ORIGINAL ARTICLE

Clinical Findings and Diagnosis of Cholesteatoma

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ABSTRACT

Aim: To differentiate cholesteatoma from non cholesteatoma (control) CSOM on simple clinical grounds for its early detection and management.

Methods: A series of 156 patients (aged 5-64-years of either sex) having atticoantral (unsafe) ear disease, including 94 patients with cholesteatoma CSOM and 62 patients of CSOM without cholesteatoma (controls) were inducted in the study. The clinical sign and symptoms, EUM and peroperative findings of both groups were recorded, compared and analyzed on SPSS12.

Results: Patients had almost same age and gender composition in either group. No significant social or hereditary predisposition observed. Cholesteatoma patients had a significantly higher incidence of pars flaccida and attic perforation (94.72%-isolated 82%) vs. 82.24%-isolated 40.24%) with associated shed out Keratin in external meatus in 73.24% and 6.44% in the cholesteatoma and control groups. Cholesteatoma patients had a higher incidence (29.68%) of previous middle ear surgery than the control patients (22.54%).aural bleeding was reported by 6(9.66%) controlled cases vs 3(3.18%) cholesteatoma cases.

Conclusion: No specific clinical indicators recorded that could distinguish cholesteatoma from control CSOM. Cholesteatoma was not evident till surgical exploration in around 24% of cases. Therefore surgical exploration appears mandatory for final diagnosis of cholesteatoma.

Key words: CSOM, Cholesteatoma, Otoscopy/EUM, Hearing loss, Keratin, Granulation

INTRODUCTION

Chronic suppurative otitis media (CSOM) is an infective condition of the middle ear cleft and prime cause of middle ear and mastoid pathologies in our region.[1,2.]Chronic otitis media is defined as chronic inflammation of the mucoperiosteal lining of the middle ear cleft lasting longer than twelve weeks.[3] Despite advances in public health and medical care CSOM is still prevalent around the world, and is common in developing countries and certain high risk population in developed nations.[2,4]

Chronic suppurative otitis media is usually classified into two main groups (a) tubotympanic and (b) atticoantral types. Atticoantral CSOM is an active and potentially dangerous process; subdivided into two categories; CSOM with cholesteatoma and CSOM without cholesteatoma.[1,5,6] Cholesteatoma is a unique pathologic condition of the temporal bone characterized by migration of keratinized squamous epithelium positioned into the middle ear and mastoid cavity. The exact pathogenic molecular mechanisms behind the formation and propagation of cholesteatoma I not clear[7].

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Cholesteatoma is supposed to be more destructive and resulting in complications of middle ear and temporal region[8.]bone destruction is a very prominent feature of unsafe otitis media and cholesteatoma (CSOM)[9,10]. Long standing cholesteatoma results in conductive hearing loss due to ossicular chain involvement and erosion. Erosion of each ossicle contributes in a graded and independent manner to the increase conductive hearing loss and incus erosion has a significant association with air bone gape (ABG). If untreated cholesteatoma may result in labyrinthine complications like vertigo and sensory neural hearing loss[11-14]. Facial nerve involvement and intracranial extension are rare now, but are serious complication of cholesteatoma[10].

The scenario of foul smelling ear discharging, progressive conductive hearing loss and keratin accumulation with an attic or pars tensa defect is frequently seen of cholesteatoma. Occasionally a patient may present with intra-cranial or extra-cranial complication resulting from CSOM. Symptoms and signs of cholesteatoma include chronic otorrhea, tympanic membrane peroration and conductive hearing loss. Intractable pain bleeding may be occasional complaints indicating virulent disease.[15-17] An endaural polyp or granulation are found in association of atticoantral disease[18]. Except a few referred from emergency or other departments

usually with complications, majority of CSOM patients present through OPD.[19,20] Bilateral discharging ear are common but bilateral cholesteatoma is rear.[1,21] Classically cholesteatoma (CSOM) presents with offensive ear discharge; progressive conductive hearing loss and keratin accumulation within attic or pars tensa defect, usually marginal.[22]

This study is designed to evaluate the criterion, if cholesteatoma can be identified on clinical grounds for earlier diagnosis of the lesion. A special attention is paid to the distinguishing sign and symptoms of cholesteatoma and non cholesteatoma CSOM.

PATIENTS AND METHODS

This study included 156 patients who underwent exploratory surgery for chronic otitis media at ENT Unit I Services Hospital Lahore and ENT-A unit Khyber teaching hospital Peshawar between June2001 and June.2007, all the patients had a standard pre and post operative investigated protocol and EUM. The final status of the disease was established on operative findings of cholesteatoma with the help of operative microscope. Only patients having CSOM atticoantral disease (unsafe CSOM) were included. Patients with tubotympanic type of CSOM were excluded from the study. The investigation protocol consisted of three parts. A questionnaire was filled for every patient recording their socioeconomic, family, hereditary particulars, pre-operative clinical signs and symptoms. The next was the audiological and radiological evaluation of the patient. The third part comprised evaluation of peroperative findings for cholesteatoma and granulation (non cholesteatoma) under high resolution microscope. The patients were grouped into (a) cholesteatoma 94 (60.26%) and (b) non cholesteatoma (control group) 62 (29.74%) based on the presence or absence of cholesteatoma peroperatively, and comparison was made between both groups on the bases of preoperative clinical EUM and peroperative findings of the patients.

RESULTS

Total 156 patients (aged 5-64 years of either sex)operated for atticoantral CSOM were studied, results obtained were analyzed for differentiating clinical characteristics of 94 (60.26%) patients proved to be having cholesteatoma were compared with 62 (29.74%) controls patients. Patients included were of all age groups and both sexes. The age in cholesteatoma cases ranged between 6-64 years (mean 39.8 years) while age of controlled group was between 5-54 years (mean 36.2 years). Male and female ratios in the two groups were 88:68 (54:40 cholesteatoma and 34:28 controls). Most of the patients' belonged to the lower socioeconomic classes presented with advance disease. (Rural population had a slight higher number in both the groups i.e. 52:42 vs. 36:26 which is probably due to larger rural population rather than higher incidence of the condition. No significant association of systemic, personal or hereditary conditions was noted between the two groups. Four (4.24%) patient with cholesteatoma and 3 (4.83%) patients of control group had diabetes mellitus, allergy was reported in 19 (20.14%) and 14 (22.45%) while smoking was recorded in 14 (14.84%) and 10 (16.1%) patients respectively in the cholesteatoma and non-cholesteatoma groups (Table 1).

Ear discharge was the commonest symptom recorded in 90.4% and 93.6% (85/94 and 58/62) total 143/156(92%) patients of similar nature in cholesteatoma and the controlled cases respectively. Duration of ear discharge ranged from 8 months to 23 (Mean13.6) year and 5months to 14 years (Mean8.8) in cholesteatoma and control groups. Aural bleeding was noted in higher number in non cholesteatoma patients 6 (9.66%) verses 3 cases (3.18%) of cholesteatoma CSOM. Hearing loss was second common symptom reported by 84 (89.36%) and 51 (82.12%) patients in cholesteatoma and controlled groups. Tinnitus was complained in 74 (78.44%) cholesteatoma and 42 (67.62%) controlled cases (Fig.1). Earache was complained by 32 (34%) patients in cholesteatoma and 23 (37.1%) cases of control group, mostly preceding a fresh episode of the discharge. Headache was noted as preceding complaint of complication in 6 (6.36%) cases in cholesteatoma and 4 (6.44%) control patients. Tympanic membrane perforation involving pars flaccida seen in 77/94 (81.92%) cholesteatoma and 25 (40.32%) controlled patients, involving pars-tensa in 5(5.31%) cholesteatoma and 11 (17.62%) in controlled cases, whereas involvment of both pars-flaccida and tensa was noted in 12 (12.76%) in cholesteatoma and 26 (41.92%) control patients. Granulation tissue noted in 49/94 (52.12%) cholesteatoma and 54/62 (96%) of control patients. Aural polyps were seen in 12 (12.72%) and 4 (6.45%) cholesteatoma and control patients respectively. Finding of keratin debris interestingly had a very high correlation with presence of cholesteatoma in 72/94 (73.23%) in cholesteatoma as compared to only 4/62 (6.44%) in non cholesteatoma patients.

Audiological tests (PTA) revealed a mean bone conduction threshold elevation of 5-60 (mean 21.60) dB and 10-55 (mean24.8) dB and a mean air conduction loss of 10-90 dB (mean 43.8 dB) and 5-70 dB (mean 41.2 dB) respectively for cholesteatoma and controlled patients. This explains the degree of

damage to the middle ear conduction mechanism and cochlea with the disease process. Previous surgical intervention reported in 28 (29.68%) and 14 (22.54%) patients in cholesteatoma and the controlled cases (Table 2).

Table 1: Patients personal, hereditary profile

Variable	Cholesteatoma (Target)	Non-Cholesteatoma (Control)
Age	Mean 39.8 yrs	Mean 36.2 yrs
M:F to ratio	1.35:1(54:40)	1.21:1(34:28)
Rural/urban	1.23:1(52:42)	1.38:1(36:26)
Disease duration	8M-23Y (mean 13.6 yrs)	5M-14 Y (mean 8.8 yrs)
Systemic problem/habits		
*Diabetes/ immune def.	4 (4.25%)/14	3 (4.83%)/10
*Allergies	19 (20.14%)	14 (22.54%)
*Smokers	14 (14.84%)	10 (16.1%)

Table 2: Results of clinical assessment

Variable	Cholesteatoma (n=94)		Non-cholesteatoma (n = 64)	
	No.	%	No.	%
2-a-Symptoms/Signs				
Discharge	85	90.4	58	93.6
Aural bleeding	3	3.18	6	9.66
Hearing loss	84	89.0	51	82.12
Tinnitus	74	78.44	42	67.62
Earache	32	33.92	23	37.0
Headache	6	6.36	4	6.44
Prev. Surgery	28	29.68	14	22.54
2-b-Otoscopic & EUM Finding				
Site of perforation				
i)Pars flaccid	77	81.92	25	40.32
ii) Pars-tensa	5	5.30	11	17.74
iii) P:flaccida + tensa	12	12.76	26	41.92
Aural polyp	12	12.76	4	6.45
Granulation	49	52.12	54	84.37
Keratin debris	72	76.59	4	6.45
Posterior wall Saging	6	6.38	-	-

X-ray of the mastoid showed well pneumatized mastoid air cell system in 22 (23.32%) and 18 (28.94%) while sclerotic mastoid were seen in 64(67.8%) in cholesteatoma and 38(61.18%) control patients 8(8.48%) and 6(9.66%) patients of the two groups had mixed cellularity of mastoid. Bone destruction was confirmed in 6/8(75%) and 5/6 (83.33%) cases respectively in cholesteatoma and without cholesteatoma cases by CT-Scan. Preoperative finding noted and were almost the same with a couple of variation. Extracranial complications recorded in 12 (12.76%) patients (mastoiditis seen in 4 (4.23%) patients and 3(3.19%) developed mastoid abscess, 3(3.19%) had postaural fistula and 2 (2.11%) patients seen with otitis externa) of cholesteatoma group while in control group 8 (12.90%) patients (including 1 (1.61%) patient of zygomatic abscess,1 (1.61%) patient of postaural abscess, 2 (3.22%) of mastoiditis and 2 (3.22%) with otitis externa while 2 (3.22%) had postaural fistula). Facial nerve implication was noted in 4(4.24%) and 2(3.22%) in cholesteatoma and non cholesteatoma patient respectively (Table 3). On investigation in cholesteatoma patients labyrinthine (vertigo/ dizziness) 6 (6.4%) and facial nerve affection was noted in and 4 (4.24%) cholesteatoma patients against 2 (3.22%) and 1.61% 2 (3.22%) patients of controlled cases. Regarding intracranial involvement in the cholesteatoma group one patient came with meningitis and one with lateral sinus thrombosis, admitted through emergency, and one patient was suffering from cerebral abscess. In controlled group 2 (3.22%) patients had established intracranial abscess one each in cerebellum and temporal lobe wile one patient was treated for suspected meningitis. (Table 4)

Table 3: Radiological and audiological results

Variable	Cholesteatoma		Non-cholesteatoma	
	No.	**%**	**No.**	**%**
Radiology of mastoid				
Large (pneumatized)	22	23.32	18	28.94
Small (sclerosed)	64	67.8	38	61.18
Mixed cellularity	8	8.48	6	9.66
CT(+ve Bone erosion)	6/8 (75%)		5/6 (83.33%)	
Audiological (PTA)				
Bone conduction loss	5-60 (mean 21.60 dB)		10-55 (mean 24.8 dB)	
Air conduction loss	10-95 (mean 43.8 dB)		5-70 (mean 41.2 dB)	

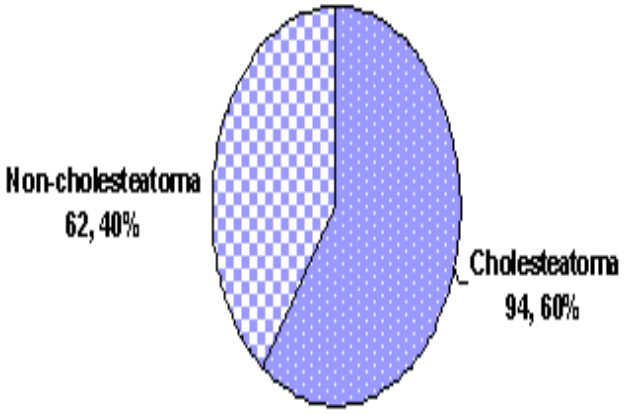

Fig. 1: Distribution of cholesteatoma and non-cholesteatoma cases

Table 4: Complications recoded

Complication	Cholesteatoma		Non-cholesteatoma	
	No.	%	No.	%
Mastoiditis/ MastoidAbscess	7	7.42	4	6.44
Mastoid fistula	3	3.18	2	3.22
Otitis externa	2	2.12	2	3.22
Dizziness/+ve fistula sign	10	10.6	4	6.44
Facial nerve symptoms	4	4.24	2	3.22
Intracranial involvement	3	3.18	3	4.82

DISCUSSION

Since pre historic time Chronic suppurative otitis media (CSOM) is an important cause of middle ear disease.[22] CSOM have cholesteatoma and non cholesteatoma veriety.[1,2] Cholesteatoma of the middle ear is a destructive condition, the frequency and rate of complications have decreased after the introduction of antimicrobial agents.'[23] Early clinical detection is important to avoid its complication[15]. Chronic otitis media is recorded in all age groups; no hereditary or social factor can be strongly related to cholesteatoma.[1,15,19] Khamani et al[2]. and Blustone[4] mentioned high prevalence of CSOM among people of poor class and rural population. This study was conducted to distinguish cholesteatoma from otitis media without cholesteatoma on clinical grounds for its early diagnosis and appropriate surgical intervention. Analysis of the hereditary, personal and social indexes showed no significant factor which can lead to diagnose of cholesteatoma (Table 1).

The per-operative occurrence of cholesteatoma was 61%-80% in agreement with other such studies.[15,23,25] The commonest presenting symptom was ear discharge in both groups. History of aural bleeding was present in more patients of control group than cholesteatoma group. Incidence of discharge was frequent than some studies in both groups but corresponding to others.[26,27] CSOM is the commonest cause of hearing impairment in developing nations.[4,28] Conductive hearing loss in otitis media is due to involvement of the ossicular chain and other structure by the disease process.[1,9,11] Clinical categorization of cholesteatoma is not significantly associated with the ABG. Erosion of each ossicle contributes in a graded and independent manner to the increase ABG. The incus erosion having the most statistically significant association with ABG. The sensorineural hearing loss is supposed to be due to toxic products of inflammation and drug toxicity. [12.] Heating loss and PTA finding in our study are consistent with that reported by Osma et al[24] as there is no significant difference among the two groups.

Intermittent or episodic earache is a common symptom in chronic ear infection but may signify complication.[13,14,19] Episodes of earache were reported by 33.92% (32) and 37% (23) patients in cholesteatoma and controlled group. No difference in the character or pattern of pain was classical for any of the two groups in accordance with reports of Aberge et al[15] and Malik et al[23].

The type and site of perforation has been considered important in the diagnosis of atticoantral otitis media but never related particularly to cholesteatoma or non cholesteatoma otitis media.[5,23] We found that the attic and parse flaccida perforation was higher in cholesteatoma group.81.92% vs 40.32%but became insignificant when totalled with parse plus pars flaccida (total 94.64% & 82.24%) however the isolated parse tensa perforation was significant in non cholesteatoma SOM i.e. 17.71% (11/62) as compared to cholesteatoma SOM only 5.3% (5/94) similar finding are noted by Malik et al[23] that pars flaccida perforation may render a high suspicion of cholesteatoma.

According to Mills[22] presence of shed out keratin fragments (debris) has interesting very high correlation with cholesteatoma. The correlation of cholesteatoma with presence of keratin fragments/ debris in 72/94 (73.23%) as compared to only 4/62 (6.44%) in non cholesteatoma patients this can be taken as an important indicator for presence of cholesteatoma. Cholesteatoma patients had a higher incidence 28 (29.68%) of previous middle ear surgery then the control patients 14 (22.58%) as shown in other studies explaining its higher rate of recurrence and difficult clearance. Posterior meatal wall sagging was only found in cholesteatoma 6(6.38%) cases and no control case.

X-ray of mastoid region is a routine investigation but is helpful only in a third of cases to diagnose cholesteatoma and bone destruction.[23] Preoperative CT scan is superior for diagnosis of intracranial complication and bone erosions.[21,27] X-ray of the mastoid showed well pneumatised mastoid air cell system in 22(23.32%) and 18(28.94%) while sclerotic mastoid were seen in 64(67.8%) in cholesteatoma and 38(61.18%) control patients, 8(8.48%) and 6(9.66%) patients of the two groups had mixed cellularity of mastoid. Results obtained in our study are same as mentioned by Malik et al. and. Edelstein et al. [23,27]

In our study the CT scan sensitivity was almost the same for both the target (cholesteatoma) and the control groups i.e. Bone destruction was confirmed in 6/8(75%) and 5/6(84.33%) cases respectively in cholesteatoma and non cholsteatoma cases by CT

scan Which is otherwise not considered mandatory in CSOM. These preoperative finding were almost the same with a couple of variation as expressed by other authers.

With modern era antibiotic and surgical modalities complications of otitis media have decreased to very low level. But still CSOM is a commonest cause of threatening intracranial and extra cranial complications[24,28,29].

Vestibular problem is common in both types of active otitis media, due to inflammation in round window area and erosion of lateral semi circular canal in particularly cholesteatoma. In this study patients labyrinthine (vertigo/dizziness) and facial nerve deficit was higher in cholesteatoma group than control patients. Ten (10.6%) patient had vestibular sign and symptom while 4(4.24%) had facial weakness in cholesteatoma on the other hand in non cholesteatoma group only 4 (6.44%) patient had vestibular and 2 (3.22%) facial nerve affection, corresponding to other such studies.[9,23]

The frequency of extra cranial complications like mastoiditis and mastoid fistula etc. in our study was 7.42% and 6.44% in cholesteatoma and control cases respectively, as in the range reported by Aberg et al[14] and Memon et al.[19] The mastoid fistula was 3 (3.19%) cholesteatoma and 2 (3.22%) controled groups while otitis externa in 2 (2.12 & 3.22%) of each group. Posterior wall sagging was also noted in 6(6.38%) cases of cholesteatoma and non (0%) in the control group. This also explain the destructive nature of cholesteatoma, eroding the bony confines of middle ear cleft.[15,20,30]

The diagnosis of intracranial abscess and complication of CSOM and other causes is difficult but very important.[31] In developing setups still incidence of intracranial complication is higher (2.8-12%) with CSOM. Although the incidence of intracranial complication has fallen from 2.3-5% to 0.24% in recent times.[24,28,29]

With cholesteatoma 1 (1.06%) patient had lateral sinus thrombosis and 1 (1.06%) patient admitted with cerebral abscess, while in the controlled group one (1.67%) patient, a diabetic, had extension of the disease to posterior cranial fossa and skull base with cerebral abscess, who died later on. Therefore almost equal prevalence in both groups was seen.

In summary there is no single clinical indicator which could be taken as the distinguishing character between cholesteatoma and non-cholesteatoma CSOM. A comprehensive clinical assessment, supported by EUM and radiological examination may lead towards diagnosis of cholesteatoma in majority of cases. Attic or pars flaccid perforating with presence of keratin accumulation correlates to high degree of cholesteatoma suspicion. But surgical exploration is confirmatory for cholesteatoma CSOM diagnosis, as in agreement with many authentic reports.[15,16,19,23,26]

CONCLUSION

Differentiation of cholesteatoma from non-cholesteatoma otitis media on clinical basis is difficult. A careful clinical, radiological and ear examination under microscope helps in detection of cholesteatoma in most of the cases expressed as presence of keratin debris alongwith parse flaccida and attic defect. But still around a quarter of cases can only be confirmed on surgical exploration as to identify middle ear cholesteatoma.

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