Clinicopathological Study of Salivary Gland Tumors in Tertiary Care Teaching Hospital

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Abstract

Background: The study “Preoperative predictors of ossicular status in chronic suppurative otitis media” was undertaken in Swami Rama Himalayan University, Dehradun. A total number of 124 patients who underwent “tympanomastoidectomy” for CSOM were evaluated to correlate the preoperative predictors with intraoperative ossicular status. Materials and Methods: This study was carried out for 12 months period in the Department of Otorhinolaryngology at Himalayan Institute of Medical Sciences, SRHU, Swami Ram Nagar, Dehradun. Subjects were recruited from Inpatient Department planned for surgery. Each of the patients selected for the study was subjected to a detailed history and complete ear, nose and throat examination. Site and size of perforation, status of attic, middle ear mucosa status, presence of myringosclerosis, tympanosclerosis, granulations and cholesteatoma were noted in each patient. Degree and type of hearing loss was evaluated via pure tone audiometry. Results: Most of the patients belonged to the age group of less than 40 years, with maximum patients falling in the age group of 21-30 years i.e., 39 (31.45%) patients. The average age of patients was 29.39±10.79 years. Female predominance was seen with male to female ratio being 1:1.33. More cases were from rural areas comprising of 81 (65.3%) cases while 43 (34.6%) resided in urban areas. Ear discharge was the most common presenting complaint seen in 109 cases (87.90%) followed by hearing loss which was present in 100 cases (80.64%). Unilateral ear discharge present in 89 (81.65%) and 20 (18.34%) had bilateral ear discharge. Conclusion: Blood-stained discharge was present in 40 (36.66%) patients out of which 28 (70%) patients had ossicular necrosis. On assessing the amount of ear discharge, highest number of patients had scanty discharge i.e., in 75 (68.80%), out of which 30 (40%) patients had ossicular necrosis. Mucopurulent discharge was seen in highest number of patients i.e., in 68 (62.38%) out of which 30 (44.1%) had ossicular necrosis. Associated symptoms of vertigo were present in 28 patients (22.5%) out of which 16 patients (57.1%) had ossicles necrosed. On findings of otoscopy and otoendoscopy, perforation in pars tensa was seen in 82 patients (66.12%) out of which ossicular necrosis was present in 14 patients (17%). Highest incidence of ossicular necrosis was seen in 4 (4.83%) patients who had perforation involving both pars tensa and pars flaccida.

Keywords: CSOM, Tubotympanic, Mastoidectomy, Attic, Antrum, Flaccida, Salivary gland, Tumors

1. Introduction

A persistent rupture in the tympanic membrane (TM) linked to a persistent middle ear infection, regardless of the discharge, is known as chronic suppurative otitis media (CSOM). There are usually 2 types of CSOM i.e., tubotympanic (safe) & atticoantral (unsafe). In CSOM, patients report to otology outpatient clinic with complaints of otorrhea and hearing impairment which are bothersome for them as it hampers their day-to-day activities. Ossicular chain erosion can be seen in both safe and unsafe type of diseases (1). CSOM is commonly seen among the younger population usually among the 1st
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and 2nd decade of life. Moreover, there is slightly female dominance but increased severity is seen among males (2). Developing countries around the world carry the burden of the disease due to poor living standard accompanied by low nutrition status with lack of medical services with trained professionals and absence of necessary medications and equipments (3).

Although it's not always linked to pus, CSOM is a recurrence of a previous case of acute suppurative otitis media (ASOM). The browning categorization of CSOM is divided into two types: the mucosal type, which is characterized by a perforation in the pars tensa, and the squamous type, which is characterized by a retraction pocket or frank cholesteatoma (26). One can distinguish between CSOM and AOM based on the kind of bacterium that was discovered. ASOM is associated with the presence of *Staphylococcus aureus*, *Micrococcus catarrhalis*, *Streptococcus pneumoniae* and *Haemophilus influenzae*. The aforementioned bacterial species often cause upper respiratory infections and enter the nasopharynx via the Eustachian tube, which leads to the middle ear. Aerobic bacteria found in CSOM instances include *Escherichia coli*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Streptococcus pyogenes*, *Staphylococcus aureus* and *Klebsiella species*. Anaerobic bacteria such as *Peptostreptococcus* and *Propionibacterium* Bacteroides are also seen in CSOM instances. Furthermore, in the case of an external injury or damage, the bacteria may potentially make their way in from the skin's normal flora.

In both active mucosal and squamous epithelial type of CSOM there is bone resorption. When there is inflammation there is proliferation with hyperemia of capillaries and prominent histiocytes. Middle ear ossicular chain reconstruction is required in 40 to 60% of tympanoplasty performed (13). Therefore, it is important to determine the conditions which lead to ossicular discontinuation so as to be enhance our preparedness for ossiculoplasty, which in turn will lead to better prognosis and hearing improvement after surgery. Additionally, knowing the status of ossicular chain before the surgery, patient can be counselled about possible surgical complications and prognosis associated with it (14). Various complications are seen in CSOM cases that are intracranial as well as extracranial. Post aural abscess, facial palsy, intracranial abscess and labyrinthitis are few of the common complications.

These complications lead to increase in further morbidity as well as mortality among the patients (15). Hence, this study will provide the much-needed insight into the factors which can act as significant predictors for the intra operative ossicular status, and help in better preparing the patient before the surgery. Furthermore, narrowing down to the most significantly related predictors, it may also be possible to reduce the financial burden on the patient, something which is of prime importance in a resource limited country like ours.

2. Materials And Methods

This study was carried out for 12 months period in the Department of Otorhinolaryngology at Himalayan Institute of Medical Sciences, SRHU, Swami Ram Nagar, Dehradun. Subjects were recruited from Inpatient Department planned for surgery.

Clinical profile, audiological, and radiological data were collected in accordance with predefined proforma after written informed consent along with prior ethics committee approvals.

Study Design:

*Type of study:* Descriptive.

*Sample size:* As per inclusion criteria a minimum of 118 patients.

\[ n = \left( \frac{Z_{1-\alpha/2}}{2} \right)^2 \frac{PQ}{L^2} \]

Here ‘n’ stands for required minimum sample size and Z was taken to be 1.96 at 0.05 level of significance. Where P is the 8% prevalence of CSOM as per a study conducted in South India. Q = 1 - P = 92% and D=5% (absolute precision of error). Then the sample size is 118.

*Selection of Subject:*

*Inclusion Criteria:*

1. Patients with a clinical diagnosis of chronic suppurative otitis media who were planned for surgery;
2. Age Group: 09 years to 60 years of age.

*Exclusion criteria:*

1. Patients who have been operated previously.
2. Chronic suppurative otitis media with intra-complications
3. History of noise induced hearing loss or acoustic trauma.
4. History of trauma
5. History of ototoxic drugs
6. Mentally ill patients

**Study Tools:**
1. Case recording form was used for the generation of data.
2. Otoscopy findings were noted using pneumatic otoscope (Welch Allyn diagnostic otoscope of 3.5 V).
3. Tuning forks of frequency 256 Hz, 512Hz, 1024Hz.
4. Karl–Storz Rigid 0-degree Oto-endoscope (2-4mm) and 0-degree endoscope (4mm).
6. Leica M400 E operating microscope.

**Study Protocol:**

1) Each of the patients selected for the study was subjected to a detailed history and complete ear, nose and throat examination.

2) **Otoscopy and Otoendoscopy:** Site and size of perforation, status of attic, middle ear mucosa status, presence of myringosclerosis, tympanosclerosis, granulations and cholesteatoma was noted in each patients.

3) **Audiometry Findings:** Degree and type of hearing loss was evaluated via pure tone audiometry.

4) **Radiological Examination:** X-ray Bilateral mastoid (Schuller’s view) was done and pneumatization of mastoid air cells was noted.

5) **Intraoperative Findings:** Documentation of oto-microscopic findings and middle ear findings and ossicular status was done.

**Data Management & Statistical Analysis:**

MS Excel 2010 was used to input the gathered data. Version 22 of the Statistical Package for the Social Sciences (SPSS) was utilized for various types of statistical analyses. Consequently, only one sample from the Kolmogorov-Smirnov test was used to ascertain whether or not the data sets deviated from a normal distribution. When analyzing normally distributed data, parametric tests were used; when analyzing non-normally distributed data, non-parametric tests were used. Regarding the quantitative variables, descriptive statistics were computed. Frequencies and percentages were computed for both category and qualitative data. To make the findings easier to grasp, a graphical depiction of the variables was provided, and chi-square tests were used to examine categorical data. A p-value of <0.05 was deemed statistically significant, but a p-value of >0.05 was deemed insignificant.

3. Results and Discussion

The study included a total of 124 patients having CSOM who underwent tympanomastoidectomy. The observations recorded during the study are shown in subsequent tables.

**Table 1:** Age distribution of patients with CSOM (n=124)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Number of patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 – 20</td>
<td>33</td>
<td>26.61</td>
</tr>
<tr>
<td>21 - 30</td>
<td>39</td>
<td>31.45</td>
</tr>
<tr>
<td>31 - 40</td>
<td>35</td>
<td>28.23</td>
</tr>
<tr>
<td>41-50</td>
<td>14</td>
<td>11.29</td>
</tr>
<tr>
<td>51 - 60</td>
<td>3</td>
<td>2.42</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>124</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Most of the patients belonged to the age group of less than 40 years, with maximum patients falling in the age group of 21-30 years i.e., 39 (31.45%) patients. The average age of patients was 29.39±10.79 years.
In our study there were 53 (42.74%) males and 71 (57.25%) females with male to female ratio being 1:1.33 which thus showed female predominance.

Patients in our study were predominantly from rural areas comprising of 81 (65.3%) cases and 43 (34.6%) patients were from urban areas.

Presenting symptoms of most of the patients was ear discharge i.e., 109 (87.90%) followed by 100 (80.64%) had hearing loss. Vertigo was present only in 28 (22.58%) patients.

Maximum number of patients had unilateral ear discharge 89 (81.65%) and 20 (18.35%) had bilateral ear discharge. Maximum number of females i.e., 59 (56.73%) had conductive hearing loss while maximum number of males i.e., 8 (40%) had mixed hearing loss.

<table>
<thead>
<tr>
<th>Degree of hearing loss (Decibel)</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal (0-25)</td>
<td>10 (8.06)</td>
</tr>
<tr>
<td>Mild (26-40)</td>
<td>48 (38.70)</td>
</tr>
<tr>
<td>Moderate (41-55)</td>
<td>35 (28.22)</td>
</tr>
<tr>
<td>Moderately Severe (56-70)</td>
<td>26 (20.96)</td>
</tr>
<tr>
<td>Severe (71-91)</td>
<td>3 (2.41)</td>
</tr>
<tr>
<td>Profound (&gt;91)</td>
<td>2 (1.61)</td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
</tr>
</tbody>
</table>
Mild conductive hearing loss was present in maximum number of patients i.e., in 48 (38.70%), while least number of patients i.e., 2 (1.61%) had profound hearing loss.

Table 7: Distribution of patients on the basis of type of CSOM (n=124)

<table>
<thead>
<tr>
<th>Type of CSOM</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe</td>
<td>30(37.5)</td>
<td>50(62.5%)</td>
</tr>
<tr>
<td>Unsafe</td>
<td>23(27.27)</td>
<td>21(47.72%)</td>
</tr>
</tbody>
</table>

In our study, safe CSOM was present in maximum number of patients i.e., 80 out of which 62.5% patients belonged to female gender, while in unsafe CSOM out of 44 patients 52.27% belonged to male gender.

Table 8: Distribution of patients on the basis of type of ear surgery performed (n=124)

<table>
<thead>
<tr>
<th>Type of ear surgery</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antrostomy + Tympanoplasty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cortical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastoidectomy + Tympanoplasty</td>
<td>74</td>
<td>59.67</td>
</tr>
<tr>
<td>Cortical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastoidectomy + Atticotomy + Tympanoplasty</td>
<td>7</td>
<td>5.64</td>
</tr>
<tr>
<td>Modified Radical Mastoidectomy + Tympanoplasty</td>
<td>24</td>
<td>19.35</td>
</tr>
<tr>
<td>Radical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastoidectomy + Tympanoplasty</td>
<td>1</td>
<td>0.80</td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
<td>100</td>
</tr>
</tbody>
</table>

In our study, maximum number of patients underwent cortical mastoidectomy with tympanoplasty i.e., 74 (59.67) patients followed by modified radical mastoidectomy with tympanoplasty i.e., 24 (19.35%) patients. Only 1 (0.80%) patient underwent radical mastoidectomy with tympanoplasty. In our study 81 (65.32%) patients had an intact ossicular status 81 (65.32%) while 43 (34.67%) patients had ossicles necrosed intraoperatively. Maximum patient i.e. 56 (51.37%) had duration of ear discharge in < 5 years duration followed by 20 (18.34%) having ear discharge for 6-10 years of duration while least number of patients 9 (8.25%) had duration more than 30 years.

Ossicular necrosis was highest amongst two groups of patients having ear discharge for 21-25 years and 26-30 years, being 1 (50%) and 2 (50%) respectively, and only 1 (12.5%) patient had ossicular necrosis who had ear discharge for 16-20 years. All the patients with ossicular necrosis had a percentage between 30-50% in almost all groups of duration of ear discharge and the result was not statistically significant (p value=0.6083).

Table 9: Relation of character of ear discharge with ossicular status (n=109)

<table>
<thead>
<tr>
<th>Character of ear discharge</th>
<th>Number of patients (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>40(36.66)</td>
<td>28(70)</td>
</tr>
<tr>
<td>Absent</td>
<td>69(63.30)</td>
<td>12(17.4%)</td>
</tr>
<tr>
<td>Copious</td>
<td>19(17.43)</td>
<td>5(26.3)</td>
</tr>
<tr>
<td>Consistency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>15(13.76)</td>
<td>5(33.3)</td>
</tr>
<tr>
<td>Scanty</td>
<td>75(68.80)</td>
<td>30(40)</td>
</tr>
<tr>
<td>Mucoid</td>
<td>40(36.69)</td>
<td>9(22.5)</td>
</tr>
<tr>
<td>Mucopurulent</td>
<td>68(62.38)</td>
<td>30(44.1)</td>
</tr>
<tr>
<td>Purulent</td>
<td>1(0.91)</td>
<td>1(100)</td>
</tr>
</tbody>
</table>

Chi square test: *p value < 0.05 was significant.

In our study bloodstained discharge was present in 40 (36.66%) patients, out of which 70% were those who had ossicles necrosed while 69 (63.30%) patients had non-blood-stained discharge out of which 12 (17.4%) had ossicular necrosis. This was found to be statistically significant (p value <0.0001). On the basis of amount of discharge, scanty discharge was present in maximum number of patients i.e., 75 (68.80%) having highest number of ossicular necrosis (40%) but the trend was not found to be statistically significant (p value =0.1311).
In our study vertigo was present in 28 (22.5%), among which 16 (57.1%) had ossicles necrosed. This was found to be statistically significant (p value=0.0047). Tinnitus was present in 78(62.90%) among which 33 (42.3%) had ossicles necrosed and this was statistically significant (p value=0.0204).

Otalgia was present in 57 (45.96%) patients among which ossicular necrosis in 28 (49.1%) patients and this was found to be statistically significant (p value = 0.0204).

**Table 11: Relation of involvement of part of tympanic membrane with ossicular status (n=124)**

<table>
<thead>
<tr>
<th></th>
<th>Perforation of tympanic membrane</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pars tensa (66.12)</td>
</tr>
<tr>
<td><strong>Pars flaccida (attic)</strong></td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>6(4.83)</td>
</tr>
<tr>
<td>Total</td>
<td>124</td>
</tr>
</tbody>
</table>

In our study maximum number of patients had perforation in pars tensa 82(66.12%) with ossicular necrosis in 14(17%) and pars flaccida perforation was present in 36(29.03%) with ossicular necrosis in 24(66.6%). Perforation involving both pars tensa and pars flaccida was seen in 6(4.83%) patients, among which ossicular necrosis was found in 5(83.3%) cases.

In our study maximum number of patients had medium perforation i.e., 29(32.95%) patients followed by large perforation in 27(30.68%) patients. Only 1(1.13%) patient had total perforation.

Ossicular necrosis was highest amongst the patients having total (100%) perforation and patients with large perforation had ossicular necrosis in 10(37.03%). Patients with subtotal perforation also had higher incidence of ossicular necrosis i.e., in 4(30.76%). This was found to be statistically significant as the size of perforation increases the incidence of ossicular necrosis increases (p value = 0.0042).

In our study, maximum number of patients had cholesteatoma as the pathology of pars flaccida i.e., 23 (54.76%) followed by patients 13 (30.95%) who had granulations. Only 6 (14.28%) had both granulations and cholesteatoma. Ossicular necrosis was highest amongst the patients with granulation i.e., 10 (76.9%) followed by patients who had both cholesteatoma and granulations number i.e., 4 (66.66%). This was not found to be statistically significant (p value=0.2705).

In our study, normal middle ear mucosa was present in 72 (81.88%) followed by edematous mucosa in 16 (18.18%) patients. Ossicular necrosis was seen higher in patients who had normal middle ear mucosa i.e.,16 (22.22%) patients and patients who had edematous middle ear mucosa ossicular necrosis was seen in 3 (18.75%) of them. This was not statistically significant (p value = 0.7616).

In our study myringosclerosis was present in 20 (16.12%) and absent in 104 (83.87%) patients. Ossicular necrosis was 4 (20%) in patients who had myringosclerosis and 39 (37.5%) ossicles were necrosed in patient who had myringosclerosis. This relation between myringosclerosis and ossicular status was not significant (p value =0.7616).

In our study maximum number of patients had mild hearing loss 48 (38.70%) and least number of patients had profound hearing loss i.e., 2 (1.61%), although ossicular necrosis was highest amongst the patients with severe hearing loss being 2(66.66%) followed by 16(61.53%) in patients who had moderately severe hearing loss.
This data was statistically significant as the severity of hearing loss increases, incidence of ossicular necrosis increases (p value =0.004).

The study “Pre-operative predictors of ossicular status in chronic suppurative otitis media” was undertaken at Swami Rama Himalayan University, Dehradun, a tertiary care center in the state of Uttarakhand. We studied a total of 124 patients of CSOM, over a period of 12 months who underwent tympanomastoidectomy to assess the preoperative predictors of ossicular status in CSOM.

In our study, there were 71 females (57.25%) and 53 males (42.74) with male to female ratio being 1:1.33. In a study done by Basak et al. there were more female patients with a male to female ratio of 1:1.2 which was consistent with our study (5). Our study was similar to the study of Gomaa et al. and Ginni et al. in terms of female preponderance of disease, who in their study had 26 males and 30 females (8).

The incidence of CSOM common among females may be attributed to the fact that females in hilly and rural areas which form the majority of the population under our care do most of the work outdoor facility and are more susceptible to atmospheric changes and climate changes. Also, the added beliefs of traditional treatment amongst the female in rural areas results in delay of treatment (9).

In our study we had ossicular necrosis in 43 patients (34.67%) which was similar to a study by Sharma et al., where ossicular necrosis was present in 35 % of the population. Sharma et al. reported an intact ossicular chain in 213 (76.4%) out of the 279 patients whereas in our study it was intact in 81 (65.32%) cases (10).

Out of 109 cases of ear discharge 63.3% cases had intact ossicles and most number of patients (36 cases) were present in duration less than 5 years also 20 cases of ossicular necrosis were seen in the similar group of duration. In the duration of 20 – 30 years of ear discharge there was nearly 50-50 distribution of patients having intact ossicular chain (55.55%) and necrosed ossicular chain (44.44%). This showed that with the increasing duration of ear discharge the proportion of ossicular necrosis also increases. Thakur et al. in their study concluded that with a continuous ear discharge and chronicity of disease of greater than 5 years in cholesteatoma ears had a significant association with necrosis of incus (11).

Blood-stained discharge was seen in around 40 cases out of which 70% cases had ossicular necrosis in our study. Amount of discharge was distributed among copious, moderate and scanty out of which maximum number was seen in scanty i.e., in 75 cases (68.80%) and out of those 40% had ossicular necrosis. On the basis of consistency of ear discharge, mucopurulent was present in most of the patients i.e.,68 cases (62.38%) followed by mucoid in 40(36.69%) and purulent in 1 (0.91%) case. 44.1% of cases with mucopurulent discharge had ossicular necrosis and 100% of cases of purulent ear discharge had ossicular necrosis (7).

Veeranjeyulu et al., in their study had 30 patients (60%) with history of mucopurulent discharge, 15(30%) with mucoid discharge and 5 patients (10%) with blood -stained discharge and consistency had significant association with ossicular necrosis (12).
We had 28 cases where vertigo was present (22.5%) out of which 57.1% (16 cases) had ossicular necrosis while 96 patients who did not have vertigo had 28.1% incidence of ossicular necrosis. Tinnitus and otalgia were present in 78 (62.9%) and 57 (45.9%) cases respectively and ossicular necrosis was seen in 33 cases in which tinnitus was present and 28 cases where otalgia was present. While in study by Veeranjaneyulu et al. incidence of tinnitus was seen in 36% and vertigo in 4% cases only which was quite low than ours (12).

Large perforations in our study had a higher percentage of ossicular necrosis i.e., in 37.03%. In a study by Thakur et al. 44.7% of the population had subtotal perforation, while there were 20.89% patients having subtotal perforation who had necrosed incus while we had 14.77% patients having subtotal perforation, out of which 30.76% had ossicles necrosed (13-15).

Myringosclerosis was seen in 20 cases only out of which 4 cases (20%) had necrosis while in rest of the cases where myringosclerosis was absent, 39 cases (37.5%) had ossicular necrosis.

Even in the study by Thakur et al. there were 14.53% cases with ossicular erosion over 172 patients which was though lower than us but they had 2.9% cases of tympanosclerosis in middle ear (14). Such low percentage of sclerosis was also seen in study by Sandeep et al. where they had 6% tympanosclerosis (15).

Myringosclerosis has significant effect on hearing thresholds. Myringosclerosis can also be associated with sclerosis of ossicular joints and thus resulting in fixation of ossicula chain and thus affecting hearing. Although in our study no direct relation was seen between myringosclerosis and ossicular necrosis.

Thakur et al. showed most of the patients having conductive hearing loss while 5.9% patients had mixed hearing loss which was similar to our finding. Necrosis of Incus was frequently seen in patients who had moderate or moderately severe pre operative hearing loss again which was a similar finding to our study (14). Mohanty et al. concluded that necrosis of incus is predicted best in the presence of moderate to moderately severe hearing loss (45–70 dBHL) as seen in our study (16).

Most patients had sclerotic mastoid air cells on X-ray (100 out of 124 cases). Among the patients having sclerotic mastoid air cells 43% had ossicular necrosis. Thus, all the ossicular necrosis was seen in patients having sclerotic mastoid air cells in our study.

In their study involvement of multiple ossicles was seen in 26.32% patients and isolated necrosis of incus was seen in only 5.26% patients. Similarly in our study, all three ossicles combined were found necrosed in 27.9% of cases (57). In a study by Rout et al., ossicular necrosis was seen highest in incus i.e., 25 (17%), showing similarity to our findings (17). When multiple ossicular involvement is considered most commonly all the ossicles were involved (malleus+ incus + stapes) i.e., 12(27.90%) followed by incus + stapes i.e., 5(11.62%). Least involvement was seen of malleus + stapes i.e., 1(2.32%).

Atticoantral (unsafe) CSOM has more incidence of ossicular necrosis as compared to tubotympanic (safe). This is the result of overproduction of cytokines and granulations which subsequently leading to bone erosion. While in tubotympanic CSOM (safe) ossicular necrosis is because of resorption of ossicular chain resulting in resorptive osteitis.

4. Conclusion
A total number of 124 patients were studied over a period of 12 months who underwent tympanomastoidectomy. The statistically significant pre-operative predictors of ossicular status as elucidated by patients on history taking were blood-stained discharge, consistency of ear discharge and associated symptoms of vertigo, tinnitus and otalgia. Otoendoscopic findings correlating positively with the ossicular necrosis were site and size of perforation and pure tone audiometry findings of degree of hearing loss. On radiological examination, X-ray mastoid showing sclerosed pneumatisation of mastoid air cells was an important predictor of the ossicular status. The pointers which weren't statistically
significant predictors of ossicular status on the history were duration of ear discharge and amount of ear discharge. Pure tone audiometry findings of type of hearing loss did not have a significant correlation with intraoperative ossicular status. When the patients were grouped into safe and unsafe CSOM, the incidence of ossicular necrosis was more in unsafe CSOM as compared to safe CSOM yet, incus was the most common ossicle involved.

References: