Patients presenting with ear discharge and hearing loss at least of three month duration of symptoms in active COM squamous type
3. Patients without any systemic debility
4. Patients with active squamous type of chronic otitis media with complication.
5. All patients must be willing to take part in the study through written informed consent

EXCLUSION CRITERIA

1. Patients belonging to either sex aged 6 year or less
2. Patients presenting with ear discharge and hearing loss less than three month duration of symptoms
3. Patients with any systemic debility
4. Patients with other types of COM than active squamous type of chronic otitis media with complications
5. All patients not willing to take part in the study through written informed consent

RESULT & ANALYSIS

It was found that operative findings: All cases underwent inside out canal wall down mastoidectomy and findings were noted. Destruction of incus either part or as a whole was commonest intra operative findings noted in our study. This was seen in as many as 76% percent cases. Malleus was absent in 30% cases, while stapes superstructure was eroded in 40% cases, erosion of facial nerve canal was noted in 18% cases, erosion of dural plate and sinus plate was seen in 6% and 4% cases respectively. Erosion of lateral semicircular canal bulge was seen in 6% cases but membranous labyrinth was opened in only one case. This patient had a dead ear.

Our study found that anaerobes were isolated in 39(33.6%) of total

specimens. The most common anaerobes identified were *Bacteroides* species in 18 (15.5%), *Peptostreptococci* species in 12 (10.3%) and *Clostridium* species 7 (6.0%). Mixed cultures were 58 (50.0%) of total species collected. Aerobes were identified in mixed cultures. Mixture of *Proteus mirabilis* and *Pseudomonas aeruginosa* were the most common 19 (16.4%), *Proteus mirabilis* and *E. coli* 8 (6.9%) each and *Staphylococcus aureus* and *Proteus mirabilis* 7 (6.0%) each. All patients were eventually subjected to surgery. The mastoid was explored by post auricular route. A canal wall down was adopted in all cases. Attic cholesteatoma with small sclerotic mastoid were dealt with inside out mastoidectomy (30%). Most cases were undergone a modified radical mastoidectomy i.e 70%

DISCUSSION

Age in this study, majority of patients are in the age group of 11 to 20 years 42 % irrespective of sex. Thereafter a decline in incidence in relation to age was observed. 21 to 30 years age group there were 34 %, 31 to 40 years age group is 12 %. The mean of presentation is 34 years. Aberg (1991)¹ reported a mean age of 41 years, Vartiainen (1998)² 38 years, Alho (1997)¹⁰ reported mean age of 42 years, Mahajan M (2009)¹¹ reported a mean age of 34 years.

In present study, the males are 68% females are 32%. Study conducted in Singapore, Pakistan, Iran and other parts of India gave similar results. 57% patients belong to low socioeconomic status which indicates low socioeconomic status plays a role in causing middle ear infections. In the present study maximum number belong to lower socioeconomic status. Followed by lower middle class 27%. Upper socioeconomic class showed only 17% cases. Lower class socioeconomic status was the only risk factor which showed a statistically significant association with development of Active squamous type of COM. This is similar to reports from Britain, Nigeria, Pakistan, Southern part of India of greater severity of squamous type of COM in people from lower socioeconomic classes with less formal education and parents who are unemployed. The contribution of low socioeconomic status to increased severity of squamous type COM might be multifactorial. Families of a lower social class often have more children and live in congested homes with poor sanitation and hygiene, all of which create environmental conditions conducive to transmission of infectious agent. In our study 38% of patients have family background of overcrowding. This data coincides with studies by Vikram BK (2008)¹², Lasisi AO (2007)¹³, Akinpelu OV (2008)¹⁴.

In addition malnutrition which commonly accompanies low socioeconomic condition suppresses the immune system and places poor children at greater risk of disease. In this study malnutrition has been found in 31% of cases which is quite high.

Lack of personal hygiene probably harbours bacteria in the body and surrounding environments which serves as potential source of infection. We have found 61% patients with improper personal hygiene. Rate of taking bath in infected and polluted pond and river is as high as 48%. Specially people who live in villages and urban slums. Studies by Vikram VK et al (2008)¹², on Clinico epidemiological study of complicated and uncomplicated Chronic otitis media also supports this data.

In the present study most common symptom observed other than ear discharge was hearing loss (92%), Next common symptom is tinnitus. 45% Patients complained of tinnitus. This data is similar to the studies conducted by Mustafa A et al (1996)¹⁵. In this study 70 % cases are unilateral, 30% cases are bilateral. In this study we did not find any significant predominance of one ear, both right and left ear were almost equally affected. Right ear 34% and left ear 36%. Study done by Akinpelu OV et al. (2007)¹⁴ and Mahajan M et al. (2009)¹¹ have similar results. In present study maximum number of ears 66% had discharge for 3 to 10 years. The average ear disease duration at presentation was 5 years. Range 6 months to 18 years. Study conducted by Vikram BK et al. (2007)¹² shown the average ear disease duration at presentation 7.74 years.

Recurrent attack of acute infections on COM is by far most common with 67 cases. Hearing loss is most common morbidity in present study. Hearing loss makes difficulty in their job of most patients. In

students it disturbs their school performance. They were avoiding to take part in sports activity, specially water sports. Many young adults are declared unfit for their job due to Active squamous type of chronic otitis media. Increased financial burden makes these patients of low socioeconomic strata push further down in their financial condition.

In this study we did not find any mortality. Mortality in active squamous type of COM is largely due to inadequately treated intracranial complications. A study by A. Mustafa et al. (2008)¹⁵ reported a mortality rate of 3.3% among patients with complications. U. Osama et al. (2000)¹⁶ reported a mortality rate of 26.3% among patients with intracranial complications. SP Dubey et al. (2010)¹⁷ reported a mortality rate of 31.2%. No mortality rate in our study is due to efficient treatment of complications under the supervision of neurosurgeon and neurophysician as our institute has super speciality in these two branches. Also may be due to a small group consisting of complication.

Discharge was mucopurulent in 11% of cases, purulent discharge 19% of cases, scanty foul smelling discharge in 46% of cases, blood stained in 24% of cases. Other findings mastoid tenderness was present in 16% of cases. Swelling was present in 12% of patients. Granulation tissue was noted in 10% of patient. Polyp was seen in 7% of ears. Granulation tissues were identified as independent risk factor of the study.

Diagnostic examination of nose and throat was performed. Deviated nasal septum was most common findings with 56% of cases. Also other factors like adenoids and enlarged tonsil were noted in 3% and 8% of cases respectively. The contributing disease focus in the nose and throat was found most commonly in uncomplicated cases and with safe type of perforations. Study by Vikram BK et al. (2007)¹² showed similar results.

In our study 54% patients have pure conductive hearing loss, 36% patient have mixed hearing loss, 10% patients have pure sensorineural hearing loss. Study done by Mahajan M et al. (2009)¹¹ showed conductive hearing loss in 52% of cases, mixed in 40% of cases and sensorineural hearing loss in 8% of cases. Vikram B.K et al. (2007)¹² found conductive hearing loss in 59% of cases, mixed hearing loss in 34% of cases and 7% cases have pure sensorineural hearing loss. We found statistically significant association between duration of disease and sensorineural hearing loss. Signify there is an increased sensorineural component with increase in duration of disease. (Fischer Exact probability Test $p=0.3316$) on calculation of relative risk 2.08 and odds ratio 2.533 showed an increased risk among cases with longer duration of disease to have mixed hearing loss.

The sequelae of active squamous type of chronic otitis media, i.e. cholesteatoma, ossicular erosion, labyrinthitis, labyrinthine fistula, owing to diffusion of toxins and bacterial breakdown products have been reported to cause deafness in these patients. Clinical and histopathological evidence has linked sensorineural hearing loss in active squamous type of chronic otitis media to entry of toxic materials through the round window membrane into inner ear, leading to biochemical alteration of inner ear fluids, serofibrinous precipitate and inflammatory cells in scala tympani, all of which results in gradual end-organ dysfunction and accentuated threshold shift.

Majority of cases 64% have moderate amount of hearing loss. 26% of patient have moderately severe and severe hearing loss. 10% of patients have mild hearing loss. Air conduction threshold 31-56 db has 64% of patients, more than 60db has 26% of patients and less than 30 db has only 10 % of patients. Lassi O.A et al. (2007)¹³ study showed mild in 37% and moderate in 53% hearing loss. Mahajan M et al. (2009)¹¹ showed more than 26% with mild degree of hearing loss, moderate amount of hearing loss in 52% cases.

In the present study 26% of patients had retraction of pars tensa, 42% of patient had retraction in pars flaccid and 32 % of patients had posterior superior retraction pockets. Mustafa A, Heta A, Kastrati B research on Complication of chronic otitis media with cholesteatoma during a 10 year period in Kosovo Eur Arch Otorhinolaryngology 2008, 265, 1477- 1482 also publishes almost similar results¹⁵.

During preoperative findings, incus absent or eroded in 76% of cases. Mostly lenticular and long process of incus were eroded. Malleus was affected in 30% of cases. Stapes super structure was absent in 40% of

cases. Los M et al. Pathology of ossicular chain in various chronic middle ear disease. *J Laryngol Otol* 1979, 93: 769-60 supports this findings²².

In the present study 18% of patient had extracranial complications. 16% had mastoid abscess while 2% patient had facial paralysis. 10% patient had intracranial complications. 4% patients had meningitis, 2% patients had brain abscess, 4% patients had extradural abscess.

Study by Siba. P et al. (2007)¹⁸ showed 24% of extracranial complication, 11% had intracranial complications. But study by Ustun Osama MD et al. (2000)¹⁶ showed higher percentage of intracranial complication 31% compared to extracranial complication 41%.

We found an increased risk among the active squamous type of chronic otitis media to have complication related to COM. Relative risk 2.38 and Odds ratio 2.854 (Fischer's exact test, $p=0.0273$).

Abscess related to mastoid is the most common complication accounts for 16% of total complication 84.6% of extra cranial complication. Ustun Osama MD et al. (2000)¹⁶ showed mastoid abscess 64% of extracranial complications. The development of subperiosteal abscess with or without fistula leads to reduction of pressure of pus with in the middle ear cleft, which in turn reduces the chances of infection spreading intracranially. The mastoid antrum is shallower in young people. It reaches adult thickness by the age of 16 years. consequently, we found younger patients frequently develop mastoid abscess and postural fistula than intracranial complication.

Although only 2% patient in our series had otitic facial palsy, its incidence is variable. Facial nerve palsy as a result of chronic otitis media is associated with dehiscence or destruction of the bony facial canal by cholesteatoma. Various explanations were given as to exact cause of it. Kangsanarak et al. found facial palsy as the most common complication in 0.26% of patients. Savic and Djerić and Altuntas et al. found facial palsy incidence as 5.1% and 1.7% respectively.

Meningitis is most common intracranial complication in our study. It is 4% of all patients and 14% of all complications and 40% of all intracranial complications. In our study 18% of the patients had multiple complications due to active squamous type of chronic otitis media. Study done by Mustafa A et al. (2008)¹⁵ showed multiple complications in 11% of total complications. The combination of sigmoid sinus abscess and mastoid abscess one of the most often occurred complication.

So far the microbiological aspect of active squamous type of chronic otitis media is concerned *Protius mirabilis*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* was commonest among patients aged below 20 years. *Streptococcus pyogenes*, *Klebsiella pneumoniae*, *E coli*, *Proteus vulgaris* was only identified among patients aged below 20 years. Analysis of total 100 specimen collected revealed that pure and mixed culture growth were obtained in equal numbers of 49% each while in 2% specimens there was no growth. Figures reported by other authors Mwaniki RK et al. (2009)¹⁹, Van Hasselt et al. ENT and Audiology News vol.12 May/June 2013²⁰ vary significantly where pure cultures were isolated in more patients than mixed cultures. It is mostly seen that aerobic gram negative rods outnumber gram positive cocci organisms in COM as reported by some authors which is comparable to the findings in present study where gram negative rods accounted for 72% and gram positive 37%.

A significant number of anaerobes were isolated such as *Bacteroides* species in 15.6%, *peptostreptococcus* species in 10.3%, *clostridium* species in 6%, and *Prevotella melaninogenica* 2% of cases were isolated.

So far aerobes were concerned both gram positive and gram negative aerobes both were identified. *Staphylococcus aureus* in 20%, Coagulase negative *staphylococcus* 4%, *Streptococcus pyogenes* in 3%, *streptococcus pneumoniae* 1.3% of cases were identified. All are gram positive aerobes.

Gram negatives aerobes are another group of micro organisms who were isolated from the active chronic squamous type of chronic otitis media. *Proteus mirabilis* 28.6%, *Pseudomonas aeruginosa* 20.8% cases, *E coli* in 8.2% cases, *Klebsiella pneumoniae* 4%, *Proteus*

vulgaris 4%, *Diphtheroids* species 2.6% cases, *Enterobacter cloacae* 1.9% cases, *Morganella morganii* .6% cases, *Raoultella ornithinolytica* .6% cases, Coliform species .6% cases were identified. This result coincides with studies conducted by Irfan AM, Liaquat A, Muhammad A, Microbiology of chronic otitis media: Experiences at Bahawalpur. Pak Armed Forces Med. J. 2008²¹. So far the treatment of active squamous type of chronic otitis media is concerned, treatment was exclusively surgical. Antibiotics in both routes systemic and ear drops were used to control infection. All surgeries were conducted under local or general anaesthesia. Inside out mastoidectomy was performed in 30% cases. Modified radical mastoidectomy was performed in 70% of cases. Patients with intracranial complications, first neuromedicine and then Neurosurgical treatment were undertaken to stabilize the patient and make the patient fit for surgery and then surgery was conducted.

CONCLUSION

The most common presenting symptom being ear discharge followed by hearing loss. Although bilateral cholesteatoma is reported in 30% of cases and unilateral cases shows almost equal distribution with left 36% and right 34% of the cases in the present study. Poster superior and attic cholesteatoma was found in 54% and 42% respectively. The average hearing loss ranged from 20-40dB. Greater degrees of conductive hearing loss were seen in patients with secondary acquired cholesteatoma. Patients with attic retraction cholesteatoma had an average loss of 20-25 dB in most of the cases. Patients with intracranial complications were accordingly treated with appropriate antibiotics and brain abscess was drained when ever required.

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