



CLINICO RADIOLOGICAL STUDY OF OSSICULAR CHAIN STATUS IN MUCOSAL CHRONIC OTITIS MEDIA

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ABSTRACT

Chronic otitis media include wide variety of pathology seen as a result of middle ear inflammation. Chronic otitis media can occur due to acute infections with or without tympanic membrane perforation. It may occur without preceding episodes of acute otitis media. Chronic otitis media is divided into chronic otitis media with cholesteatoma and chronic otitis media without cholesteatoma. The precise incidence of ossicular involvement is quite low in mucosal type of disease than squamous disease but is a cause of substantial hearing loss.

MATERIAL METHOD: This study has been conducted in Otolaryngology department, Patna medical college and hospital, Patna. Study group include 200 patients having chronic otitis media without cholesteatoma selected from ENT out patient department. Results is based after thorough clinical and radiological evaluation.

RESULTS : The frequency of ossicular defect in these patient was noted. Out of 90 patient long process was most affected followed by stapedial arch, malleus handle and incus.

CONCLUSION: In patient with chronic otitis media without cholesteatoma the hearing loss can be the only symptom. The degree of hearing impairment depends on size of perforation and state of ossicular chain.

KEYWORDS : Chronic;otitis;media;mucosal;ossicles Status;tympanic Membrane

INTRODUCTION

Chronic otitis media implies a permanent abnormality of pars tensa and flaccida most likely as a result of earlier acute otitis media, negative middle ear pressure, or otitis media with effusion¹.

Continuing inflammation within middle ear leads to submucosal infiltrate with histiocytes, lymphocytes and other mononuclear cells, increasing vascularity and increase in mucous secreting goblet cells².

Chronic inflammation leads to osteitis with bone destruction. Mucosal chronic otitis media is often associated with destruction of ossicular chain. The affected ossicles typically show areas of hyperaemia with proliferation of capillaries and prominent granulation tissue. The long process of incus, stapes crura, body of incus and manubrium are involved in decreasing order of frequency³.

The otorrhoea with multiple infections may be a factor relevant to more rapid destruction. The inflammatory reaction in the middle ear associated with granulation tissue is agreed to be the most likely factor for ossicular damage occurring⁴.

Pseudomonas aeruginosa LPS stimulates RANKL primed precursor osteoclasts into bone resorbing osteoclasts by and autocrine paracrine mechanism involving at least 11 cytokines including TNF alpha, IL-1alpha, IL-1beta and IL-10, G-CSF, MCP-1, MCP-1alpha⁵.

There are considerable difference in ossicular chain pathology between anterior, posterior and inferior perforations⁶.

MATERIAL AND METHODS

This study has been conducted over a period of 2 years from June 2017 to February 2019 in department of otolaryngology, Patna medical college and hospital, Patna. Total number of patient being 200.

AIM AND OBJECTIVES OF THE STUDY

1. Prevalence of ossicular chain defect in COM without cholesteatoma
2. Frequency of ossicular defect
3. Ossicular chain defect in relation to types of perforation
4. Assess the association of ossicular defects and hearing

loss

5. Comparison of ossicular chain status in staphylococcus aureus and pseudomonas aeruginosa
6. Ossicular chain status in active vs dry ear
7. Ossicular chain status in long standing chronic otitis media cases

INCLUSION CRITERIA

1. Patients with chronic otitis media without cholesteatoma.
2. Patient willing for reconstructive surgery offered to him or her
3. Patient giving consent for study upon him or her
4. Patient willing to come for regular follow-up and obey the medical advice.

EXCLUSION CRITERIA

1. Patient not giving consent for study upon them
2. Patient having cholesteatoma
3. Patient not willing for surgery
4. Patient with lost follow up.

Patient with discharging ear coming to ENT OPD were selected and subjected to detailed history, examined by otoscope initially and subsequently by a microscope and otoendoscope to establish a preoperative diagnosis of mucosal and squamous disease.

All patient were then subjected to pre operative pure tone audiometry to find out the hearing status and to obtain documentary evidence of the same, and X ray mastoid bilateral law's view to access pathology and anatomy of mastoid. Ear swab culture was done to know the predominant organism.

CT scans were done in selected patient to exclude middle ear and mastoid pathology, and to identify cholesteatoma, and study ossicular chain status.

Patients after medical treatment and those with dry ear for more than 3 months were offered tympanoplasty and mastoid exploration.

All patient were evaluated under microscope during surgery to further assess ossicular chain status.

RESULTS

Study was made upon 200 patients. Out of which 120 were

male(60%)and 80 were females(40%)fig 1.Patient selected were those age more than 10 years and less than 60.Maximum number of patients were in the range of 20 to 40 years and lesser in both extremes fig 2.

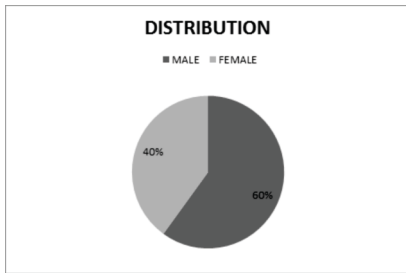


Fig 1 distribution in different sex

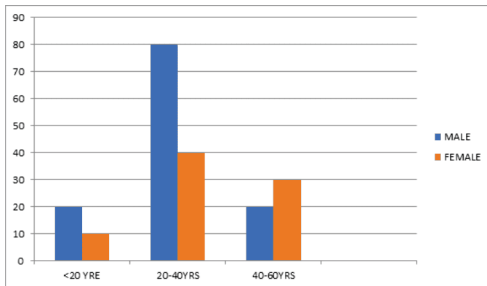


Fig 2 Prevalance in different age group

Out of 200 patients examined who were with complain of discharging ear i.e chronic otitis media without cholesteatoma 110 patients were having no ossicular defects.90 patients were having ossicular defect.Prevalence of ossicular defect in a sample size of 200 was 45.

The frequency of ossicular defect in these patient was noted.Out of 90 patient long process was most affected followed by stapedia arch ,malleus handle and incus body.fig 3

FREQUENCY OF OSSICULAR DEFECTS N = 200

INTACT	55
LONG PROCESS OF INCUS	30
INCUS BODY	1
MALLEUS HANDLE	2
STAPEDIAL ARCH	11
MALLEUS HEAD	1
MALLEUS TOTAL	-

Fig 3 frequency of ossicular defect

There was considerable difference in ossicular chain defect and type of perforations. The incidence of defective long process was highest in posterior perforations and extremely low with anterior perforations fig 4.The frequency of ossicular chain defect was higher in ear with active disease.

FREQUENCY OF OSSICULAR DEFECTS IN DIFFERENT PERFORATIONS

MISSING OSSICLES	ANTERIOR N=20	POSTERIOR N=70	INFERIOR N=30	SUBTOTAL N=80
NONE	50	57	33	62
LONG PROCESS	25	43	16	25
INCUS BODY	-	2	-	2
MALLEUS HANDLE	-	3	-	25
STAPEDIAL ARCH	-	-	-	2

MALLEUS HEAD	-	-	-	2
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Fig 4 ossicular defect in different type of perforation

Variation was seen in hearing loss in seen with different types of ossicular defects. Maximum hearing loss is seen when all the ossicles are missing. However correlation with missing parts and hearing loss show close variation. fig 5

HEARING LOSS IN RELATION TO OSSICULAR DEFECT

OSSICLES MISSING	HEARING LOSS
LENTICULAR PROCESS	45
LONG PROCESS INCUS	50
MALLEUS HANDLE	46
MALLEUS HANDLE AND LONG PROCESS OF INCUS	50
LONG PROCESS OF INCUS AND STAPES SUPRASTRUCTURE	58
ALL OSSICLES	58

Fig 5 hearing loss associated with ossicular defect

It was also seen in our study that extent of ossicular defect was more in culture positive pseudomonas aeruginosa group than staphylococcus aureus group and other minor microbial agent.

After this study,it is found that prevalence of ossicular defect is increasing in safe type of chronic otitis media owing to the different pathology of chronic otitis media.Ossicular chain defects are seen in almost every 4th case of chronic otitis media without cholesteatoma.This is of great concern and management should be undertaken after full otomicroscopic and radiological examination.

DISCUSSION

The term chronic suppurative otitis media describes chronic middle ear disease and is defined as chronic inflammation of the middle ear and mastoid cavity which represents with recurrent ear discharge or otorrhoea through a tympanic membrane perforation¹.

Continuing activity of chronic otitis media is likely to result in increasing damage to ossicular chain and potentially to the inner ear.The former is common but latter seems to be relatively rare.The precise incidence of ossicular chain damage is unknown but if there ,cause substantial deterioration in hearing².

Otorrhoea particularly with multiple infective organisms may be a factor more relevant to cause rapid decrease in hearing due to ossicular deterioration. Granulation tissue in middle ear due to inflammation is the most likely cause of Ossicular damage.Osteoblastic and osteoclastic activity occur in bone due to inflammatory process resulting in resorption and remodelling of bone³.

Bacteria also play a role in the bone destruction seen in COM and infected cholesteatoma. Nason et al. showed that Pseudomonas aeruginosa LPS stimulates RANKL primed precursor osteoclasts into bone-resorbing osteoclasts by an autocrine/paracrine mechanism involving at least 11 cytokines including TNF- α , IL-1 α , IL-1 β , IL-9 and IL-10, granulocyte-colony stimulating factor (G-CSF), monocyte chemotactic protein-1 (MCP-1) and macrophage inflammatory protein (MIP-1 α) among others.

Permanent damage to ossicular chain occurs mainly to incus long process and stapes suprastructure where there is abundant osteoclastic activity but osteoblastic activity appears weak^{4,5}.

One of the main complain of patient in safe ear chronic otitis media is hearing loss which is mostly conductive type. . As the disease process advances only slowly, the patient appears to adapt to the loss so that thresholds of 30–40 dB HL are common with little complaint from the patient. In mucosal disease, the size of the perforation in the pars tensa is relevant to the hearing loss but other important factors such as the presence of granulation tissue, mucus, adhesions and tympanosclerosis are also of importance in determining the hearing level. If the ossicular chain loses continuity, there may be a substantial increase in hearing impairment with thresholds increasing up to 50–60 dB HL in such cases. In bilateral disease this constitutes a significant handicap and hearing rehabilitation including reconstructive surgery may be a priority for the patient.

The discharge can be continuous or intermittent, mucoid or purulent⁶. In patients with intermittent otorrhoea, an increase in discharge may follow a URTI or entry of contaminated water into the middle ear, most commonly when swimming. However, many patients present with hearing difficulty as their only symptom. The hearing impairment is conductive, though older people may present primarily with age-related sensorineural hearing impairment but have an additional unilateral conductive component. On questioning, these patients will often report that they had otorrhoea when they were younger⁷.

The hearing should be assessed by pure-tone audiometry. There is usually associated hearing impairment which is mainly conductive. Bacteriology is usually not necessary unless complications are suspected or initial antibiotic therapy fails to reduce the inflammation. *Pseudomonas aeruginosa* and *Staphylococcus aureus* are the most commonly reported pathogens, most of the other organisms being Gram negative coliforms⁸.

Topical antibiotic therapy is the most effective means of treating active otorrhoea in COM. In those cases that do not become inactive on medical management, surgery is required to heal the ear. Those cases that become inactive should have closure of the perforation to prevent recurrence of activity, together with ossiculoplasty if appropriate.

The most common pathology in the middle ear is erosion of the long process incus⁹. This is reasonably straightforward to correct surgically. The preferred option is to place a prosthesis between the handle of malleus and the head of stapes¹⁰. Various materials are used, most commonly autograft incus or head of malleus and alloplastic prostheses¹¹. When the stapes superstructure is also missing, the malleus handle has to be connected to the stapes footplate and autograft materials are rarely suitable. Occasionally there is also erosion of the malleus handle; here the prosthesis connects the tympanic membrane directly to the stapes superstructure or footplate¹². The choice of material is largely dependent on the situation in the operated ear and the surgeon's personal preferences. Homograft materials are not recommended because of the theoretical risk of transferring prion disease.

CONCLUSION

In patient with chronic otitis media without cholesteatoma the hearing loss can be the only symptom. The degree of hearing impairment depends on size of perforation and state of ossicular chain.

In our study ossicular defect was seen in 45% cases of which ,most commonly affected bone was long process of incus. Degree of hearing impairment depends on the size of perforation and state of the ossicular chain. Hearing loss is more in chronically discharging ear. Ossicular chain is more affected if perforation is in posterior or posterior superior

quadrant. Myringoplasty closes perforation in most cases . Myringoplasty and ossiculoplasty should be done in two stage for better results.

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