

## DOES SURGERY OF CHRONIC OTITIS MEDIA CAUSE SENSORI NEURAL HEARING LOSS?

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### ABSTRACT

**Objective:** To determine the relationship of sensori neural hearing loss and surgery for chronic otitis media.

**Methodology:** This study was designed as a clinical trial on 90 patients with chronic otitis media (COM), who were admitted in hospital for Tympanoplasty and Mastoidectomy who were selected for the study. A pre and post, bone conduction hearing test was performed in frequencies 250 to 4000 HZ. By means of AMPLID319, auditory tests were performed in one audiometric center by one expert audiologist. Other variables like age, gender, kind of surgery, diagnosis of the lesion of the middle ear and duration of drilling were investigated and evaluated too. Then descriptive and inferential statistics were utilized to evaluate hearing level before and after surgery.

**Result:** Age of subjects was  $25.1 \pm 10.7$ . About 53.3% of cases were females. Cholesteatomas was the most common diagnosed disease in middle ear (37.8%). Drilling duration was  $31.1 \pm 16.5$  minutes. There was not a statistically significant difference between the hearing levels in pre and post operated cases except for the frequency of 250 HZ. Also, no significant difference was found between duration of drilling and diagnosis of the lesion of middle ear, and hearing loss.

**Conclusion:** As the results of the study showed no difference in hearing level was found between pre and post operated cases, therefore, it seems that by observing and considering the primary principles of ear surgery, no more sensory neural hearing loss will appear and there is no need to be worried or be sensitive in this regard.

**KEY WORDS:** Sensori neural hearing loss, Tympanoplasty, Mastoidectomy, Chronic otitis media.

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### INTRODUCTION

Sensori neural hearing loss is considered as a consequence of chronic otitis media, and incidence of a permanent sensori neural hearing loss after surgery is 1.2% to 4.5%. There are about 30-35 million cases per year of otitis media<sup>1</sup> which is defined as the inflammation of the middle ear.<sup>2</sup> These can be acute or chronic. Chronic otitis media is a persistent inflammation of the middle ear, typically for a minimum of a month. This is a distinction to an acute ear infection that usually lasts only several weeks.<sup>1</sup> despite the use of modern antibiotics, chronic otitis media remains a common disease that has

a significant health impact on up to 2% of the population.<sup>3</sup> As a whole, chronic otitis media is defined as a long-lasting otitis media.<sup>2</sup> It may be associated with a chronically draining ear, Mastoiditis and Cholesteatoma, Meningitis. Severe or chronic otitis media may permanently affect hearing and be associated with Dizziness. The sensorial hearing loss is typically more severe at high frequencies.<sup>1-5</sup> Chronic otitis media can be treated medically and surgically which depends on disease pathology, signs and patients age. Surgical treatment is performed to remove infected cells as well as for improvement of hearing.<sup>6</sup> Sensorial hearing loss is considered as a consequence of chronic otitis media, assumed inflammatory mediators as the substance that can deteriorate the function of the inner ear. Also the risk of deterioration to hearing on the operated ear is one of the most commonly discussed issues when asking for patient consent for middle ear surgery.<sup>7-10</sup> The incidence of permanent sensorial hearing loss after surgery is 1.2 to 4.5%.<sup>11,12</sup> Multiple factors may be involved including suction, drill-induced acoustic trauma of the Cochlea, excess manipulation of the ossicles, and inadvertently touching the ossicle with a rotating burr.<sup>10</sup>

In spite of this, some authors have confirmed that there is relationship between sensorial hearing loss and chronic otitis media surgery, whereas there is another study which did not confirm this relationship.<sup>12-14</sup> Considering this discrepancy and lack of enough data about chronic otitis media surgery and sensorial hearing loss in Iran, this study was carried out to determine the relationship of sensorial hearing loss and chronic otitis media surgery at Esfahan University of Medical Sciences in Iran.

## METHODOLOGY

This study included 90 patients with chronic otitis media, who were admitted in a hospital of Esfahan University of Medical Sciences for Tympanoplasty and Mastoidectomy. Before and 10-14 days after surgery, bone conduction test was performed on normal and abnormal ear in frequencies 250, 500, 1000, 2000 and 4000 HZ.

By means of AMPLID 319, auditory tests were performed in one audiometric center by one expert audiologist. In addition the Tesi-Dent with TIM 20000 model of drill were used for surgery. Surgeries were performed by senior Ear Nose Throat surgeon along with their assistants. An information form was used to collect variables like age, gender, kind of surgery from patients' files. Other variables were also collected such as diagnosis of the lesion of the middle ear and duration of drilling. The diagnosis was done by senior of E.N.T surgeon. One of the colleagues was responsible for measuring of drilling time from start till end of process. This study was approved by Ethic Commitment of Esfahan University of Medical Sciences and the research objectives were explained to all patient who gave their consent to participate in the study. The descriptive statistics (frequency, correlation) and inferential statistics (paired t-Test, Chi-square) were utilized to evaluate hearing loss after surgery. The significant level was considered at 0.05 in this study.

## RESULT

Our findings showed that age of patients was in the range of 10-50 year, with mean age of 25±10.7. About 53.3% of patients were female. The distribution of patients' job were: housewives 36.5%, students 31.1%, workers 16.2%, staffs 2.7%, Farmers 4.1% and unemployed. The surgery performed included: Modified radical mastoidectomy 37.8%, Mastoidectomy and Tympanoplasty 58.9% and radical mastoidectomy

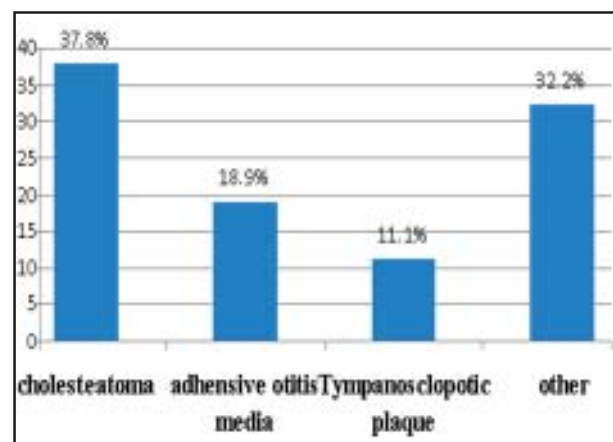


Fig-1: Distribution of diseases in admitted patients

Table-I: Mean and Standard Deviation of hearing level before and after surgery in different frequencies

Measurement stage Frequencies (HZ)	Before surgery	After surgery	PV
250	10.56±8.29	12.28±9.31	<0.004
500	12.11±10.3	12.78±9.5	N.S
1000	13.83±13.37	14.29±12.65	N.S
2000	16.67±16.16	17.44±15.16	N.S
4000	17.39±16.19	17.83±15.14	N.S

tomy 3.3%. As seen in Figure-1, the most common diagnosis was cholesteatoma in (37.8%) of patients.

Range of drilling duration were 10-90 minutes with mean duration of 31.9±16.5. Duration of diseases was 10-30 years. Table-I shows the means of hearing level before and after surgery. There were not significant differences between various frequencies of hearing level before and after surgery except in frequency of 250HZ (p=0.04).

Table-II and III shows the hearing levels in infected and normal ears before and after surgery. There were significant differences between hearing level in infected and non infected ears in different frequencies but there were no significant difference in frequency of 250HZ before surgery. There were significant different between duration of disease, patients age and hearing level in different frequencies (p<0.001), but there were no significant differences between diagnosis, drilling duration, jobs and hearing level before and after surgery.

### DISCUSSION

The result of this study showed that there was significant difference in the frequency of 250 HZ whereas, there were no significant differences in the other frequencies such as 500, 1000, 2000 and 4000 HZ. As regard the frequency of 250 HZ it is not so important clinically and one can say the hearing loss was not affected after middle ear surgery. Pignatero, Volter as well as, Sakagam, Naderipour and their co-workers have confirmed this findings in their

Table-II: Mean and Standard Deviation of hearing level in infected and sound ears before surgery

Chronic otitis media Frequencies (HZ)	Yes	No	PV
250	10.56±8.29	10.39±5.8	N.S
500	12.11±10.3	10.36±6.46	<0.006
1000	13.83±13.37	11.36±9.32	<0.003
2000	16.67±16.16	12.89±12.32	0.001
4000	17.39±16.19	14.11±12.71	0.007

studies.<sup>15-18</sup> Palva, Tos , Mozafariniya and their co-workers have also pointed out that hearing loss is the consequence of the middle ear surgery.<sup>12,13,19</sup> It looks, this discrepancy is due to study duration, sample size, post operation audiometry time, perfection of the audiometrist as well as the instrument type, surgery maneuvers, drill-generated noise and experience of surgeon. Although, experts say that, the possible contribution of drill noise during mastoid surgery to post operative sensori neural hearing loss is controversial. The amount of energy transmitted to the cochlea depends on the noise levels produced and the duration of exposure. Various studies have shown that mastoid drill can produce noise levels exceeding 100 db.<sup>20</sup> While most studies fail to demonstrate any permanent sensori neural hearing loss<sup>21</sup> in contrast, inadvertent injury to the ossicular chain during mastoid surgery is regarded as a major cause of postoperative permanent sensori neural hearing loss.<sup>10</sup> Besides all above,, most of the studies which have showed the sensori neural hearing loss were conducted before 1995, As such it

Table-III: Mean and Standard Deviation of hearing level in infected and sound ears after surgery

Chronic otitis media Frequencies (HZ)	Yes	No	PV
250	12.28±9.31	11.17±6.54	<0.004
500	12.78±9.51	10.36±6.63	N.S
1000	14.29±12.65	10.61±8.89	N.S
2000	17.44±15.16	11.5±15.14	N.S
4000	17.83±15.14	13.89±12.31	N.S

seems, improvement in medical technology as well as meticulous instruments, besides experience of surgeon can be considered as reasons of declining of sensori neural hearing loss after surgery for chronic otitis media.

In conclusion our study has shown that the middle ear surgery in chronic otitis media did not cause the sensori neural hearing loss. It is suggested that all ENT surgeon should do chronic otitis media surgery without being worried, but must take all the precaution.

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