

ORIGINAL ARTICLE

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

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ABSTRACT

Background: Cholesteatoma is a benign but destructive lesion leading to ossicular necrosis.

Objective: To see the frequency of incus bone erosion on mastoid exploration in chronic suppurative otitis media with middle ear cholesteatoma.

Study Design: Cross-sectional descriptive study.

Setting: This study was carried out in the Department of ENT Unit-2, Sir Ganga Ram Hospital, Lahore.

Duration of Study: Fifteen months months (10th April, 2019 to 9th July, 2020)

Sample technique: Non- probability purposive sampling

Methods: One hundred and twenty patients were admitted through outpatient department of ENT Unit-2, Sir Ganga Ram Hospital Lahore. Patients were included after fulfilling the inclusion criteria and information was collected on a prescribed proforma. Finally during surgery under general anesthesia, the operative findings were noted to know the incus bone erosion after middle ear cholesteatoma formation in chronic suppurative otitis media.

Results: A total number of one hundred and twenty patients of chronic suppurative otitis media with middle ear cholesteatoma were included. Out of which 80 (66.7%) were males and 40 (33.3%) were females (Table 1). The patients shown in table 2 were divided in six age groups (Table 2). Table 3 shows that the procedure of mastoidectomy was performed in 112 patients (93.3%) and modified radical mastoidectomy was performed in 8 patients (6.7%). Incus bone erosion in chronic suppurative otitis media with middle ear cholesteatoma in 102 patients (85%) and 18 patients (15%) have no incus bone erosion (Table 4).

Conclusion: Ear discharge was the most common presenting characteristic of chronic suppurative otitis media with cholesteatoma. The majority of the cases had ossicular erosion, with the incus being the most common site of involvement. Males are more likely than females to develop cholesteatoma.

Keywords: erosion of incus bone, Mastoid exploration, Chronic suppurative otitis media, Cholesteatoma

INTRODUCTION

Cholesteatoma is a cluster of viable and desquamated squamous epithelium in the middle ear or mastoid air spaces that is irregular^{1,7}. Alternatively, cholesteatoma can be thought of as a three-dimensional epidermal and connective tissue structure that takes the shape of a sac and mostly conforms to the architecture of the middle ear, attic, and mastoid spaces. The structure has the ability to develop independently and at the expense of the underlying bone, and it has a proclivity to recur after removal^{2,8}. While cholesteatomas are most frequently located in the middle ear and mastoid, they may also occur in the external ear canal and, in rare cases, as a lump on the patient's side of the head eroding the squamous temporal bone with intracranial extension.^{3,9} Puncturing, pitting, and cavitation are the three stages of ossicle erosion.^{4,10} There are four major ossicular defects that can result from cholesteatoma erosion and lead to deafness. The presence of only the long phase of incus with intact malleus and stapes is the most common^{5,11}. It starts eroding the surrounding structures such as the scutum and

the ossicular chain. This occurs probably due to the release of substances by mononuclear inflammatory cells and osteoclasts. An expanding cholesteatoma can invade the antrum and the mastoid space, eroding additional structures such as the bony facial canal, the tegmen and the lateral semi-circular canal⁶. The erosion of the suprastructure of the stapes, as well as the loss of incus, is the second most common defect. Third, the malleus handle is involved in the cholesteatoma developing into the middle ear, which could necessitate its removal along with the incus, but the stapes remains intact. Finally, all ossicles except the stapedial foot plate can be lost. The most common ossicular chain defect is cholesteatoma, which causes erosion of the long process of the incus. Rather than its shaky blood supply, the cause is due to its fragile structure and location.¹² In chronic suppurative otitis media with middle ear cholesteatoma, the incus is a common bone that is eroded. A cholesteatoma is a destructive lesion that removes middle ear mucosa, erodes the underlying tissue, and causes otorrhea, bone damage, hearing loss, facial nerve paralysis, and intra-cranial complications. When the incus, which is a part of the ossicular chain, is eroded due to cholesteatoma, the patient suffers from shown the presence of cholesteatoma associated with existence of two or more affected ossicles,

Received on 17-02-2021

Accepted on 17-05-2021

but erosion of ossicles was not present conductive hearing loss.¹³ A analysis of 55 patients with chronic suppurative otitis media was conducted. When the ossicles were compared separately, incus was found to be involved in 90% of the cases.¹⁴ The researchers looked at 80 cases of chronic suppurative otitis media with middle ear cholesteatoma. Only cholesteatoma was found in 60 cases, and cholesteatoma with granulations was found in 20 cases. Ossicular necrosis leading to incus erosion was seen in 30 cases.¹⁵ Since ossicular chain erosion occurs in 30% of cholesteatoma cases, conductive hearing loss is a common complication. A conductive hearing loss of up to 50 decibels can result from lenticular process erosion¹⁶. Twenty-five patients with a history of progressive hearing loss were tested, and the outcomes were compared to preoperative and intraoperative findings to determine the diagnostic significance of Digital Volume Tomography for incus erosion. After surgery, intact incus was found in 13 cases and expected incus erosion was confirmed in 12 cases.¹⁷ Cholesteatoma is a destructive lesion that causes bone erosion, resorption, and degradation of the incus bone, as well as conductive hearing loss.¹⁸

SUBJECTS AND METHODS

This is a cross sectional descriptive study and was carried out in the Department of ENT Unit-2, Sir Ganga Ram Hospital Lahore affiliated with Fatima Jinnah Medical University Lahore for a duration of fifteen months (10th April, 2019 to 9th July, 2020). The Sampling technique used is Non- probability purposive sampling. The calculated sample size is 120 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 meeting inclusion criteria (irrespective of age and sex suffering from chronic suppurative otitis media with middle ear cholesteatoma undergoing mastoidectomy under general anesthesia) were included and the patients with tubotympanic disease were excluded. One hundred and twenty patients were admitted through outpatient department of ENT Unit-2, Sir Ganga Ram Hospital Lahore. All the information was collected on a proforma (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. The operative findings during the surgery were noted to know the incus bone erosion after middle ear cholesteatoma formation in chronic suppurative otitis media. All the data was analysed by SPSS version 20 for windows. Quantitative data like age was analyzed using mean and standard deviation. Qualitative data gender and presence or absence of incus bone erosion was analysed using percentages and frequencies.

RESULTS

A total number of one hundred and twenty patients of chronic suppurative otitis media with middle ear cholesteatoma were included. Out of which 80(66.7%) were males and 40(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

14(11.7%), in second age group, patients aged 11-20 years 60(50%), in third age group, patients aged 21-30 years 26(21.7%), in fourth age group, patients aged 31-40 years 6(5%), in fifth age group, patients aged 41-50 years 12(10%) and in the sixth age group, patients aged >50 years 2(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 112 patients (93.3%) and modified radical mastoidectomy was performed in 8 patients (6.7%). Incus bone erosion in chronic suppurative otitis media with middle ear cholesteatoma in 102 patients (85%) and 18 patients (15%) have no incus bone erosion (Table 4).

Table 1: Gender distribution of cases (n=120)

Sex	Frequency	Percentage
Males	80	66.7
Females	40	33.3
Male to female ratio	2:1	

Table 2: Age distribution of cases(n=120)

Age (years)	Frequency	Percentage
1 – 10	14	11.7
11- 20	60	50.0
21 – 30	26	21.7
31 – 40	6	5.0
41 – 50	12	10.0
> 50	2	1.6
Mean±SD	21.2±11.9	

Table 3: Procedures performed in all cases (n = 120)

Procedure	Frequency	Percentage
Radical mastoidectomy	112	93.3
Modified radical mastoidectomy	8	6.7

Table 4: Incus bone erosion in all cases (n = 120)

Incus bone erosion	Frequency	Percentage
Yes	102	85.0
No	18	15.0

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 One hundred and twenty 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%) [Table 1]. 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.²³ Majority of patients i.e. 60 (50%) were in the age group of 11-20 years of their ages, next 26 (21.7%) in the age group of 21-30 years, 14 (11.7%) in the age group of 1-10 years, 12 (10%) in the age group of 41-50 years, while only 6 (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 al²⁴ 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.^{25,26}

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.²⁷ 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 posterior 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 112 cases (93.3%) and modified radical mastoidectomy was performed in 8 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

The most common presenting feature of chronic suppurative otitis media with cholesteatoma was ear discharge and is more common in low socio economic class, over crowded areas where there is less awareness about hygiene. Most of the cases showed the ossicular erosion and incus was most commonly involved. Cholesteatoma is more common in males than in females. Cholesteatoma a benign but 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.

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