Per Operative Extent of Disease in Chronic Suppurative Otitis Media (CSOM) Squamosal Type and Ossicular Chain Status based on"ChOLE"and "EAONO/JOS"Classification.

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ABSTRACT

Background: Otitis media is infection of middle ear, with tympanic membrane perforation the term huge or massive is used when it has extension. Similarly, if there is bone erosion, then it is considered to be of severe type. The draw back in this scenario is that comparison for outcome cannot be carried out and hence objective learning is not possible due to absence of uniform classification. The European Academy of Otology and Neurotology and the Japanese Otological Society has recently introduced a classification system grounded on cholesteatoma extension and its complications and similarly another is ChOLE-classification. In this study both staging system have been used primarily for extension of disease and ossicular chain status.

Objective: To evaluate the intraoperative extent of disease and to analyze the nature of ossicular erosion in patients of squamosal type of CSOM based on ChOLE and EAONO/JOS Classification.

Material and Methods: This Retrospective chart review study was conducted from January 2017 to June 2019 in ENT Department, Saidu Group of Teaching Hospitals, Saidu Sharif Swat, Khyber Pakhtunkhwa, Pakistan. A total of 95 patients of squamosal type of Chronic Supportive Otitis Media operated during the period were included in the study after following the set exclusion criteria. Peroperative extent of disease was noted from the patient's charts and operation notes according to the "EAONO/JOS" classification system for cholestetoma staging. The ossicular status at the end of surgery was also noted from the operation notes according to the "ChOLE" classification. The data collected was analyzed for results.

Results: Majority of the patients (80%) were in stage 3, followed by stage 2 (9%) and stage 4 (8%). Three percent of the patients were in stage 1. Class "O" was 3%, in which the ossicular chain was intact while Class 1 was 18% and Class 2 was 34%. Majority of the patients (45%) were in advanced stage of Class 3, in which either mobile stapes (3a) or Mobile foot plate (3b) was observed.

Conclusion: Multi ossicular involvement was more common likely contributing to difficulty in ossicular reconstruction and hearing restoration. Moreover both the staging systems are quite helpful in surgically oriented categorization of extent of disease.

Key words: *Squamosal Chronic Supporative Otitis Media, Ossicular status, Extent of Cholesteatoma.*

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INTRODUCTION

Chronic Supporative Otitis Media is a long standing infection of the middle ear cleft characterized by permanent tympanic membrane perforation, recurrent / persistent ear discharge, tympanosclerosis, retraction pocket, granulation tissue or cholesteatoma formation.[1] CSOM is still common in under developed/developing countries in Otolaryngology practice. About 65-330 million people suffer from ear infection worldwide and 60% of them had significant hearing impairment.[2] Brawing classified CSOM into Mucosal and Squamosal types.[3] Both types can cause Intra cranial and Extra cranial complication but complication are more frequent with squamosal type due to bony erosion by cholesteatoma / granulation.[4] Bony erosion is more frequent with granulation tissues.[5] Factors responsible for bony erosion are:

(a) activation of osteoclasts (b) pressure necrosis (c) collagenolytic enzymes (d) tumor necrosis factor alpha (TNF) (e) lysosomal enzymes (f) Non lysosomal enzymes (g) calpain I,II.[6,7,8,9]

Squamosal disease causes erosion of the lateral attic wall, ossicles, destroy bony inter cellular septae resulting in the formation of large cavity. It may erode facial canal, semicircular canal, sinus and dural plate, resulting in life threatening complications.[10,11]

The goal of surgery in squamosal CSOM is:

(a) to eradicate the disease.
(b) To make ear dry and safe.
(c) Preserve or restore hearing.[12-13]

Surgical procedure for CSOM squamosal are canal wall up or canal wall down Mastoidectomy. In canal wall down we drill out the post canal wall up to the level of mastoid part of facial nerve, skeletonize it and exteriorize the mastoid cavity to External Auditory Canal. It is further divided in to radical, modified radical Mastoidectomy and Attico Antrastomy or Epitympanomastiodectomy. In each canal wall down masoidectomy we have to do a wide meatoplasty as well.[14,15,16,17]

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MATERIALAND METHODS

This study was a retrospective charts review carried out in the Department of ENT Saidu Group of Teaching Hospitals Saidu Sharif Swat from January 2017 to June 2019. Operation notes of total 95 Patients, who were admitted and operated for Squamosal type CSOM, were reviewed. Patient charts with incomplete information were excluded from the study. In the review process, age and gender were noted. Peroperative extent of disease was noted according to the "EAONO/JOS" classification system for cholestetoma staging primarily from the operation notes. The ossicular status noted earlier at the end of surgery was analyzed from the operation notes according to the "ChoLE" classification. Data was collected and analyzed for results.

RESULTS

Of the 95 patients, 46 (48%) were male and 49(52%) were female.The age ranged from 5 to 60 years. The most common age group was 11 to 30 years.

Foul smelling ear discharge with or without polyp were main clinical findings in the majority of cases. In this study, cholestetoma without granulation was found in 52%, cholestetoma with granulation in 42 % and granulation without cholestetoma in 6%.

Table No 1 shows the extent of disease in accordance to the EAONO/JOS staging system. Majority of the patients (80%) were in stage 3, followed by stage 2 (9%) and stage 4 (8%). Three percent of the patients were in stage 1.

Table No 2 shows the breakdown of stage 3 disease. Intracranial complications like purulent meningitis, brain abscess and brain herniation into the mastoid cavity were seen in few cases.

Regarding the ossicular chain status, "ChOLE" Class "O" was 3%, in which the ossicular chain was intact while Class 1 was 18% and Class 2 was 34%. Majority of the patients (45%) were in advanced stage of Class 3, in which either mobile stapes (3a) or Mobile foot plate (3b) was observed as shown in the Table No 3.

Table No 1.Extent of Disease in accordance to EAONO/JOS staging

Stage	Number	Percentage
1	3	3%
2	9	9%
3	76	80%
4	7	8%

Table No 2.Extracranial Complications

Complication Type	N=76	%
Facial Palsy	2	3%
Labyrinthitis	3	4%
Post auricular Abscess	22	29%
Post Auricular Fistula	6	8%
Labyrinthine Fistula	2	2%
Facial Canal Dehiscence	7	9%
Posterior Canal wall Erosion	13	16%
Sinus Plate Erosion	11	15%
Dural Plate Erosion	10	14%

Table No 3.Extent of Ossicular Damage according to ChOLE Classification

Class	N=95	%
"0" Intact Ossicular Chain	**3**	**3%**
"1" Malleus and Stapes Present	**17**	**18%**
"2" Malleus and Footplate Only	**32**	**34%**
"3a" Mobile Stapes Only	**29**	**30%**
"3b" Mobile Footplate Only	**14**	**15%**

DISCUSSION

This Chart review study was carried out at Saidu Teaching Hospital Saidu Sharif Swat, Department of ENT to find the peroperative extent of disease in CSOM squamosal type and ossicular chain status based on ChOLE and EAONO/JOS classification[12].

In our study, age of the patients ranged from 5 to 60 years. Majority of our patient were in the range of 11 to 30 years. This finding is consistent with other studies[5,19,20,21] .The gender distribution is almost equal (46:49)with slight female predominance.Sengupta-A et-al also reported the same male female ratio.[21] The male female ratio is differently reported by Sherazi et-al[13] and Joseph et-al.[18] in their studies.

This study showed that cholestetoma without granulation was found in 52%, cholestetoma with granulation in 42 % and granulation without cholestetoma in 6 %. D. Shreshta et-al[5] reported cholesteatoma in 61% cases and granulation tissue in 27% cases. While in the study conducted by Udaiapurwala et-al[19] and Bahauddin et-al[22] granulation tissue (62.5%) has been reported more than cholestetoma (37.5%) cases in middle ear cleft which is contradictory to the findings in our study but DK Banskota[20] reported much similar findings to our study having 81.28% cholesteatoma and 12.7% granulation in their cases and similar results have also been given by Thapa et-al[23] in their study with cholesteatoma in 84.26% and granulation in 15.74% cases. Surprisingly Meyehoff et-al[24] reported granulation more frequently than cholesteatoma.

Regarding ossicular chain damage, Class "0" comprised 3% in our study which reflects that ossicular chain is completely intact and the cholestetoma is limited. In the present study, Incus was the most commonly completely or partially eroded ossicle accounting for 97% of cases (Class 1,2,3a and 3b),followed by stapes (49%) while the least involved ossicle was malleus which was damaged in 45% of cases. Similar results have been reported in other studies like Joseph et-al[18] showed involvement of malleus 32%, involvement of incus in 89%, involvement of stapes in 41% cases. Similarly, Kurien et-al[25] also found that the malleus was least affected in 67% and incus most affected 100%.Contrary to our study, Shrestha et-al[14] reported erosion of incus in 56% cases and presence of supra structure in 76% cases. In most cases more than one ossicle involvement has been reported by Bahauddin et-al.[22],a finding very similar to our study in which we also noted multi ossicular involvement in majority of cases.

Regarding extracranial complications, the most common complication noted in this study was post auricular abscess (29%) followed by posterior canal wall erosion, sinus and dural plate erosion while facial nerve paralysis was noted in 3% of cases. The labyrinthine fistula was the least noted extracranial complication noted in 2% of cases. Shrestha-S et-al[14] also showed a high incidence of dural plate dehiscence in 36% and sinus plate dehiscence are 12%.In another study,Ayubi S et-al[26] also reported facial palsy in 2%, lateral semicircular canal fistula in 10%, dural plate erosion 20%.Ayubi S et-al also reported facial canal dehiscence in 16.6%, Bhatia et-al[27] 24% and Wang H[28] in 29.7%. They also reported tympanic segment of facial canal as the commonest site of dehiscence which was in accordance in our study. Facial paralysis by CSOM has also been reported by QUARANTA and CASSANO.[29] Otogenic brain abscess (4%) and purulent meningitis (2%) were notable intracranial complications classified as stage 4 in this study. Sengupta et-al[21] reported the similar statistics in their study.

CONCLUSION

We concluded that majority of the patients were presented in more advance stages and multi ossicular involvement was more common likely contributing to difficulty in ossicular reconstruction and hearing restoration. Moreover, both the staging systems are quite helpful in surgically oriented categorization of extent of disease.

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