



Study to Determine the Incus Bone Erosion Ratio on Mastoid Exploration in Cases of Chronic Suppurative Otitis Media with Middle Ear Cholesteatoma

Zafar Mahmood^{1*}, Abdul Waheed² and Muhammed Razzaq Dogar³

¹ ENT and Head and Neck Surgery, KVSS Hospital, Sessi, Pakistan

² Department of ENT and Head and Neck Surgery, Khairpur Medical College, Khairpur, Pakistan

³ Head and Neck Department, JPMC, Karachi, Pakistan

*Corresponding e-mail: drzaar@hotmail.com

ABSTRACT

Aim: To evaluate the frequency of incus bone erosion during mastoid exploration in chronic suppurative otitis media with cholesteatoma of the middle ear. **Study design:** A cross-sectional descriptive study. **Place and duration:** In the ENT Department of KVSS Hospital Sessi, Karachi for the one-year duration from January 2018 to January 2019. **Methods:** 70 chronic suppurative otitis media patients with the middle ear cholesteatoma were prospectively evaluated and selected with a non-probability purposive sampling technique. The operation was performed on 70 patients under general anaesthesia in the operating room. A standard questionnaire was prepared and history, examination, laboratory data, and treatment were recorded for each patient. **Results:** One of the usual common diseases of the ear, nose and throat is chronic suppurative otitis media. Previously this disease was called atticofurrow type was considered usually unsafe, is mostly caused by marginal perforation with cholesteatoma, the distinguishing feature of this condition and is taken as a complicating element. A total of 70 patients with chronic suppurative otitis media with middle ear cholesteatoma were included in the study. Forty-five (64.28%) are men and 25 (35.71%) are women. 2: 1 was the M: F ratio. There were 10 patients in the first age group from 1 to 10 years 10 (14.28%), in the second age group patients from 11 to 20 years 35 (50%), in the third age group 21-30 years 12 (17.14%), in the fourth age group, 31 to 40 years of age 5 (7.14%), in the fifth age group, 41 to 50 years age 5 (7.14%), and in the sixth age group, 3 patients were >50 years (4.28%). The mean \pm standard deviation in the age group was 21.2 ± 11.9 years. The mastoidectomy was performed in 64 patients (91.42%) and a modified radical mastoidectomy was performed in 6 patients (8.57%). Bone erosion due to suppurative otitis media with middle ear cholesteatoma was absent in 59 patients (84.28%) and 11 patients (15.71%) without bone erosion.

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

INTRODUCTION

Cholesteatoma is a devastating lesion with the desquamated, viable squamous epithelium of the mastoid air spaces or of the middle ear. Otherwise, cholesteatoma can be adopted as a three-dimensional structure of the connective and epidermal tissue, mostly in the sac form and generally in accordance with the structure of various areas of the middle ear, mastoid and attic. This structure is capable of gradual and autonomous growth at the underlying bone expense and tends to reappear after its removal [1]. Though cholesteatoma occurs most frequently in the mastoid and middle ear, the disease can progress in the external auditory canal and infrequently occurs as a lump eroding a squamous temporal cell bone with an intracranial extension on the patient's head. Ossicles erosion occurs in three stages: pitting, cavitation and pumicing [2]. There are 4 main bone defects that can occur due to erosion of cholesteatoma, which mainly causes hearing loss. The most usual is to engage the long incus process only without deteriorating the stapes and malleus. The second utmost usual is the erosion of the stapes, as well as the erosion incus. Thirdly, the growing

of cholesteatoma in the middle ear contains a malleus handle that may need to be removed with incus, but the stapes remain intact [3]. Finally, all ossicles may be lost, except for the stapedius footplate. Cholesteatoma erosion of the incus long process is the common defect of the ossicular chain. This is due to the delicate structure and location, and not to the small blood supply. Incus is a common bone eroded by cholesteatoma of the middle ear in suppurative chronic otitis media [4]. Cholesteatoma is destructive damage with a three-dimensional structure of the epidermis, capable of independent growth, changes the middle ear mucosa, causes corrosion of the subcutaneous tissue and tends to reappear after extraction and causes the otorrhoea, bone destruction, hearing loss, facial nerve paralysis, and intracranial complications. Incus is part of the ossicular chain when the patient undergoes erosion due to cholesteatoma, the patient suffers from conductive hearing loss [5]. A study of 55 chronic suppurative otitis media patients showed the cholesteatoma presence with the presence of two or more affected ossicles but without erosion. With separate ossicles comparison, the incus was complicated in 90% of cases [6]. A chronic suppurative otitis media case with the middle ear cholesteatoma has been investigated. A total of 70 patients had cholesteatoma and 20 patients also had granulation tissue. Bone erosion was observed in 30 cases and incus in 30.5%. Hearing loss fluctuation is a common complication of cholesteatoma since erosion of the ossicular chain occurs in 30% of cases. Erosion of the lenticular process can cause conductive hearing loss up to 50 dB. Twenty-five patients with a history of progressive hearing loss were assessed, and the results were compared with pre-operative and intraoperative findings, and the diagnostic value of the incus bone erosion by digital volume tomography was assessed. Intact incus was detected in 13 cases and the expected erosion was confirmed in 12 cases after surgery [7].

A cholesteatoma is a destructive injury that destroys underlying tissues, resorption, and destruction and destroys hearing loss. A study involving 23 patients with identification of incus in all cases, including 10 with a thin layer of mucosa, 11 of which were embedded in the granulation tissue and 2 of them in the surrounding bone [8]. In Pakistan, the incidence of incus bone erosion due to cholesteatoma has not been studied in detail. However, foreign studies were carried out regarding the incus status in the middle ear cholesteatoma [9,10]. This study aimed to provide information on the frequency of incus bone erosion in patients with suppurative chronic otitis media due to cholesteatoma. It was also useful to know how many patients suffer from deafness and what precautions should be taken to protect patients from deafness as well as from dangerous complications of the disease, i.e. extracranial and intracranial complications.

MATERIALS AND METHODS

This cross-sectional descriptive study was held in the ENT Department of KVSS Hospital Sessi, Karachi for the one-year duration from January 2018 to January 2019. The total 70 cases with 13% margin error and 95% confidence level, which assumes the expected percentage of bone erosion in suppurative chronic otitis media with cholesteatoma were selected by non-probability purposive sampling technique. In chronic suppurative otitis media patients with cholesteatoma of the middle ear, mastoidectomy was performed and all patients were included regardless of age and gender with central and partial perforation, i.e. tubo-tympanic disease. Patients with upper respiratory disease were excluded from the study. Sixty patients were admitted to the ENT. Patients were included after meeting the inclusion criteria. All information about the demographic profile, i.e. name, age, gender, address and registration number, is collected in Performa. Informed consent was obtained and one surgeon performed the operation. Finally, it was observed the surgical findings of incus bone erosion after cholesteatoma of the middle ear in chronic suppurative otitis media. All these tasks were done by a researcher. All data were analysed by SPSS 18.0. Quantitative data, such as age, were analysed using the standard deviation and mean. Qualitative gender data and the presence or absence of bone erosion in the incus was analyzed using percentages and frequencies. There is no evidence of the relevance of this study.

RESULTS

A total of 70 patients with chronic suppurative otitis media with middle ear cholesteatoma were included in the study. Forty-five (64.28%) are men and 25 (35.71%) are women. 2:1 was the M: F ratio (Table 1).

Table 1 Gender distribution

Sex	No.	Percentage (%)
Male	45	64.28%
Female	25	35.71%

There were 10 patients in the first age group from 1 to 10 years 10 (14.28%), in the second age group patients from 11 to 20 years 35 (50%), in the third age group 21-30 years 12 (17.14%), in the fourth age group, 31 to 40 years of age 5 (7.14%), in the fifth age group, 41 to 50 years age 5 (7.14%), and in the sixth age group, 3 patients were >50 years (4.28%). The mean \pm standard deviation in the age group was 21.2 ± 11.9 years (Table 2).

Table 2 Patients divided according to age into six age groups

Age in Years	No.	Percentage (%)
1-10	10	14.28%
11-20	35	50.0%
21-30	12	17.14%
31-40	5	7.14%
41-50	5	7.14%
Above 50	3	4.28%

Table 3 shows that radical mastoidectomy was performed in 64 patients (91.42%) and a modified radical mastoidectomy was performed in 6 patients (8.57%). Bone erosion due to suppurative otitis media with middle ear cholesteatoma was absent in 59 patients (84.28%) and 11 patients (15.71%) without bone erosion (Table 4).

Table 3 Radical Mastoidectomy

Procedure Performed	No.	Percentage (%)
Radical Mastoidectomy	64	91.42%
Modified Radical Mastoidectomy	6	8.57%

Table 4 Erosion of incus bone

Erosion of Incus Bone	No.	Percentage (%)
Yes	59	84.28%
No	11	15.71%

DISCUSSION

Chronic suppurative otitis media is a chronic ailment with devious inception and result in life-endangering complications if not treated or managed incorrectly and often occurs in cholesteatoma. In all suppurative chronic otitis media cases, there were frequent complaints about ear discharge [11]. The cholesteatoma with granulation and cholesteatoma alone are the most common symptoms during surgery [12]. Cholesteatoma was more common in men (66.7%) than in women (33.3%). The male-female ratio is 2: 1 and is associated with other reports that showing most chronic suppurative otitis media patients are men. Most patients, i.e. 10 patients in the first age group from 1 to 10 years 10 (14.28%), in the second age group patients from 11 to 20 years 35 (50%), in the third age group 21-30 years 12 (17.14%), in the fourth age group, 31 to 40 years of age 5 (7.14%), in the fifth age group, 41 to 50 years age 5 (7.14%), and in the sixth age group, 3 patients were >50 years (4.28%). In this study, young adults between the ages of 11 and 20 were more likely than older. The findings contradict the findings of Cruz, et al., Which presented that the maximum occurrence was in the 10-15 age group [13]. Patient age findings are linked to another study showing that the age ratio is almost the same [14]. This study showed that the maximum incidence of the disease is between 21 and 30 years of age. In this study, incus erosion was found in 85% of cases, and intact incus was observed in 15% of cases. The most commonly affected was the long incus process (Table 4). This finding is correlated with another study. Incus injury, such as the most common bone defect, can be caused by the poor blood supply. The second reason is that the erosion of the ossicles depends on the main focal area of the disease process [15]. The pathology mainly concerned the postero-superior quadrant. It was found many patients were from poor rural communities or slums of cities where infections were common due to unbalanced nutrition and lack of hygiene. The management of cholesteatoma of the middle ear was quickly eliminated to stop bone erosion and pose a life-threatening threat to the external parenchyma, which can cause an open, dry, dry and odorless inactive cavity. The mastoidectomy was performed in 64 patients

(91.42%) and a modified radical mastoidectomy was performed in 6 patients (8.57%). For cholesteatoma surgery, the canal wall down technique was preferred. Cholesteatoma can be completely eliminated by exposing the cavity, and not by exposure with wide access and closed technique, i.e. canal wall up technique, in which the possibility of staying remains [16]. Therefore, this study shows that open methods (down the canal wall) are suitable and safe for patients suffering from chronic suppurative otitis media with cholesteatoma of the middle ear.

CONCLUSION

Cholesteatoma a benign destructive lesion is the most common symptom in chronic suppurative otitis media cases that were operated. In many cases, incus bone erosion was observed. Early diagnosis and treatment can prevent complications. The treatment of cholesteatoma is a surgical procedure whose main purpose is to eliminate the disease, ensure a safe and dry ear and improve hearing. Success depends almost entirely on the body's ability to improve and maintain restructuring just as a surgeon is able. Radical mastoidectomy is the preferred procedure for the treatment of extensive cholesteatoma. The most usual chronic suppurative otitis media feature with cholesteatoma of the middle ear was ear discharge. In low socioeconomic groups, It was observed that cholesteatoma is very usual and in the marginal city area where infections were usually due to unbalanced nutrition and lack of hygiene.

DECLARATIONS

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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