

**Original article:**

## **Incidence of Sensorineural Hearing Loss after Middle Ear Surgeries: A Prospective Study at a Tertiary Care Teaching Hospital**

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### **ABSTRACT**

**Background:** Surgery of the ear is the most challenging situation for an otorhinolaryngologist. One of the commonly occurring middle ear conditions is otitis media. Even middle ear surgery carries a significant risk of injuring inner ear. Therefore postoperative hearing assessment should be done in all the cases. The present study was done with the main aim to determine the incidence of postoperative hearing loss after middle ear surgeries.

**Materials and Methods:** A total of 50 patients, 11-60 years of age who underwent middle ear surgeries in department of ENT, Government Medical College, Haldwani, Uttarakhand (India) were taken for the study. Clinical history regarding frequency and duration of otorrhea, hearing loss, and details regarding previous treatment were taken. All patients were subjected to general physical examination as well as examination of ear, nose and throat. Pre-operatively and post-operatively at 2 weeks and at 4 weeks patients were subjected to pure tone audiometry test. Data was analysed using SPSS software 16 and was expressed as percentage and number as required.

**Results:** There were majority of females in this study (68%) and rest were males (32%). There were 44% (n= 22) who presented with symptoms past 2 years. There were 30%(n=15) patients who had symptoms between 2-5 years. Mean of bone conduction audiometry at 2 weeks postoperatively was slightly higher at 2KHz (14.5±4.2). Mean bone conduction audiometry results at 4 weeks post operatively are also slightly higher than the preoperative values at 0.5 kHz, 1 kHz, 2 kHz and 4 kHz.

**Conclusion:** From the above study we can conclude that with adoption of proper technique and instrumentation during middle ear surgeries the incidence of sensorineural hearing loss can be reduced to great levels. In our study there was insignificant difference between the preoperative and postoperative hearing levels.

**Keywords:** Audiometry, Otorrhea, Otitis media, Sensorineural

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### **INTRODUCTION**

Surgery of the ear is the most challenging situation for an otorhinolaryngologist. One of the commonly occurring middle ear conditions is otitis media. Various surgical procedures are performed for the correction of chronic otitis media. So a surgeon should be thorough with the postoperative complications and pitfalls associated with the surgery in order to improvise his skills. Any

otosurgical procedure carries a risk of injuring inner ear. Even middle ear surgery carries a significant risk of injuring inner ear. Therefore postoperative hearing assessment should be done in all the cases.

Even with various advancements and precautions, mild amount of sensorineural hearing loss is associated with middle ear surgeries. The exact aetiology behind it is unknown. Some studies

indicate that there is damage to cochlea during middle ear surgeries. There are various other studies according to whom this loss is insignificant.<sup>1,2</sup> Regular postoperative follow up is very essential to determine the pattern of development of postoperative hearing loss but there is paucity of adequate assessment techniques. The present study was done with the main aim to determine the incidence of postoperative hearing loss after middle ear surgeries.

#### **MATERIALS AND METHODS**

A total of 50 patients, 11-60 years of age who underwent middle ear surgeries in department of ENT, Government Medical College, Haldwani, Uttarakhand (India) were taken for the study. Patients with previous medical history of hearing loss, suffering from otosclerosis and patients with head trauma were excluded from the study. Clinical history regarding frequency and duration of otorrhoea, hearing loss, and details regarding previous treatment were taken. All patients were subjected to general physical examination as well as examination of ear, nose and throat. Tuning fork tests were performed. Pre-operatively and post-operatively at 2 weeks and at 4 weeks patients were subjected to pure tone audiometry test and hearing threshold for pure tone audiometer was assessed for air conduction in at frequency ranging from 125-8000 Hz in sound proof room and for bone conduction ranging from 250- 4000 Hz. Data was analysed using SPSS software 16 and was expressed as percentage and number as required.

#### **RESULTS**

The present study was conducted involving 50 subjects. There were majority of females in this study (68%) and rest were males (32%).

Graph 1 shows the age wise distribution of the subjects. There were 30% subjects who were aged between 11-20 years (n=15). Majority of the

patients were aged between 21-30 years(36%). There were only 12% patients (n=6) who were aged between 31-40 years. There were 22% (n=11) patients who were aged more than 40 years.

Table 1 shows the distribution of the subjects according to the duration of symptoms at the time of presentation. There were 44% (n= 22) who presented with symptoms past 2 years. There were 30%(n=15) patients who had symptoms between 2-5 years. There were 26% (n=13) patients who presented with symptoms more than 5 years.

Table 3 shows mean bone conduction by sudiometry. Mean of bone conduction audiometry at 2 weeks postoperatively was slightly higher at 2KHz (14.5±4.2). Mean bone conduction audiometry results at 4 weeks post operatively are also slightly higher than the preoperative values at 0.5 kHz, 1 kHz, 2 kHz and 4 kHz. At 12 weeks the mean bone conduction shows progressive rise from 0.25 KHz to 2 KHz. The difference in p value between preoperative and postoperative bone conduction was more than 0.05, so there was no significant difference amongst them.

#### **DISCUSSION**

The present study prospective was conducted in the institute, state and enrolled 50 patients. Postoperative hearing was assessed in all the patients after middle ear surgery. There were 30% subjects who were aged between 11-20 years. Majority of the patients were aged between 21-30 years(36%). There were only 12% patients who were aged between 31-40 years. There were 22% patients who were aged more than 40 years. Mean of bone conduction audiometry at 2 weeks postoperatively was slightly higher at 2KHz (14.5±4.2). Mean bone conduction audiometry results at 4 weeks post operatively are also slightly higher than the preoperative values at 0.5 kHz, 1 kHz, 2 kHz and 4 kHz. At 12 weeks the mean bone conduction shows progressive rise from 0.25 KHz

to 2 KHz. Therefore according to our study there was no significant difference in the level of hearing preoperatively and postoperatively.

According to a study by Hegewald et al<sup>3</sup>, patients who underwent mastoidectomy were tested for postoperative sensorineuronal hearing loss after 30 hours and 48 hours postoperatively. There was no significant hearing loss postoperatively. According to a study by Yadav et al<sup>4</sup>, 11-50 years was the most common age group selected which was quite similar to our study. This age group is most frequently selected as it has least chances of false results during audiometry. In a study conducted by Urquhart et al<sup>5</sup>, in which they studied 40 patients of ear surgeries to find correlation between duration of postoperative ear discharge and sensorineural hearing loss and found no significant relation between them.

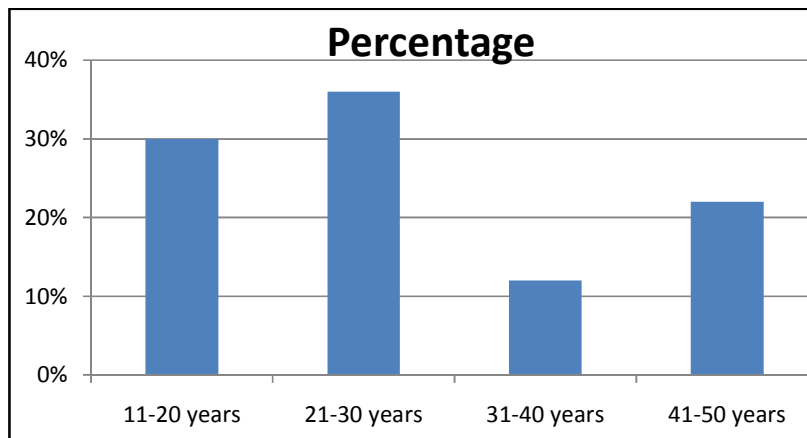
According to our study chronic otitis media was most prevalent in 21- 30 years of age group. In a study conducted by Biswas et al<sup>6</sup>, 28% of children in south India suffer from chronic otitis media. In a study conducted by Schick et al<sup>7</sup>, retrospectively analysed temporary hearing problems after ear surgery. They concluded that slight temporary threshold shifts were observed at 2000 Hz and 4000 Hz. According to them the use of the drill and

manipulating the ossicular chain does not result in any significant sensory hearing deficit. According to a study by Domanech et al<sup>8</sup>, drilling of the temporal bone lead to the impairment of the hearing level in significant number of patients. In a study conducted by Holmquist et al<sup>9</sup>, they presented a simple technique of measuring hearing intensities postoperatively. They found out that noises generated by the drill should be regarded as a risk to the cochlea during ear surgeries. Khurana AS et al<sup>10</sup> in their study to establish the risk of inner ear damage during middle ear surgeries in 60 patients. They concluded that there was only 1 case of significant sensorineural hearing deficit and 10 cases of mild sensorineural deficit. According to spencer et al<sup>11</sup>, the sound generated by the suction are not of adequate duration and amplitude to produce sensorineural hearing loss.

#### CONCLUSION

From the above study we can conclude that with adoption of proper technique and instrumentation during middle ear surgeries the incidence of sensorineural hearing loss can be reduced to great levels. In our study there was insignificant difference between the preoperative and postoperative hearing levels.

**Graph 1: Distribution of patients according to age group**



**Table 1: Distribution of subjects according to duration of symptoms**

TIME PERIOD	FREQUENCY	PERCENTAGE
0-2 years	22	44
2-5 years	15	30
>5 years	13	26

**Table 2: Mean bone conduction audiometry test**

Mean bone conduction audiometry test	0.25	0.5	1	2	4
Preoperative PTA	13.5±2.2	13.8±4.1	14.1±3.2	14.2±3.4	13.9±3.9
Post-operative at 2 weeks	14.1±3.1	14.1±2.4	14.3±3.2	14.5±4.2	14.1±3.7
Post-operative at 4 weeks	14.1±3.4	14.3±3.2	14.2±2.9	14.4±3.9	14.4±2.8
Post-operative at 12 weeks	13.8±3.0	14.0±2.4	14.2±2.6	14.3±2.8	14.1±2.4

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