

Original article:

Evaluation of Pure tone audiometry (PTA) as a predictor of Ossicular erosion in Tubotympanic Chronic Suppurative Otitis media

¹Dr. Beni Prasad , ²Dr. Anup Agrawal

¹Head of Department, ²Resident

Department of ENT, National institute of medical science & research, Jaipur (Rajasthan)

Corresponding author*

Abstract.

This retrospective study was done to determine the predictive value of pre-operative audiological factors in diagnosing Ossicular erosion in patients with tubotympanic chronic suppurative otitis media (CSOM).. A total of 25 patients with age between 15-45 years were studied from the Inpatient Department of ENT, NIMS Jaipur, from Jan 2016 to June 2017. All Cases with inclusion and exclusion criteria, audiometric evaluations were done.

This study shows that Ossicular chain erosion can be predicted if PTA was ranged from 45-60dB.

Keyword- PTA, Ossicular erosion, Tubotympanic

Introduction

Chronic suppurative otitis media (CSOM) is a chronic middle ear infection with or without discharge with a permanent perforation in the tympanic membrane. CSOM is of 2 type i.e. Tubotympanic (safe) & Atticoantral (unsafe). Ossicular chain erosion is found in both safe and unsafe type of diseases. Ossicular erosion, a frequent complication of CSOM, may lead to total failure of middle ear mechanics and resulting in substantial hearing loss.^[1] Between 40 and 90% of tympanoplasty require middle ear ossicular chain reconstruction.^[2] A high resolution computed tomography scan of temporal bone is a preoperative tool that can be used to assess the status of the ossicular chain; however, its cost factor limits its use to CSOM. preoperative information about ossicular status becomes important as the surgeon can be prepared for performing ossiculoplasty well in advance. Also, patients can be informed of the realistic estimate of hearing improvement after surgery.

Materials and methods

Total of 25 cases attending ENT OPD, National Institute of Medical Science Research & Hospital, jaipur during 1.5 year period from Jan 2016 to June 2017, who underwent ossicular reconstruction, were taken up for the study. Inclusion criteria were dry central TM perforations of age group 15-45 years having only conductive type of hearing loss of all sex, race, religion. This was the Retrospective study.

Exclusion criteria were preexisting or congenital hearing loss, SNHL, atticoantral diseases. After taking detailed history, thorough otoscopic examination of ear were carried out to confirm that the perforation was central and dry. After that Tuning fork tests (Weber's , Rinne's and absolute bone conduction) were carried out with 512 Hz forks. 1024 and 256Hz forks were used wherever necessary.

Similarly Pure Tone Audiometry (PTA) was carried out in each case to confirm that the hearing loss was of conductive type and to determine its level. X-rays of mastoid bones-Towne's and Lateral-Oblique views were done in all cases to rule out atticofacial diseases. The data analysis was carried out using SPSS. The ossicular status was documented at the time of surgery. A patient with partial or complete loss of any ossicle, found during surgery, was considered to of having satisfied the criteria of ossicular discontinuity.

Result

A total of 25 patients who presented in Department of ENT, National Institute of Medical Science Research & Hospital, Jaipur over a period of 1.5 year from January 2016 to june 2017, who underwent ossicular reconstruction, with inclusion and exclusion criteria, Data of all the patients were collected.

The results are as follows:

Table 1- Age Distribution

Age Distribution (Year)	No. of patient	Percentage (%)
15-25	8	32
26-35	10	40
36-45	7	28
Total	25	100

Age distribution: In our study, the maximum numbers of patients were in the age group of 26-35 years & minimum were in age group 36-45 year.

Table 2- Sex Distribution

Sex	No. of patient	Percentage (%)
Male	11	44
Female	14	56
Total	25	100

Sex Ratio: The total number of male and female patients in our study was 11 and 14 respectively.

Table 3- Type of perforation & PTA

S.No.	Type of perforation	PTA
1.	Central	45
2.	Central	47
3.	Central	46
4.	Central	50
5.	Central	53
6.	Central	46
7.	Central	45
8.	Central	49
9.	Central	50
10.	Central	51
11.	Central	54
12.	Central	51
13.	Central	50
14.	Central	47
15.	Central	48
16.	Subtotal	51
17.	Subtotal	52
18.	Subtotal	50
19.	Subtotal	49
20.	Subtotal	52
21.	Subtotal	58
22.	Subtotal	59
23.	Subtotal	50
24.	Subtotal	47
25.	Subtotal	46

The total number of Central and Subtotal Perforation in our study was 15 and 10 respectively. The mean pre-operative PTA was 49.84 dB HL. The minimum value being 45 dB HL and the maximum value being 59 dB HL.

Discussion

A Retrospective study of 25 patients with tubotympanic type of CSOM was conducted and majority of them were females, that is, 56%. Most common age group affected was between 26 and 35 years.

Ossicular discontinuity is identified only if the discontinuity of the ossicular chain is confirmed at the time of operation. If pre-operative information can be used to

determine whether or not the ossicular chain is intact, the patient can be better informed and the surgeon can be better prepared before surgery^[3]. In our study the mean pre-operative PTA was found to be 49.84 dB HL. The values ranged from 45 to 59 dB HL. Sanjeev mohanty et al^[4] found mean pre operative PTA 49.18dB HL, ranged from 45 to 64 dB HL.

Complete disruption of the ossicular chain can result in a 60 dB hearing loss^[5]. In CSOM, malleus is found to be the most resistant ossicle, the handle of malleus being the most commonly necrosed part of the malleus. Incus is found to be the most common ossicle to get necrosed in cases of CSOM. The commonest defect was erosion of the lenticular process, followed by the long process^[6,7,8,9].

Conclusion

Ossicular necrosis can be predicted by the PTA in the range of 45–60 dB hearing loss. This Knowledge can influence surgical decision making and preparedness regarding ossiculoplasty and patient consent, preoperatively^[10].

References:

1. Anglitoiu A, Balica N, Lupescu S, Vintila R, Cotulbea S (2011) Ossicular chain status in the otological pathology of the Ent Clinic Timisoara. *Medicine in Evolution* 17: 344-351.
2. Roth JA (2009) Ossicular chain reconstruction with a titanium prosthesis. *Laryngol & Otol* 123:1082–1086
3. Jeng F-C, Tsai M-H, Brown CJ (2003) Relationship of preoperative findings and ossicular discontinuity in chronic otitis media. *Otol Neurotol* 24(1):29–32
4. Sanjeev Mohanty, M. Gopinath, Mukundan Subramanian, Nisha Vijayan(2012) Relevance of Pure Tone Average (PTA) as a Predictor for Incus Erosion. *Indian J Otolaryngol Head Neck Surg* 64(4):374–376; DOI 10.1007/s12070-011-0392-6
5. Merchant SN, Rosowski JJ (2003) Auditory physiology. In: Glasscock ME, Gulya AJ (eds) *Surgery of the ear*, 5th edn. Reed Elsevier India , New Delhi, p 70
6. Sharma M, Shetty D.P. Ossicular status in patients operated for chronic suppurative otitis media. *Int J Res Rev* 2016;4(9):1610-1616.doi:10.17511/ijmrr. 2016.i09.16.
7. Teja D D, Rhea P. Influence f Tympanic Membrane Perforation on Hearing Loss. *Glob J Oto* 2017; 5(5): 555673. DOI: 10.19080/ GJO.2017.05.555673.
8. Swan IR, Canter R, WilliamMc K. Chronic otitis media. Scott E Brown's *Otolaryngology, Head and neck surgery*. 7th edition, London: Edward Arnold (publisher's) Ltd, Michael Gleesan editor; 2008; 3:3420-3.
9. Varshney S, Nangia A, Bist SS, Singh RK, Gupta N, Bhagat S. Ossicular chain status in chronic suppurative otitis media in adults. *Indian J Otolaryngol Head Neck Surg* 2010;62:621.
10. Ebenezer Jareen, Rupa Vedantam (2010) Preoperative predictors of incudal necrosis in chronic suppurative otitis media. *Otolaryngology Head Neck Surg* 142:415–420