

## Assessment of Patch Test in Predicting Ossicular Status in Chronic Otitis Media

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### ABSTRACT

**Objectives:** To assess the reliability of paper-patch test in predicting the intra-operative ossicular status of patients with tympanic membrane perforation from small to medium size. **Methods:** This is a hospital based prospective study conducted from 30<sup>th</sup> April, 2016 to 1<sup>st</sup> May, 2017 in the Department of Otorhinolaryngology of Nepalgunj Medical College Teaching Hospital. The patients of chronic otitis media with small to medium sized central perforation were subjected to complete history taking and thorough examination. Audiological evaluation was done before patching, then after patching the perforation with cigarette paper. The result was recorded to predict the ossicular status. **Result:** The most common age group affected by the disease was 20-30 years with 21(42%) patients. Most of them were females 28(56%). Left ear was affected more 19(38%) than right ear 16(32%) and bilateral 15(30%). All the patients had conductive type of hearing loss out of which moderate degree of hearing loss was present in 36(72%) and mild degree of hearing was present in 14(28%). Following patch test, the hearing improved and in 7(14%) of patients the hearing came to normalcy. Majority of patients had mild degree of hearing loss, i.e., 36(72%) and moderate degree of hearing loss was seen in 7(14%). It was found that in those patients in whom there was less improvement in hearing that i.e. less than 10 dB, the mobility of the ossicles was restricted intra-operatively. **Conclusion:** The type of hearing loss was conductive hearing loss out of which most common was moderate degree of hearing loss in 36(72%) followed by mild degree of hearing present in 14(28%). Following patch test, it was found that in those patients in whom there was less improvement in hearing i.e., less than 10 dB, ossicular discontinuity was noted intra-operatively and thus ossicular reconstruction by tympanoplasty procedures had to be undertaken.

**Key words:** Chronic otitis media, ossicular status, patch test

### INTRODUCTION

Chronic otitis media (COM) is a common problem in otorhinolaryngology and is an otological challenge in the developing countries. It is particularly the single most important cause of hearing impairment in rural population. It affects both sexes and all age groups. Perforation most commonly arises as a result of either otitis media or trauma, usually presenting clinically with conductive hearing loss and chronic infection. Although the tympanic membrane (TM) has a remarkable ability for regeneration and spontaneous healing, chronic perforations do commonly occur and may require repair<sup>1</sup>.

COM is a "persistent disease, insidious in onset, capable of causing severe destruction of middle ear structures with irreversible sequelae which clinically manifests with deafness and discharge for more than 3 months". It is classified into two main groups; tubotympanic (TT) and atticofacial on basis of clinical and biological behavior. COM(TT) is characterized by a

perforation of pars tensa; perforations vary in size and site<sup>2</sup>.

Assessment of the audiometric profile can help the clinician anticipate middle ear pathology which in turn can help in pre-operative planning and counseling. Perforations of the TM result in a predominantly low frequency conductive hearing loss that is roughly proportionate to the size of perforation. An air conduction – Bone conduction gap (A-B gap) that is disproportionately large for a given perforation may indicate ossicular discontinuity or fixation. A piece of cigarette paper or gelfilm coated with ointment may be placed over the perforation with assessment of hearing before and after placing the patch which indicates normal ossicles or ossicular problems such as fixation or discontinuity<sup>3</sup>.

In this study we assessed the reliability of patch test in predicting the ossicular status preoperatively in patients with COM so that the surgeon is prepared for ossicular reconstruction if required. This study has not been done earlier in the mid-western part of Nepal and hence we are conducting this study.

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### MATERIALS AND METHODS

This Prospective study was conducted in outpatient department of Nepalgunj Medical College Teaching hospital, Kohalpur from 30<sup>th</sup> April, 2016 to 1<sup>st</sup> May, 2017. Total of 50 cases were enrolled between the ages of 15 – 50 years of chronic otitis media having small to medium size central perforation of tympanic membrane. The patients excluded in this study were with chronic otitis media (attico-antral), COM with total

perforation, tympano-sclerotic patch and having sensorineural hearing loss.

Audiological evaluation was done before patching, then after patching with cigarette paper. The result was recorded to predict the ossicular status. AC thresholds were measured by taking average threshold of speech frequencies i.e., mean of hearing threshold at 0.5, 1, 2, 4 Kilohertz (KHz). BC thresholds were measured for 0.5, 1, 2, 4 KHz. Responses were based on subject activation of hand held response buttons. The resulting levels were expressed in dB Hearing loss. The amount of intensity that has to be raised above the normal level is a measure of the degree of hearing impairment at that frequency. Masked PTA was done if there was a difference of more than 40 dB between air conduction threshold of the test ear and the bone conduction threshold of the opposite ear, or when the air bone gap of the poorer ear under test was more than 10 dB.

**RESULTS**

The age of the patients ranged from 15–50 years with a mean age of 25.22 (SD ±7.5). The age distribution is shown in table I. Out of 50 patients evaluated, there were 28(56%) female and 22(44%) male patients. The left ear was affected in 19(38%) patients and right ear was affected in 16(32%) patients and disease was bilateral in 15(30%) cases.

Age Group (in Yrs)	Frequency	%
15-20	18	36
20-30	21	42
30-40	8	16
40-50	3	6

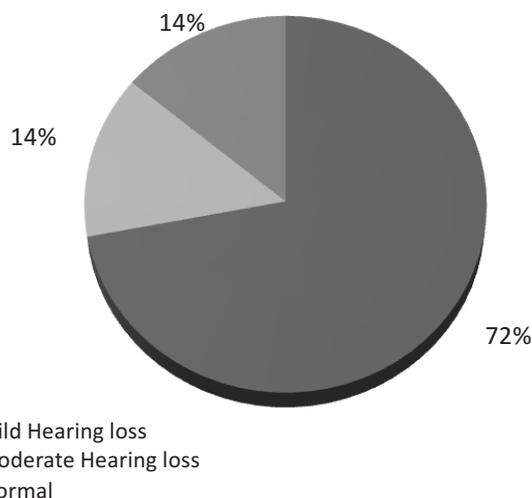
**Table I: Age distribution**

All the patients had conductive type of hearing loss before patch test out of which moderate degree of hearing loss was present in 36(72%) and mild degree of hearing was present in 14(28%).

Pre-Patch Test PTA	Frequency	%
Mild Hearing loss	14	28
Moderate Hearing loss	36	72
Total	50	100

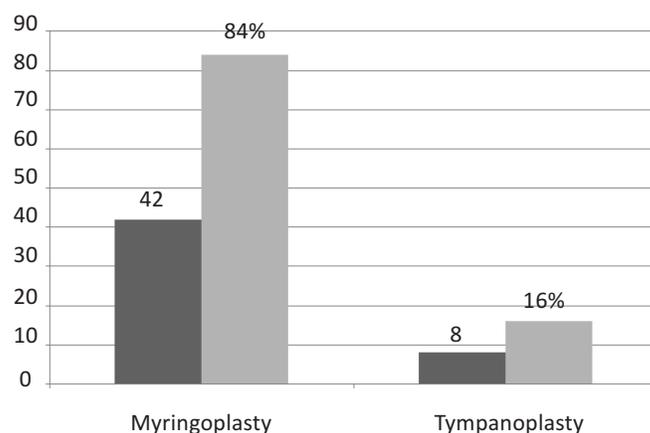
**Table II: Pre-Patch Test PTA**

After patch test, the degree of hearing loss was again calculated. The hearing loss improved and now majority of patients had mild degree of hearing loss, i.e. 36(72%) and moderate degree of hearing loss was seen in 7(14%). In 7(14%) of patients the hearing was found to be normal.



**Figure 1: Post Patch Test PTA**

Per-operatively the mobility of the ossicles was found to be preserved in 42(84%) patients and in 8(16%) patients, there was ossicular discontinuity. Out of the 50 patients, 42(84%) patients underwent Myringoplasty and for the 8(16%) patients, Tympanoplasty had to be undertaken.



**Figure 2: Post Patch Test PTA**

Variable	Mean (dB)	Standard Error	P value
Pre Patch test PTA	44.82	0.929	0.001
Post Patch test PTA	30.64	1.078	

**Table III: Change in hearing**

The mean pre patch test PTA value was found to be 44.82 dB and the mean post patch test PTA value was found to be 30.64 dB with a P value of 0.001 implying significant improvement in hearing following post patch test which helps in predicting ossicular mobility intraoperatively.

## DISCUSSION

The main objective of this study is to assess the reliability of patch test in predicting the ossicular status in patients with chronic otitis media so that the surgeon is prepared for ossicular reconstruction if required. An immobile ossicular chain is indicated by an air bone gap that is disproportionately larger for a given size of perforation. Improvement in hearing by closing the perforation with cigarette paper coated with ointment placed over the perforation with assessment of the hearing before and after placing the patch indicates normal ossicles. If there is no improvement, it indicates ossicular problems such as fixation or discontinuity<sup>3</sup>.

In the present study, the most commonly affected age group was 20-30 years seen in 21(42%) patients and the mean age was 25.22 years. There were 28(56%) female and 22(44%) male patients. The left ear was affected in 19(38%), right ear was affected in 16(32%) patients disease was bilateral in 15(30%) cases.

All the patients had conductive type of hearing loss out of which moderate degree of hearing loss was present in 36(72%) and mild degree of hearing was present in 14%(28%). (Table II). The hearing loss ranged from 30 dB to 55 dB. Following patch test, the degree of hearing loss was again calculated. The hearing loss improved and in 7(14%) of patients the hearing came to normalcy. This improvement in hearing was supported by a study by Golz et al.<sup>4</sup> to evaluate the results of paper-patching in patients with chronic perforations of the TM of different sizes and they found the closure rate 63.2%, 43.5%, and 12.5% for small, medium, and large perforations, respectively. Thus it showed the reliability of patch test for closing small to medium perforations as in this study. These findings were also favored by Park et al. in their study also by Roosli et al.<sup>5</sup> whose study aimed to determine how tympanic membrane (TM) perforations and their closure, using a paper-patch technique, affect middle-ear mechanics and thus improve the conductive hearing for different sizes of the TM perforation.

Out of the 50 patients, 42(84%) patients underwent Myringoplasty and for the 8(16%) patients who had ossicular chain disruption, Tympanoplasty had to be undertaken. This was favored by study of Rout et al.<sup>6</sup> about the ossicular chain defects in safe type of COM. They found that approximately 1/3 of patients were having some amount of ossicular involvement and 1/5 patients were having ossicular necrosis and the average hearing loss was maximum when all 3 ossicles were absent that is 58.4 dB and minimum with isolated malleus involvement i.e. 45 dB.

## CONCLUSION

Before the patch test, hearing loss was measured ranging from 30 dB to 55 dB with the mean hearing loss 44.82. All the patients had conductive type of hearing loss out of which moderate degree of hearing loss was present in 36(72%) and mild degree of hearing was present in 14(28%). Then, patching of the perforation was done with cigarette paper and hearing recorded. It was found that in those patients in whom there was less improvement in hearing i.e. less than 10 dB, ossicular discontinuity was noted intra-operatively and thus ossicular reconstruction by tympanoplasty procedures were undertaken. In rest of the cases, in which there was improvement in hearing by 10 dB or more, the ossicular chain was intact intra-operatively.

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