

# Frequency of Incus Bone Erosion on Mastoid Exploration in Chronic Suppurative Otitis Media with Middle Ear Cholesteatoma

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## ABSTRACT

**Aim:** To assess the frequency of incus bone erosion on mastoid exploration in chronic suppurative otitis media with middle ear Cholesteatoma.

**Study design:** Cross-sectional descriptive study.

**Place of study and duration:** Department of ENT Al-Hada Armed Forces Hospital, Taif Region, KSA and the Department of ENT Unit, Mayo Hospital Lahore affiliated with King Edward Medical University Lahore from 10<sup>th</sup> September, 2012 to 9<sup>th</sup> March, 2013

**Sample technique:** Non-probability purposive sampling.

**Methods:** A total number of 60 patients presenting with chronic suppurative otitis media of with middle ear Cholesteatoma were studied prospectively. Surgeries were performed in the operation theater under General Anesthesia on all 60 patients. A standard questionnaire was prepared and the history, examination, laboratory data and treatment were recorded on it for each patient.

**Results:** Chronic suppurative otitis media is a common ailment seen in the specialty of ear, nose and throat. Unsafe type of this disease previously known as atticofacial type usually presents with marginal perforation having cholesteatoma which is the hallmark of this affection and also considered as the complication producing element. A total number of sixty patients of chronic suppurative otitis media with middle ear cholesteatoma were included. Out of which 40(66.7%) were males and 20(33.3%) were females. Male to female ratio was 2:1. The patients shown in table 2 were divided in six age groups. In the first age group, patients aged 1-10 years 7(11.7%), in second age group, patients aged 11-20 years 30(50%), in third age group, patients aged 21-30 years 13(21.7%), in fourth age group, patients aged 31-40 years 3(5%), in fifth age group, patients aged 41-50 years 6(10%) and in the sixth age group, patients aged >50 years 1(1.6%). Mean  $\pm$  standard deviation of age group was 21.2 $\pm$ 11.9 years. The procedure of mastoidectomy was performed in 56 patients (93.3%) and modified radical mastoidectomy was performed in 4 patients (6.7%). Incus bone erosion in chronic suppurative otitis media with middle ear cholesteatoma in 51 patients (85%) and 9 patients (15%) have no incus bone erosion.

**Keywords:** Incus bone erosion, Mastoid exploration, chronic suppurative otitis media, Cholesteatoma

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## INTRODUCTION

Cholesteatoma is a destructive lesion with an abnormal collection of viable and desquamated squamous epithelium in the middle ear or mastoid air spaces<sup>1</sup>. Alternatively cholesteatoma may be taken as a three dimensional epidermal and connective tissue structure, usually in the form of a sac and frequently conforming to the architecture of the various spaces of middle ear, attic and mastoid. This structure has the capacity for progressive and independent growth at the expense of underlying bone and has a tendency to recur after removal<sup>2</sup>. Although cholesteatomas are more commonly found

in the middle ear and mastoid, the disease can occur in the external ear canal and very rarely it may present as a lump on the side of a patient's head eroding the squamous temporal bone with intracranial extension<sup>3</sup>.

Erosion of ossicles occurs in three stages, pumicing, pitting and cavitation<sup>4</sup>, basically there are four major ossicular defects that may result from erosion by cholesteatoma giving rise to deafness. The most common is involvement of only the long process of incus with intact malleus and stapes<sup>5</sup>. The second most common defect is erosion of the supra structure of the stapes as well as loss of incus. Third, the cholesteatoma growing into the middle ear involves the malleus handle which may necessitate its removal along with the incus, however the stapes remains intact. Finally there may be loss of all ossicles except the stapedial foot plate. Erosion of the long process of the incus by cholesteatoma is the

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most frequently encountered defect of the ossicular chain. The reason is due to its delicate structure and location rather than its tenuous blood supply<sup>6</sup>.

Incus is a common bone which is eroded in chronic suppurative otitis media with middle ear cholesteatoma. A cholesteatoma is a destructive lesion with 3 dimensional epidermal structure capable of independent growth, replaces middle ear mucosa, erodes the underlying tissue and tends to recur after removal and results into otorrhoea, bone destruction, hearing loss, facial nerve paralysis and intra-cranial complications. Incus is a part of ossicular chain, when it will be eroded due to cholesteatoma, patient will suffer from conductive hearing loss<sup>7</sup>.

A study describing 55 patients of chronic suppurative otitis media shown the presence of cholesteatoma associated with existence of two or more affected ossicles, but erosion of ossicles was not present. On comparing the ossicles separately incus was involved in 90% of cases<sup>8</sup>. Eighty cases of chronic suppurative otitis media with middle ear cholesteatoma were studied. Sixty cases were found only with cholesteatoma and in 20 cases cholesteatoma with granulations were seen. Incus bone erosion was seen in 30 cases 37.5%<sup>9</sup>. Conductive hearing losses is a common complication of cholesteatoma as ossicular chain erosion occurs in 30% of cases. Erosion of the lenticular process may produce a conductive hearing loss as high as 50dB<sup>10</sup>. Twenty five patients with history of progressive hearing loss were examined and results were compared with preoperative and intra-operative findings to evaluate the diagnostic value of digital volume tomography for incus erosion. Intact incus was found in 13 cases and predicted incus erosion was verified in 12 cases after surgery.

A cholesteatoma is destructive lesion which erodes the underlying tissues, resorption, destruction of incus bone and resulting hearing loss<sup>7</sup>. A study comprising 23 patients with identification of incus in all cases, 10 includes covered with a thin mucosa layer, 11 buried in granulation tissue and 2 were joined to surrounding bone. In Pakistan the frequency of incus bone erosion due to cholesteatoma formation have not been studied in detail. But foreign studies have been done on the status of incus in middle ear cholesteatoma<sup>9</sup>.

This study is designed to give information about the frequency of the incus bone erosion due to cholesteatoma formation in chronic suppurative otitis media patients. It was also help to know that how many patients were suffered from deafness and which measures should be taken to protect the patients from deafness and also from the dangerous complications of the disease i.e. extra-cranial and intra-cranial complications.

## MATERIALS & METHODS

This study was carried out in the Department of ENT Al-Hada Armed Forces Hospital , Taif Region, KSA and the Department of ENT Unit-I, Mayo Hospital Lahore affiliated with King Edward Medical University Lahore for a period of six months from 10<sup>th</sup> September, 2012 to 9<sup>th</sup> March, 2013. The calculated sample size is 60 cases, with 13% margin of error, 95% confidence level taking expected percentage of incus bone erosion in chronic suppurative otitis media with middle ear cholesteatoma i.e. 37.5%. All patients irrespective of age and sex suffering from chronic suppurative otitis media undergoing mastoidectomy with middle ear cholesteatoma were included. All patients with Central perforation and subtotal perforation i.e. tubo-tympanic disease. Patients with upper respiratory tract disease were excluded.

Sixty patients were admitted through an emergency and outpatient department of ENT Unit-I, Mayo Hospital Lahore. Patients were included after fulfilling the inclusion criteria. All the information was collected on a Performa (attached) regarding demographic profile i.e. name, age, sex, address and registration number. Informed consent was taken and surgery was performed by a single surgeon. Finally during surgery the operative findings were noted to know the incus bone erosion after middle ear cholesteatoma formation in chronic suppurative otitis media. All this work was done by researcher himself. All the data was analysed by SPSS version 10 for windows. Quantitative data like age was analysed using mean and standard deviation. Qualitative data gender and presence or absence of incus bone erosion was analysed using percentages and frequencies. No test of significance is applicable in this study.

## RESULTS

A total number of sixty patients of chronic suppurative otitis media with middle ear cholesteatoma were included. Out of which 40 (66.7%) were males and 20 (33.3%) were females. Male to female ratio was 2:1 (Table 1). The patients shown in table 2 were divided in six age groups. In the first age group, patients aged 1-10 years 7(11.7%), in second age group, patients aged 11-20 years 30(50%), in third age group, patients aged 21-30 years 13(21.7%), in fourth age group, patients aged 31-40 years 3(5%), in fifth age group, patients aged 41-50 years 6(10%) and in the sixth age group, patients aged >50 years 1(.6%). Mean±standard deviation of age group was 21.2±11.9 years (Table 2). Table 3 shows that the procedure of mastoidectomy was performed in 56

patients (93.3%) and modified radical mastoidectomy was performed in 4 patients (6.7%).

Incus bone erosion in chronic suppurative otitis media with middle ear cholesteatoma in 51 patients (85%) and 9 patients (15%) have no incus bone erosion (Table 4).

Table 1: Gender distribution (n=60)

Gender	Frequency	%age
Male	40	66.7
Female	20	33.3

Male to female ratio: 2:1

Table 2: Age distribution of cases (n = 60)

Age (Years)	Frequency	%age
1-10	7	11.7
11-20	30	50
21-30	13	21.7
31-40	3	5
41-50	6	10
>50	1	1.6

Mean±SD: 21.2±11.9

Table 3: Procedures performed in all cases (n=60)

Procedure radical mastectomy	Frequency	%age
Radical mastectomy	56	93.3
Modified radical mastoidectomy	4	6.7

Table 4: Incus bone erosion in all cases (n=60)

Incus bone erosion	Frequency	%age
Yes	51	85
No	9	15

## DISCUSSION

Chronic suppurative otitis media is a persistent disease with insidious onset and can cause dangerous life threatening complications if left untreated or treated inadequately and are frequent in conjunction with cholesteatoma. All the sixty cases of chronic suppurative otitis media presented with the common complaints of ear discharge. During surgery, cholesteatoma alone and cholesteatoma with granulations appeared to be the commonest finding. Cholesteatoma was more common in males (66.7%) than in females (33.3%). The finding regarding the male female ratio was 2:1 correlates with that of another study showing that the majority of patients of chronic suppurative otitis media with cholesteatoma were males.

Majority of patients i.e., 30(50%) were in the age group of 11-20 years of their ages, next 13(21.7%) in the age group of 21-30 years, 7(11.7%) in the age group of 1-10 years, 6(10%) in the age group of 41-50 years, while only 3(5%) patients were 31-40 years of age (Table 2). In the present study young adults of age 11-20 years were found more indisposed than old ones. The findings contradicted with those of

Cruz et al who showed that peak incidence was in 10-15 years age group. The finding regarding the age of the patients correlates with another study which showed almost same incidence of age relation. That study stated that the peak incidence of the disease was in the age group between 21 to 30 years.

In this study 85% cases showed the incus erosion while 15% cases showed intact incus. The long process of incus was the commonest portion involved (Table 4). This find correlates with another study. For damage of incus as the most common ossicular defect may be due to its tenuous blood supply. The second reason may be that erosion of the ossicles depends upon the site of the main focus of the disease process. The pathology was mainly in the postero- superior quadrant.

It is revealed that majority of patients belonged to poor communities living in rural or slum areas of the cities where infections were more common due to unbalance diet and poor hygiene.

The management of middle ear cholesteatoma was prompt removal with aiming to arrest the bone erosion and potential threat to life producing a clear, dry, odorless inactive cavity, open to the external meatus. Both techniques i.e. radical mastoidectomy and modified radical mastoidectomy were employed. Radical mastoidectomy performed in 56 cases (93.3%) and modified radical mastoidectomy was performed in 4 cases (6.7%).

With regard to cholesteatoma surgery the group of canal wall down technique was preferred. Cholesteatoma can be thoroughly removed by wide access exposure and exteriorizing the cavity rather than a closed technique i.e. canal wall up technique, where the chance of residuality always persists. By exteriorizing the mastoid cavity, the keratin if accumulates with not create any problem by establishing self-cleaning properly leading to its easy removal postoperatively. This study, therefore, suggests that the open (canal wall down) methods are convenient as well as safer for the patients suffering from chronic suppurative otitis media with middle ear cholesteatoma.

## CONCLUSION

Cholesteatoma a non-malignant destructive lesion is the commonest finding in operated cases of chronic suppurative otitis media. Most of the cases showed the incus bone erosion. Early diagnosis and treatment can prevent complications. Treatment of cholesteatoma is surgical with the primary goal to eradicate disease and provide a safe and dry ear and to improve the hearing. Success depends almost as much on the ability of the body to heal and preserve the reconstruction as it does on the surgeon's skill.

Radical mastoidectomy is a procedure of choice for the treatment of extensive cholesteatoma. The most common presenting features of chronic suppurative otitis media with cholesteatoma was ear discharge. It was also observed that cholesteatoma is more common in low socio-economic groups and slum areas of the cities where infections are more common due to unbalance diet and poor hygiene.

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