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Original Research Article

Pure tone audiometric profile in relation to intraoperative findings in patients of chronic otitis media

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Abstract

Background: Chronic otitis media is a common condition in ENT, resulting in hearing loss. Myringoplasty, tympanoplasty with or without mastoidectomy is done to improve hearing and to make the ear dry. Aim of this study was to correlate pure tone audiometric findings with intraoperative findings in patients of chronic otitis media. By doing this correlation we will be able to counsel the patients regarding: Expected postoperative hearing outcome, need for ossiculoplasty and expected cost of surgery.

Objectives of study: To do ear examination including otoscopic examination.

To do Tuning fork test and Pure tone audiometry to assess degree as well as type of hearing loss.

To correlate the preoperative hearing assessment with intraoperative tympanic membrane and middle ear changes.

Methods and Materials

Study area: Tertiary care Hospital having a specialized step up dedicated for ENT.

It has a good influx of patients presenting to the ENT OPD, referred from various rural and urban primary and secondary centers.

Study time: January 2021 till October 2021 is the time frame for collection of data. Four months were used to conduct the analysis of data.

Study population: Patients visiting ENT OPD, both males and females, both urban and rural diagnosed a case of chronic otitis media and undergoing tympanoplasty with or without mastoidectomy.

Sample Size and Sample technique: 80 cases, all the cases diagnosed as chronic otitis media and undergoing tympanoplasty with or without mastoidectomy, fulfilling the inclusion criteria were taken as samples.

Data analysis: The descriptive summaries of variables were presented through frequency distribution as well as mean± Sd. Quantitative variables were expressed as mean ± sd and compared between groups ANOVA/Kruskal-wall is test and unpaired t-test/Mann Whitney Test. Qualitative variables were compared using Chi-square test/Fisher's exact test. A p-value <0/05 was considered statistically significant. The data was tabulated in MS excel and analysis performed using R programming software.

Results: The age range was between 15 and 55. The majority of the cases in our study were between the ages of 21 and 30, with a mean age of 30. 29. This may be because hearing loss

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impairs one's ability to work effectively, prompting older folks to seek medical help. The average age of patients with ossicular erosion was 36.79 years old. There were more female patients than male patients. Although bilateral illness was not infrequent, unilateral disease affected the majority of individuals. The average number of years with ear discharge was 11.34. Patients with ossicular erosion had a mean history of ear discharge for 18.74 years, compared to patients without ossicular erosion for a difference of 9.03 years that was statistically significant. Ossicular erosion was discovered in 10 of the 34 individuals that underwent surgery on the left ear. 9 of the 46 individuals whose right ear was operated on developed ossicular erosion.

Discussion: Hearing loss was observed to increase with perforation size, although it was found that patients with attic perforations had the most severe hearing loss. When compared to cases where there was no perforation in these sites, it was discovered that cases with attic perforation and posterosuperior perforation had considerable hearing loss. In every instance where there was attic penetration, osseous degradation was visible. Ossicular erosion was found in 19 cases (23.75%) out of 80 patients. The incus was the most often eroded ossicle, followed by the malleus and the stapes. It was discovered that the mean PTA, which is statistically significant, was 48 dB in instances with ossicular erosion and 32.98 dB in patients with intact ossicles. In none of the tympanosclerosis patients was there ossicular erosion. Ossicular erosion and the presence of granulation tissue were strongly correlated.

Conclusion: One of the likely conclusions that can be derived from our study's results is that there is a connection between the length of an ear discharge and a higher risk of ossicular erosion. The amount of hearing loss that develops is inversely related to the size of the hole that has been created in the tympanic membrane. Patients with substantial hearing loss had holes in both the attic and the poster superior, in contrast to cases where neither site had a perforation. Both of these locations were free of perforations in patients who did not have a substantial hearing loss.

Keywords: Correlation study, audiometric findings, intra-operative findings, patients of chronic otitis media

Introduction

The tympanic membrane can be found at the medial end of the external auditory meatus and makes up the majority of the lateral wall of the tympanic cavity. The tympanic cavity is located behind the ear [1]. The superior pars flaccida, also known as shrapnell's membrane, and the inferior pars tensa of the tympanic membrane are separated by the medial and lateral malleal folds of the tympanic membrane [2]. There are three distinct layers that make up the tympanic membrane. The vibration of the tympanic membrane and the mobility of the ossicular chain are the primary mechanisms by which sound impulses are transferred from the ear canal to the cochlea as they travel through the middle ear [3]. The movement of the basilar membrane is caused by variations in the pressure that are transferred to the perilymph. The ratio of the area of the tympanic membrane to the area of the stapes footplate is the primary mechanism for sound transformation that occurs within the middle ear (area ratio) [4]. The human tympanic membrane has an area that is 20 times larger than the footplate, so in order for the transformer action of the area ratio to be ideal, the sound pressure that is applied to the inner ear by the stapes footplate should be 20 times or 26 dB higher than the sound pressure that is applied at the tympanic membrane. The ratio of the lever arms of the malleus and incus in humans is 1.34 and this ratio is responsible for the lever action of rotating the malleus and incus arms around the axis of rotation of the ossicles. If the tympanic membrane and the ossicular lever behaved perfectly as transformers, the theoretical sound pressure gain in the middle ear would be approximately 28 decibels (=26 decibels area ratio +2 decibels ossicular

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lever) [4-6]. Subjective hearing tests, such as those using tuning forks and pure tone audiometry, are used on patients undergoing myringoplasty surgeries in order to evaluate their pre-operative hearing capabilities. In the tuning fork examinations, tuning forks with frequencies of 128, 256, 512, and 1024 Hz are utilised; however, a tuning fork with 512 Hz is recommended for use in ordinary clinical practise. The purpose of doing pure tone audiometry is to determine hearing sensitivity thresholds at discrete frequencies throughout a range that is significant for human communication [7-9]. The pure tone audiometer is a piece of electrical equipment that, as its name suggests, generates pure tones, the volume of which can be adjusted in increments of 5 dB. Bone conduction thresholds are assessed for tones ranging from 250 to 4000 hertz, whereas air conduction thresholds are measured for tones ranging from 125 to 8000 hertz. A graph called an audiogram is used to chart the values that were obtained from the test. The purpose of this study is to determine whether or not there is a correlation between the preoperative hearing status and the intra-operative changes that occur in the tympanic membrane and the middle ear [10-13]. Because of this, we will be able to offer the patient preoperative counselling in the following areas:

Expected post-operative hearing outcome,
1) Need for ossiculoplasty.
2) Cost of surgery.

Materials and Methods

Site of study: Department of ENT, Hospital.

Study population: Patients visiting ENT OPD and diagnosed as case of COM and undergoing tympanoplasty with or without mastoidectomy.

Study design: Cross sectional study.

Sample size: 80 (E) Total duration of study: 10 months.

Period of collection of data: January 2021 to October 2021.

Period taken for analyzing data: 04 months.

Methodology in brief

- Patients meeting the inclusion criteria were taken as a part of the study after taking consent.
- Complete history was taken and ENT examination done.
- Tuning fork tests were performed using tuning forks of frequency 512 Hz •Pure tone audiometry was done.
- Intraoperatively tympanic membrane status (size and site of perforation) and middle ear changes including ossicular status, granulations, tympanosclerosis, and middle ear mucosal status were noted.
- Preoperative hearing was compared with intraoperative findings.

Inclusion criteria

- Patients of Chronic otitis media (mucosal and squamous types): Of age above 2 years, of both the sexes, fit for surgery, giving consent for the study.

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Exclusion criteria

- Patients unfit for surgery.
- Patients not giving consent for the study.
- Patients under 2 years of age.
- Revision cases of tympanoplasty and mastoidectomy.
- Patients with extra and intracranial complications of Chronic otitis media.
- Patients with traumatic perforations.
- Patients with otitis externa.
- Patients with malignancy of temporal bone.
- Patients with mixed type of hearing loss.

Following receipt of clearance and permission from the Institutional Ethics Committee, a total of 80 patients who fulfilled the inclusion/exclusion criteria and provided informed consent were enrolled in the research project. The patients who visited the ENT department of Hospital were asked to fill out a Study Proforma so that their information could be recorded. Following the completion of the standard investigations and pure tone audiometry, patients were taken back for surgery. A pre-anesthetic checkup was performed on each and every patient. The study's proforma was used to make note of the findings.

Statistical calculations

Sample size: Researchers have reported the incidence of Ossicular defects in patients of COM to vary between 23.66% to 56.8%. Therefore, assuming 40.23% as the prevalence and 11% margin of error, the minimum required sample size at 5% level of significance is 38 patients.

Statistical analysis: The descriptive summaries of variables are presented through frequency distributions as well as mean ± sd. Quantitative variables are expressed as mean ± sd and compared between groups ANOVA/Kruskal-Wallis test and/or unpaired t-test/Mann-Whitney test. Qualitative variables are compared using Chi-square test/Fisher's exact test. A p-value < 0.05 is considered statistically significant. The data is tabulated in MS Excel and analysis performed using 'R' programming software.

Observations and Results

The study pure tone audiometric profile in relation to intraoperative findings in patients of chronic otitis media was conducted on 80 patients having chronic otitis media, which presented to the ENT outpatient department in Hospital during the time period January 2021 to October 2021 and were operated for the same.
All patients were subjected to detailed history and examination including pure tone audiometry, the findings of which were tabulated. Intraoperative findings were also tabulated. The aim of the study was to evaluate the correlation of pure tone audiometric findings with intraoperative findings in these patients.

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The observations and results obtained are as follows

Age distribution

Table 1: Age distribution

Age (years)	n	%
≤ 20	15	18.75%
21-30	32	40.00%
31-40	20	25.00%
41-50	8	10.00%
> 50	5	6.25%
Total	80	100%

Table 2: Mean age

	mean ± sd
Age (years)	30.29 ±10.5

Table 3: Ossicular status in various age ranges

Age (years)	Eroded		Intact	
	n	%	n	%
≤ 20	0	0.00%	15	24.59%
21-30	5	26.32%	27	44.26%
31-40	10	52.63%	10	16.39%
41-50	1	5.26%	7	11.48%
> 50	3	15.79%	7	3.28%
Total	19	100%	61	100%

Table 4: Mean age in cases with eroded and intact ossicles

	Eroded	Intact	p-value
	Mean ± Sd	Mean ± Sd	
Age (years)	36.79 ±9.1	28.26 ±10.14	<0.001

In the present study the age range was from 15 years to 55 years. Most patients were in the range of 21 to 30 years (32 cases), mean age being 30.29 years. Age range of 31 to 40 years had maximum cases with ossicular erosion. Mean age of patients in whom ossicular erosion was noted was 36.79 years.

Sex distribution

Table 5: Sex distribution

Gender	n	%
Male	28	35.00%
Female	52	65.00%
Total	80	100%

Table 6: Sex distribution: cases with eroded and intact ossicles

Gender	Eroded		Intact		p-value
	n	%	n	%	
Male	7	36.84%	21	34.43%	0.424
Female	12	63.16%	40	65.57%	
Total	19	100%	61	100%	

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Out of 80 cases, 14 cases were males and 52 cases were females. Out of 19 cases in whom ossicular erosion was noted, 7 (36.84%) were males and 12 (63.16%) were females.

Unilateral or bilateral com

Table 7: Side

Side	n	%
Unilateral	46	57.50%
Bilateral	34	42.50%
Total	80	100%

Table 8: Ossicular status in unilateral and bilateral cases

Side	Eroded		Intact		p-value
	n	%	n	%	
Unilateral	8	42.11%	38	62.30%	0.060
Bilateral	11	57.89%	23	37.70%	
Total	19	100%	61	100%	

Out of 80 cases, 46 cases had unilateral disease and 34 cases had bilateral disease. Out of 17 cases in whom ossicular erosion was seen, 11 (57.89%) cases were patients with bilateral disease and 8 (42.11%) were seen in patients with unilateral disease.

Duration of discharge

Table 9: Duration of ear discharge

Discharge duration (yrs)	N	%
< 1	10	12.50%
1-10	36	45.00%
11-20	18	22.50%
21-30	14	17.50%
31-40	2	2.50%
Total	80	100%

Table 10: Mean ear discharge duration

	Mean	± sd
Discharge duration (yrs)	11.34	±10.4

Table 11: Ossicular status in various ranges of discharge duration

Discharge duration (yrs)		Eroded		Intact	p-value
	n	%	n	%	
< 1	0	0.00%	10	16.39%	0.030
1-10	6	31.58%	30	49.18%	0.089
11-20	6	31.58%	12	19.67%	0.139
21-30	6	31.58%	8	13.11%	0.032
31-40	1	5.26%	1	1.64%	0.188
Total	19	100%	61	100%	

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Table 12: Mean discharge duration in cases with eroded and intact ossicles

	Eroded	Intact	p-value
	Mean ± sd	Mean ± sd	
Discharge duration (yrs)	18.74 ±9.16	9.03 ±9.72	<0.001

Out of a total of 80 instances, it was discovered that the majority of patients (18 cases) had a history of ear discharge for a length of time ranging from one to ten years. The average duration of ear discharge in a patient's history was 11.34 years. It was observed that none of the twenty patients who had a history of ear discharge for less than one year possessed ossicular erosion. This was the case. Ossicular erosion was found in 6 of the patients out of a total of 36 individuals whose history of ear discharge ranged from one to ten years. There was evidence of ossicular erosion in 6 of the 18 patients who had a history of ear discharge between 11 and 20 years. There were a total of 14 individuals with a history of ear discharge between 21 and 30 years, and ossicular erosion was found in 6 of those cases. In two of the four cases in which there was a history of ear discharge between 31 and 40 years, ossicular erosion was present. In patients with ossicular erosion, the mean duration of history of ear discharge was 18.74 years, while in patients without ossicular erosion, it was 9.03 years. This difference has a p value of 0.001, which indicates that it is significant.

Operated side

Table 13: Operated side

Operated side	n	%
Left	34	42.50%
Right	46	57.50%
Total	80	100%

Table 14: Ossicular status in cases operated on left ear and right ear

Operated side	Eroded			Intact	p-value
	n	%	n	%	
Left	10	52.63%	24	39.34%	0.153
Right	9	47.37%	37	60.66%	
Total	19	100%	61	100%	

Out of 32 cases that were operated on left ear, ossicular erosion was noted in 10 cases. Out of 46 cases that were operated on right ear, 9 cases had ossicular erosion.

Discussion

80 individuals with unilateral or bilateral chronic otitis media were chosen, ranging in age from 15 to 55. Pure tone audiometry was part of a full workup (per the proforma supplied). The patient's consent was obtained before the operation. Intraoperative observations were recorded.

A table was used to summarise the history, preoperative examination results, and intraoperative findings. Results from pure tone audiometry performed prior to surgery were linked with those obtained during surgery [14].

The patients in the current study ranged in age from 15 to 55. Patients older than this age tended to have multiple types of hearing loss and were therefore excluded from this study. According to a study by Sanjeev Kumar Thakur *et al*., 32 cases of patients had a mean age of 30.29 years, with the majority of patients being between the ages of 21 and 30. The mean age was 29.78 years in a research by Saurabh Varshney *et al*. The most frequent appearance in this age range is likely caused by hearing loss, which reduces productivity and causes patients to seek medical attention [15, 16].

The majority of cases of ossicular erosion in our study occurred in patients between the ages of 31 and 40, and the mean age of patients with ossicular erosion was 36.79 years. Out of 80 cases in our study, 28 (35%) had male gender and 61 (55%) had female gender. 7 (36.84%) of

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the 17 instances in which ossicular erosion was identified involved men, compared to 12 (63.16%) of the cases. 40.9% of the 82 patients in a research by C. Balasubramanian were men and 59.1% were women. The male to female ratio in a research by Nilank Saroha was 1:1.14. Therefore, similar to our analysis, most studies found that female patients outnumbered male patients. The likelihood that COM will affect more women than men is likely due to residential overcrowding and close interaction with children who have upper respiratory tract infections [17].

80 cases were included in this study, of which 48 (57.50%) had unilateral disease and 34 (42.50%) had bilateral disease. According to a study by Sanjeev Kumar Thakur, 35.47% of individuals had bilateral infected ears, compared to 64.53% of cases with unilateral disease. 38.89% of patients in a study by Nilank Saroha had bilateral disease; the remaining individuals had unilateral disease. Thus, it is clear that most studies had a higher number of unilateral cases than did our study. Bilateral illness instances, however, were not unusual. The Eustachian tube's dysfunction is a major factor in this illness. The continuum theory regards OM with effusion (OME) as an initial disease that, if left untreated, may develop into chronic transformation. Therefore, nasal pathology can result in Eustachian tube dysfunction, which can then cause OME, which, if left untreated, can develop into COM. Ossicular erosion was observed in 17 cases, of which 11 (57.89%) had bilateral disease and 8 (42.11%) had unilateral disease. This difference was not statistically significant. Similar to this, no statistically significant difference in ossicular erosion in unilateral and bilateral cases of COM was observed in a study by Chandrakala Srinivas.

In our investigation, it was discovered that out of 80 instances, 36 individuals had a history of ear discharge that had lasted between one and ten years. The average number of years with ear discharge was 11.34. According to a study by Sanjeev Kumar Thakur, ear illness lasts an average of 8.61 years. According to a study by Saurabh Varshney, the average time between ear discharges was 11.30 years. In our investigation, it was shown that none of the 10 patients with ear discharge histories of less than a year had ossicular erosion. Twelve of the 36 patients with ear discharge histories of 1 to 10 years exhibited ossicular erosion. Ossicular erosion was discovered in 6 cases out of 18 patients with an ear discharge history of between 11 and 20 years. Ossicular erosion was found in 6 out of 14 patients who had a history of ear discharge between the ages of 21 and 30. Two of the four cases with an ear discharge history of between 31 and 40 years had ossicular erosion [18].

The difference in the mean number of years of ear discharge in patients with and without ossicular erosion was 18.74 years compared to 9.03 years, with a significant p value of 0.001. Thus, it may be concluded that as COM length grows, the likelihood of ossicular degradation increases as well. Similar to our study, Chandrakala Srinivas' research revealed a higher risk for ossicular discontinuity with increasing illness duration. Four of the five patients in this study with ossicular abnormalities had the condition for more than 10 years. Ossicular abnormalities and disease duration had a positive connection that was statistically significant ($P = 0.026$).

In 5 of the 34 cases where the left ear underwent surgery, ossicular erosion was found. 9 of the 46 instances of the right ear that underwent surgery had ossicular erosion. It was not determined that this difference was statistically significant.

It was noticed that 15 of the 80 cases out of which none of the patients experienced ossicular erosion-had tiny central perforations. 6 of the 32 instances with medium central perforation also exhibited ossicular erosion. 6 instances of the 21 patients with significant central perforations also exhibited ossicular erosion. Out of the 9, 7 had ossicular erosion. There were 9 total perforations. Ossicular erosion was discovered in all six cases where there was attic perforation.

In cases with small central perforations, the mean PTA was found to be 58 dB, in cases with medium central perforations, 34.72 dB, in cases with big central perforations, 38.14 dB, in cases with entire perforations, 45.89 dB, and in cases with attic perforations, 54.67 dB. P value was 0.001, which is a significant value. It was therefore discovered that hearing loss

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increased with perforation size and was highest in attic perforations. According to a study by Ravi Dudda, the average hearing loss varied statistically significantly with increasing diameters of tympanic membrane perforation, which is consistent with our data. However, there was no correlation between the size of tympanic membrane perforation and hearing in a research by Alireza Karimi-Yazdi.

Tympanic membrane links the force accumulated over its full surface to the smaller stapes footplate. Tympanic membrane perforations result in conductive hearing loss, which can be anywhere from insignificant and 50 dB. By losing the sound pressure difference across the tympanic membrane, a perforation reduces ossicular coupling, which is the main mechanism of conductive loss. Losses brought on by perforations vary on the frequency, volume, and size of the middle ear space in addition to the size of the defect. At the lowest frequencies, perforation-induced losses are higher and they typically decline as frequency rises. The size of the perforation is a significant factor in determining the loss; greater perforations lead to larger hearing losses. Another key factor is the middle ear space; smaller middle ear air space volumes lead to wider air bone gaps. The relationship between middle ear volume and pressure in the middle ear cavity is inverse. This means that decreased middle ear volumes will result in more conductive loss.

Out of 80 cases, pars tensa perforation was seen in 77 cases and attic perforation in 6 cases, according to our study. In every instance where there was attic penetration, osseous degradation was visible. In our investigation, it was found that hearing loss was significantly more common in patients with attic and posterosuperior perforation than in cases without these perforations. There was no discernible difference in the severity of hearing loss between anterior and posterior perforations, according to a study by Arvinder Singh Sood. But according to a study by Vijayshree Nahata, posterior perforations cause a greater loss of hearing. Due to round window exposure and a higher prevalence of ossicular fixation, posterior quadrant perforations had more hearing loss than anterior quadrant holes. The round window's soundproofing is eliminated by posterior perforations, which results in higher hearing loss than perforations in the other quadrant. The location has traditionally been considered to play a significant role in determining the severity of hearing loss in tympanic membrane perforation patients.

Conclusion

Based on the findings of our research, one possible conclusion is that the length of time that an ear discharge lasts correlates to an increased risk of ossicular erosion. Hearing loss is proportional to the size of the hole that has been created in the tympanic membrane. When compared to cases in which there was no perforation in either the attic or the posterosuperior, patients who experienced substantial hearing loss had perforations in both of these locations. The incus is the ossicle that wears away the most frequently. We are able to make a determination regarding the likelihood of ossicular erosion by considering the degree of hearing loss. As a result, we will be able to provide the patient with preoperative counseling concerning the following topics: the projected post-operative hearing prognosis, the necessity of ossiculoplasty, and the cost of operation. There is a substantial association between the existence of granulation tissue and ossicular erosion.

Complete history was taken; general physical examination, systemic examination and complete ENT examination were done. Tuning fork tests i.e., Rinne’s test, Weber’s test and Absolute bone conduction test were done. PTA was done to assess degree and type of hearing loss. Patients were selected according to inclusion and exclusion criteria. Fitness for surgery was obtained and patients were posted for surgery. The aim of the study was to evaluate the correlation of pure tone audiometric findings with intraoperative findings in these patients. Clinical profile and intraoperative findings were tabulated. The results and findings in our study are summarized as below: Age range was from 15 to 55 years. Most cases in our study

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were in the range of 21 to 30 years, mean age being 30.29 years. This might be probably due to difficulty in hearing affecting the work efficacy leading the patients to seek medical intervention at this age. Mean age of patients in whom ossicular erosion was noted was 36.79 years. Female patients outnumbered male patients. Most patients had unilateral disease; however, bilateral disease was not uncommon. Mean duration of history of ear discharge was 11.34 years. Mean duration of history of ear discharge in patients with ossicular erosion was 18.74 years and without ossicular erosion it was 9.03 years, the difference being significant. Out of 34 cases that were operated on left ear, ossicular erosion was noted in 10 cases. Out of 46 cases that were operated on right ear, 9 cases had ossicular erosion. It was found that hearing loss increased with increase in size of perforation however, hearing loss was the highest in patients with attic perforation. It was noted that the hearing loss in cases with attic perforation and posterosuperior perforation was significant compared to cases with no perforation in these sites. Ossicular erosion was seen in all the cases with attic perforation. Out of 80 cases, ossicular erosion was noted in 19 cases (23.75%). Incus was the commonest ossicle to be eroded followed by malleus and stapes. It was noted that the mean PTA in cases with ossicular erosion was 48 dB and in cases with intact ossicles it was 32.98 dB, which is statistically significant. Ossicular erosion was not seen in any of the cases of tympanosclerosis. There was significant correlation between ossicular erosion and presence of granulation tissue.

Recommendations

Bases on the discussion, we conclude that Pure tone audiometry is a good predictor for intraoperative findings especially ossicular erosion. Based on the Pure tone audiometry finding the surgeons may plan the surgery better and preoperative counseling can be done to the patients regarding expected hearing outcomes, cost of surgery, need for ossiculoplasty and ossicular prosthesis.

References

1. Karimi-Yazdi A, Saedi B, Fayezizadeh M, Seifmanesh H. Association between audiometric profile and intraoperative findings in patients with chronic suppurative otitis media. Iranian Journal of Otorhinolaryngology. 2011;23(2):37-42.
2. Mishra D, Nagi RS, Sharma K. To evaluate the correlation between preoperative otoscopic features, pure tone audiometric findings and intraoperative ossicular chain status in patients with chronic otitis media. International Journal of Otolaryngology and Head & Neck Surgery. 2020;9(04):141.
3. Ebenezer J, Rupa V. Preoperative predictors of incudal necrosis in chronic suppurative otitis media. Otolaryngology-Head and Neck Surgery. 2010;142(3):415-420.
4. Dudda R, Rangaiah ST, Prasad MH, Balaji NK. Correlation between degree of hearing loss and intraoperative findings in tubotympanic type of chronic suppurative otitis media. Int J Otorhinolaryngol Head Neck Surg. 2018;4(2):537-41.
5. Shariff M. Analysis of hearing loss by pure tone audiometry in patients with chronic suppurative otitis media. Natl J Physiol Pharm Pharmacol, 2019, 1.
6. Carrillo RJC, Yang NW, Abes GT. Probabilities of ossicular discontinuity in chronic suppurative otitis media using pure-tone audiometry. Otology & Neurotology. 2007;28(8):1034-1037.
7. Sheikh R, Haidar H, Abdulkarim H, Aslam W, Larem A, Alsaadi A, *et al*. Preoperative predictors in chronic suppurative otitis media for ossicular chain discontinuity: a cross-sectional study. Audiology and Neurotology. 2016;21(4):231-236.
8. Singh P, Jain S, Methwani D, Kalambe S, Chandravanshi D, Gaurkar S, *et al*. Study of Correlation of Pre-Operative Findings with Intra Operative Ossicular Status in Patients with Chronic Otitis Media. Iranian journal of otorhinolaryngology. 2018;30(100):273.

9. Carrillo RJC, Yang NW, Abes GT. Relationship of pure tone audiometry and ossicular discontinuity in chronic suppurative otitis media. Philippine Journal of Otolaryngology Head and Neck Surgery. 2006;21(1-2):5-10.
10. Maeng JW, Kim HJ. Effects of middle ear lesions on pre and postoperative hearing outcomes in patients with chronic otitis media. Korean Journal of Audiology. 2012;16(1):18.
11. Kolluru K, Kumar S, Upadhyay P. A study of correlation between tympanic membrane perforation size with hearing loss in patients with inactive mucosal chronic otitis media. Otology & Neurotology. 2021;42(1):e40-e44.
12. Santosh UP, Sridurga J, Aravind DR. A Correlative Study Between Size of Tympanic Membrane Perforation, Pure Tone Audiometry and Intraoperative Findings in Tympanoplasty. Bengal Journal of Otolaryngology and Head Neck Surgery. 2018;26(1):43-47.
13. Al-Serhani AM. Correlation of hearing profile and operative findings in chronic suppurative otitis media with tympanosclerosis. Saudi Journal of Otorhinolaryngology Head and Neck Surgery. 2003;5(2):58.
14. Demir UL, Akyildiz MY, Alpay M. The factors which affect disease specific quality of life in patients with chronic otitis media. The Journal of International Advanced Otology. 2012;8(3):371.
15. Mannuru KB, Havle AD, Vihapure GM, Shedge SA, Prabhune SC, Ahmed K, *et al*. Otoendoscopy and Audiometry Findings as Predictors of Ossicular Dysfunction in Mucosal Chronic Suppurative Otitis Media: A Cohort Study. Journal of Clinical & Diagnostic Research, 2021, 15(12).
16. Hifni A, Bahar E, Ghanie A. Correlation between Intraoperative Ossicular Status and Conductive Hearing Loss Degree among Chronic Suppurative Otitis Media Patients in Dr Mohammad Hoesin General Hospital Palembang. Bioscientia Medicina: Journal of Biomedicine and Translational Research. 2021;5(4);406-417.
17. Yashveer JK, Pankaj D, Sonker T. Correlation of radiological and operative finding regarding the cellularity of mastoid in chronic suppurative otitis media (atticoantral disease). Journal of Evolution of Medical and Dental Sciences. 2018;7(17):2153-2156.
18. Talati PD, Kumar KR, Ghosh P. A Comparative Study between Pure Tone Audiometry and Impedance Audiometry Findings in Patients with Chronic Retracted Tympanic Membranes.