Original Article

Frequency of Cholesteatoma in Chronic Suppurative Otitis Media and its Treatment Modality in a Tertiary Care Setup - A Retrospective Study

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ABSTRACT

Objective: To explore the frequency of cholesteatoma in chronic suppurative otitis media and its treatment modality among Pakistani population.

Study Design: Retrospective Observational Study

Place and Duration of Study: This study was conducted at the department of otorhinolaryngology, Jinnah Post Graduate Medical Centre Karachi, Pakistan, from January 2015 to December 2020.

Materials and Methods: All patients of CSOM were selected by using non probability purposive sampling technique. Data was collected from patients' files. Patients with a history of severe systemic illness, those who were unfit for the surgery and those who refused were excluded. Structured proforma was used to collect information. Descriptive statistics were used to explore incidence of cholesteatoma in chronic suppurative otitis media.

Results: We identified 677 patients through the coding system of our hospital between 1st of January 2015 till 31st of December 2020. Systemically ill patients, unfit patients for surgery and those who refused surgery were excluded. Females were in a higher number 373 (55.1%). The mean age was 21.74±8.97. For exploratory analysis, participants were divided into four age groups. Most common age group was between 6 to 20 years (52.4%). Out of 677 patients, 157 (23.1%) had cholesteatoma present.

Conclusion: Cholesteatoma is known sequelae in CSOM patients. It needs extra care and expertise to prevent complications. Timely recognition and correct choice of management may result in better hearing outcomes. In addition, improvement in socioeconomic status (good hygiene) and awareness may reduce the number of cases.

Key Words: CSOM, cholesteatoma, treatment modality

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INTRODUCTION

Chronic suppurative otitis media (CSOM) is a long standing (lasting >6-12 weeks) disease of middle ear cleft [1]. It is characterized by persistent ear discharge, tympanic membrane perforation and hearing loss [2].

The distinction remains between active CSOM (mucosal and squamosal disease), where there is active inflammation and productive pus, and inactive CSOM, where this is not the case though there is potential for the ear to become active at some time. A third clinical entity is healed CSOM where there are permanent abnormalities of pars tensa but the ear does not have the propensity to become active because pars tensa is intact and there is no significant retraction of pars tensa or flaccida [1].

Long standing acute otitis media (AOM) leads to CSOM. It most commonly affects children. Risk factors include frequent upper respiratory tract infections and poor socioeconomic conditions (overcrowded housing and poor hygiene and nutrition) [3,4]. Hearing loss is the leading and preventable sequelae of CSOM which retards child's speech development, education and behavior [5,6].

Cholesteatoma can be either congenital (behind an intact tympanic membrane) or acquired. The overall incidence is estimated to be around 9 per 100,000 people. At least 95% of cholesteatomas are acquired. The incidence is similar in children and adults [7]. Cholesteatoma are the end stage of (squamous epithelial) retractions of pars tensa or flaccida that are

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not self-cleansing, retain epithelial debris and elicit a secondary, inflammatory mucosal reaction [2]. It is a cystic structure lined by keratinizing stratified squamous epithelium, resting on a fibrous stroma of variable thickness, which may be having some element of original mucous lining [8]. It can spread locally and involve facial nerve [1]. Intracranial manifestations include brain abscess, meningitis and lateral sinus thrombosis. Without prompt intervention, these are common causes of death in CSOM [9,10].

The annual incidence of acquired cholesteatoma ranges from approximately 9 to 12.6 cases per 100,000 adults and from 3 to 15 cases per 100,000 children [11]. Burden of CSOM varies and according to World Health Organization (WHO), there is prevalence in the developing world as high as 7% [12]. CSOM is more neglected and improperly managed in developing countries like Pakistan [11]. Therefore, associated complications are higher and devastating. Reasons to this disparity include illiteracy, poverty, overcrowding, and lack of health facilities [13]. Similarly, it is one of the common otological conditions seen in India by an otorhinolaryngologist [14].

To the best of our knowledge there is no data available on such large scale which explores frequency of cholesteatoma in CSOM and its management accordingly in Pakistan.

MATERIALS AND METHODS

This is a retrospective observational study conducted at the department of otorhinolaryngology, Jinnah Post Graduate Medical Centre, Karachi (JPMC), Pakistan over a period of 6 years from January 2015 to December 2020. All patients of CSOM were selected by using non probability purposive sampling technique. Patients included were all diagnosed cases of CSOM irrespective of age, sex and socioeconomic status between 1st of January 2015 till 31st December 2020. Patients were identified from coding system of our hospital. The data was collected over a period of four months (February 2021 to May 2021). Patients excluded were those who had some serious systemic illness, those who were unfit for surgery and those who refused. Patients were subjected to management and planned follow up of 1 year. The results were later evaluated.

The data was collected by using a pro forma in which information was entered from the patient's files. The information that was collected included general history of the patient (age, and gender), past medical history (diabetes and hypertension), patients were also noted about duration and frequency of disease, and symptoms suggestive of complications (facial nerve involvement, vestibular and neurological functions). We also collected data for lab reports including hematological, ear pus culture and sensitivity. Furthermore, we recorded radiological data as well including X ray mastoid both ears and CT-Scan temporal and brain. Lastly, audio-logical assessment including pure tone audiometry (PTA) and tympanogram were also reported. During the study, patients' privacy and confidentiality were maintained. Statistical Package for Social Sciences (SPSS) version 23.0 (IBM SPSS Statistics, Armonk, NY) was used for data entry and statistical analysis.

Descriptive statistics were reported. Frequencies and percentages (%) were reported for categorical variables (gender, and comorbidities, family history, past medical and surgical history) and assessed by chi-square test where appropriate. Mean ±SD was reported for quantitative variables such as age. A p-value of < 0.05 was considered as significant throughout the analysis.

Ethical approval was obtained for this study from the Ethical Review Committee (ERC), JPMC. This study was conducted in accordance with the tenets of the Declaration of Helsinki.

RESULTS

We identified 867 patients through the coding system of our hospital between 1st of January 2015 till 31st of December 2020. 55 patients were considered as ineligible. Out of 812 eligible patients, 135 were excluded on the basis of exclusion criteria. Hence, 677 patients were included in final analysis.

Out of which females were higher i.e. 55.1% (95% CI, 50.5%-57.0%). We further divided data according to patients' origin and preoperative information of all patients as shown Table 1.

Table No.1: Socio-demographic characteristics and Pre-operative information of all patients (n=677)

	Frequency	Percentage
Gender		
Female	373	55.1%
Male	304	44.9%
Regions		
Sindh	446	65.8%
Balochistan	90	13.2%
Afghanistan	75	11.0%
Khyber Pakhtonkhwa	55	8.1%
Punjab	11	1.62%
Type of CSOM		
Mucosal Com	520	76.8%
Squamous Com	157	23.1%
Associated complications		
Yes	75	11.1%
No	602	88.9%
Presence of Cholesteatoma		
Yes	157	23.1%
No	520	76.8%

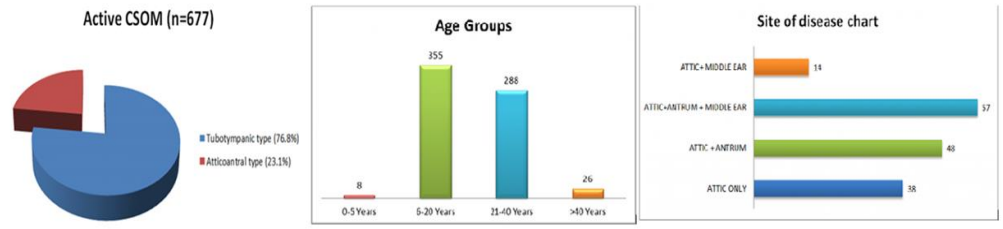

Figure No.1: Exploratory Analysis

Table No.2: Intraoperative data of all patient

Operative Procedures	Frequency (Percentage)
Cortical Mastoidectomy	411(60.7%)
Tympanoplasty	104(15.4%)
Modified Radical Mastoidectomy	103(15.2%)
Atticotomy	34(5%)
Combine Approach Tympanoplasty	12(1.8%)
Radical Mastoidectomy	07(1%)
Combine Neurosurgery and Mastoid Exploration	06(0.9%)

Table No.3: Association of CSOM patients with different variables

Study Variable		Disease Type		P-value
		Mucosal COM	Squamous COM	
Gender of Patient	Male	230(34%)	74(10.9%)	0.635
	Female	288(42.5%)	85(12.6%)	
Complication	YES	26(3.8%)	49(7.2%)	<0.001*
	NO	492(72.7%)	110(16.2%)	
Presence of Cholesteatoma	YES	1(0.1%)	156(23%)	<0.001*
	NO	517(76.4%)	3(0.4%)	
Type_Com1	Positive	26(3.8%)	49(7.2%)	<0.001*
	Negative	492(72.7%)	110(16.2%)	
Operative Procedures	Tympanoplasty	103(15.2%)	1(0.1%)	<0.001*
	Cortical Mastoidectomy	409(60.4%)	2(0.3%)	
	Atticotomy	0(0%)	34(5%)	
	Modified Radical Mastoidectomy	2(0.3%)	101(14.9%)	
	Radical Mastoidectomy	0(0%)	7(1%)	
	Combine approach tympanoplasty	4(0.6%)	8(1.2%)	
	Combine Neurosurgery and mastoid exploration	0(0%)	6(0.9%)	
Division of Complication	Extra cranial	26(3.8%)	40(53.3%)	<0.001*
	Intracranial	0(0%)	9(12%)	
Division of Surgery	Canal Wall Up	516(76.2%)	11(1.6%)	<0.001*
	Canal Wall Down	2(0.3%)	148(21.9%)	

For exploratory analysis, participants were divided into four age groups as shown in Figure 1.

The mean age was 21.74±8.97. Most common age group was between 6 to 20 years (52.4%). Intraoperative data of all patients in Table 2.

All of 677 patients were labeled as tubo tympanic type (active mucosal) and as atticoantral type (active squamous) of CSOM on the basis of history and clinical examination as shown in Figure 1.

Pure tone audiometry revealed that 504 patients (74.4%) had pure conductive deafness whereas 173 (25.5%) had mixed deafness; preoperative examination revealed that all 677 cases (100%) had perforated ear drum. We also reported site of cholesteatoma as show in Figure 1.

Association of CSOM patients with different variables are shown in Table 3.

DISCUSSION

This study aimed to find out the incidence of cholesteatoma in CSOM patients among Pakistani population, Table 1. Out of 677 eligible patients of CSOM, 157 (23.1 %) patients had cholesteatoma. This study is consistent with other studies of our region[14-16]. CSOM remained a prime infection of middle ear and mastoid cavity in our region. Cholesteatoma associated with CSOM is notorious to cause more damage as potentially it is dangerous because of its capacity to destroy bone[17]. Therefore, prompt treatment is necessary in order to avoid devastating intra and extra cranial complications. Cholesteatoma is more common in people less than 30 years, as reported in a review that around 68% patients were between 1-30 years of age[18]. Similarly, in our study above 50% were less than 30 years of age, as shown in Figure I. Cholesteatoma in children is more aggressive as compared to adults[19]. This might be the cause of more devastating complication in children.

History and comprehensive ear examination help in diagnosing cholesteatoma. In addition, computed tomography (CT), magnetic resonance imaging (MRI) and ancillary diagnostic tools aid to make definitive diagnosis. Early diagnosis helps to treat with less invasive procedures than conventional treatment. Moreover, it will help in preventing complications such hearing loss, particularly in children[20].

Treatment modality includes nonsurgical approach and surgical approach. In former case, antibiotic coverage is recommended to reduce the active inflammation and formation of granulation tissue[21]. Among different antibiotics, fluoroquinolones (ciprofloxacin or levofloxacin) are most appropriate[22]. In systemically unwell patients, oral or systemic antibiotics should be

considered. However, nonsurgical management is not a definitive treatment for cholesteatoma. In fact, it is only to reduce the ongoing inflammation, prevent intra and post-operative complications[20]. All patients in our study received antibiotic coverage as a protocol measure.

Currently, surgical removal of cholesteatoma is the only definitive treatment[20]. There are two options widely available; canal-wall-up (CWU) procedure involves posterior tympanoplasty approach. Other is canal-wall down (CWD) procedure consists mainly of modified radical mastoidectomy[23,24]. The choice of surgery plays significant role in defining hearing outcomes. Patients who receive CWD may result in worse hearing outcomes than those who undergo CWU due to impairment of resonance in the middle ear[25,26]. HO SY et al reported in their study that, CWU achieved significant improvement in hearing with speech reception threshold of less than 25 dB[23]. Likewise, in present study CWU procedure led to significant improvement in hearing. Special consideration should be given in pediatric cases. Given the complex and aggressive form of disease in children, early intervention increases the chance of preserving or reclaiming the hearing of patients[20]. However, delay results in opposite to it.

Post-operatively, patient should be regularly monitored. Deciding follow up duration is really challenging task for clinician. Up to 90% of recurrent cases present within 5 years. However, long term studies reported recidivism up to 24 years as well. Hence, it advisable to follow up as long as possible.

In order to prevent recidivism, we highly recommend complete eradication of disease and the consideration of recurrence risk factors, such as type of surgical treatment, the extent of disease, history of grommet insertion, and poster superior type of cholesteatoma.

Strengths of our study include largest data from Pakistan, multiple experienced surgeons involved, and one of the largest health sectors setting in a developing country. Major limitation of our study includes retrospective nature of our study.

CONCLUSION

Cholesteatoma is a known sequalea in CSOM patients. It needs extra care and expertise to prevent complications. Timely recognition and correct choice of management may result in better hearing outcomes. In addition, improvement in socioeconomic status (good hygiene) and awareness may reduce the number of cases.

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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