

Assessment of Post-Operative Hearing Loss after Middle Ear Surgery: A Prospective Study

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ABSTRACT

Background: At the end of surgery for chronic ear disease, various forms of packing have been applied to the external auditory canal (EAC) and the middle ear cavity (MEC). Hence; under the light of above mentioned data, we planned the present study to assess post-operative hearing loss after middle ear surgery.

Materials & Methods: The present study involved assessment of postoperative hearing loss in patients undergoing middle ear surgeries. A total of 30 patients scheduled to undergo middle ear surgery were included in the present study. Middle ear surgeries were carried out under the hands of skilled and experienced ENT surgeons. Postoperative middle ear functioning was assessed using a pure tone audiogram. All the readings were obtained after one week of surgery. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

Results: Hearing loss and Otorrhoea were the most common preoperative symptoms found to be present in the present study. In majority of the patients (83.3 %), postoperative hearing improvement was within the normal range.

Conclusion: Early identification of the patients with developing post-operative sensorineural hearing loss should be done as soon as possible so that prompt treatment could be initiated.

Key words: Hearing Loss, Middle Ear Surgery, Post-Operative.

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Article History:

Received: 13-02-2019, Revised: 09-03-2019, Accepted: 29-03-2019

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2019.5.2.015	

INTRODUCTION

At the end of surgery for chronic ear disease, various forms of packing have been applied to the external auditory canal (EAC) and the middle ear cavity (MEC).^{1,2} Mild Sensorineural hearing loss subsequent to middle ear surgery has till today been an important complication to middle ear surgery inspite of advances in surgical techniques, operative instruments, monitoring devices and better treatment options.³⁻⁵

Surgical management of the only hearing ear is stressful for the surgeon because there is a possibility of hearing deterioration. Conservative management, such as careful observation and hearing aid use, is one of the choices, but surgical management should be considered when there is refractory otorrhea or a destructive lesion. There have been a few reports into surgical interventions in only hearing ears.⁶⁻⁸

Hence; under the light of above mentioned data, we planned the present study to assess post-operative hearing loss after middle ear surgery.

MATERIALS & METHODS

The present study was conducted in the department of ENT, Vardhman Mahaveer Medical College & Safdargunj Hospital, New Delhi, India. It involved assessment of postoperative hearing loss in patients undergoing middle ear surgeries. A total of 30 patients scheduled to undergo middle ear surgery were included in the present study.

Exclusion Criteria

- Patients with presence of any form of malignant pathology,
- Patients with history of any other systemic illness,
- Patients with presence of any form of bleeding disorder

Detailed demographic data and clinical profile of all the patients was obtained. Thorough preoperative assessment of all the patients was carried out. Preoperative ear examination was carried out in all the patients. Middle ear surgeries were carried

out under the hands of skilled and experienced ENT surgeons. Postoperative middle ear functioning was assessed using a pure tone audiogram. Three frequencies were selected for assessment of hearing loss; which included 500 Hz, 1000 Hz and 2000 Hz. All the readings were obtained after one week of surgery. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

RESULTS

In the present study, a total of 30 subjects scheduled to undergo middle ear surgery were analyzed. Mean age of the subjects of the present study was 38.4 years.

Table 1: Age-wise and gender distribution of patients

Parameter		n	%
Age-wise (years)	Less than 25	10	33.3
	25- 50	15	50
	More than 50	5	16.7
Gender	Males	17	56.7
	Females	13	43.3

Graph 1: Age-wise and gender distribution of patients

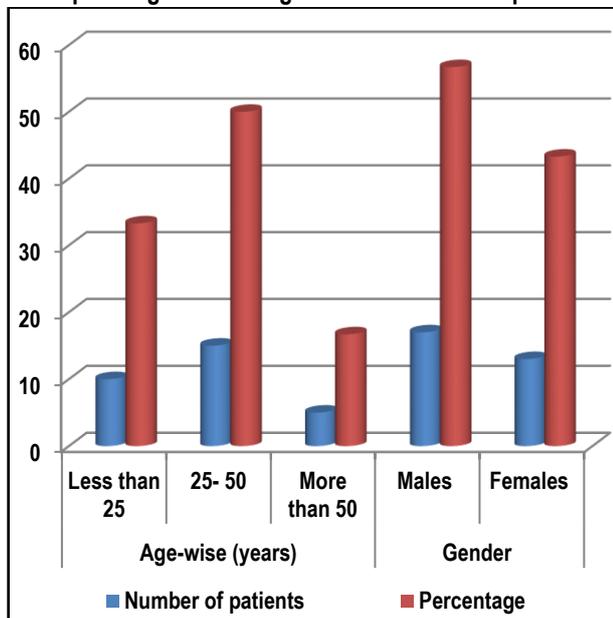


Table 2: Distribution of symptoms

Symptom	n	%
Otorrhoea	30	100
Earache	15	50
Tinnitus	12	40
Vertigo	10	33.3
Hearing loss	30	100

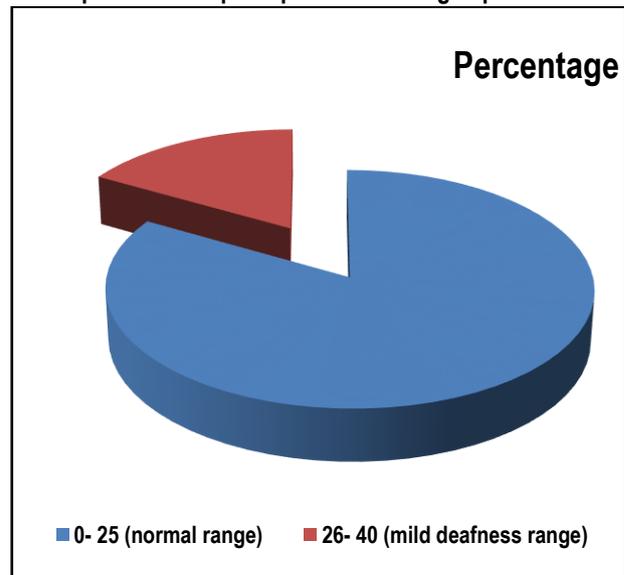
Table 3: Postoperative hearing loss in dB

Hearing loss (in dB)	n	%
0-10	2	6.7
10.1- 15	2	6.7
15.1- 20	7	23.3
20.1- 25	13	43.3
25.1- 30	4	13.3
30.1- 35	2	6.7

Table 4: Overall postoperative hearing improvement

Hearing improvement (dB)	n	%
0- 25 (normal range)	25	83.3
26- 40 (mild deafness range)	5	16.7

Graph 2: Overall postoperative hearing improvement



Majority of the patients (50%) belonged to the age group of 25 to 50 years respectively. 56.7 percent of the subjects of the present study were males while the remaining were females. Hearing loss and Otorrhoea were the most common preoperative symptoms found to be present in the present study. In majority of the patients (83.3 %), postoperative hearing improvement was within the normal range.

DISCUSSION

Until recently the practice of otological procedures on cadaver temporal bones was a common occurrence in otolaryngology departments. The difficulty in acquiring specimens has led to alternative techniques which involve artificial and computer-aided models.^{5,7} In the present study, a total of 30 subjects scheduled to undergo middle ear surgery were analyzed. Mean age of the subjects of the present study was 38.4 years. Majority of the patients (50%) belonged to the age group of 25 to 50 years respectively. Gupta S et al assessed the hearing improvement in different types of tympanoplasties. Settings and Design: Prospective, hospital-based. A total of 50 patients were included who were 12 years old and above, of both sexes with conductive hearing loss due chronic otitis media with or without perforation. The ratio of males (28) was more as compared with females (22). Maximum number of patients belonged to the age group of 10-20 years (34%), followed by 20-30 years (30%), whereas least number of cases was found in the age group of > 50 years. Hearing loss and otorrhea were present in majority of the cases (100% and 72%, respectively). A total of 18 of the cases had cholesteatomatous chronic suppurative otitis media, while 32 ears were observed to be noncholesteatomatous chronic suppurative otitis media. The average preoperative air conduction (AC) in the present study was found to be 46.6 dB ranging from 20 dB to 112.5 dB, while the average postoperative AC was found to be 39 dB with an average gain of 7.6 dB. The four frequency average

preoperative and postoperative air-bone gap (ABG) were found to be 26.48 dB and 20.17 dB respectively, with the average gain of 6.3 dB. The average ABG closure within 0-30 dB was seen in 33 (82%) of the cases. Social hearing was achieved in 86% of the cases in type I, 46% in type II, and 40% in type III tympanoplasty. Tympanoplasty as a procedure when indicated without compromising for the disease, can be effectively used to improve hearing in chronic suppurative otitis media, and other types of conductive hearing losses. Force transmitted to the inner ear during middle ear surgery is an often-cited cause of inner ear harm. The forces involved in middle ear surgery are significantly greater than the forces imparted during hearing. The depression of the stapes footplate during hearing depends on both the frequency and the intensity of the sound.^{8,9} Gauze strip, cotton-buds, and absorbable gelatin sponge (gelfoam) have been commonly used as packing material. Among these materials, gelfoam has long been a most popular material used for packing of the MEC and the EAC during otologic surgery.^{10,12} 56.7 percent of the subjects of the present study were males while the remaining were females. Hearing loss and Otorrhoea were the most common preoperative symptoms found to be present in the present study. In majority of the patients (83.3 %), postoperative hearing improvement was within the normal range. The complete obstruction of EAC by cerumen is known to cause hearing loss of about 30 dB over all frequencies, and the amount of hearing loss can be varied by the materials or compactness of the packing. When the MEC was packed with gelfoam in guinea pig, hearing loss occurred by 30 to 40 dB mainly at lower frequencies.¹¹ Cho YS et al evaluated the amount and patterns of hearing loss resulting from packing in middle ear cavity (MEC) and external auditory canal (EAC) after middle ear surgery. They obtained pure tone thresholds by bone (BC) and air conduction (AC) up to 12 weeks after middle ear surgery in 17 patients who had minimal middle ear pathology. To observe the effects of packing only in the EAC as in cases of explorative tympanotomy or stapes surgery, BC and AC threshold were obtained after packing only in the EAC in 18 volunteers. PTA by AC increased significantly by a maximal value of 38.7 dB at the second postoperative day, by 35.0 dB at 1 week after middle ear surgery. PTA by BC also increased maximally at the second postoperative day by 4.8 dB. The elevation of BC threshold at high frequencies (2, 3, 4 kHz) was more pronounced. Packing of EAC without MEC packing resulted in elevation of AC threshold by 43.0 dB, with similar patterns of BC threshold changes as MEC and EAC packing.¹²

CONCLUSION

Under the light of above obtained results, the authors conclude that early identification of the patients with developing post-operative sensorineural hearing loss should be done as soon as possible so that prompt treatment could be initiated. However; further studies are recommended.

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Source of Support: Nil.

Conflict of Interest: None Declared.

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Cite this article as: Neha Deol, Balvinder Singh. Assessment of Post-Operative Hearing Loss after Middle Ear Surgery: A Prospective Study. *Int J Med Res Prof*. 2019 Mar; 5(2):65-67. DOI:10.21276/ijmrp.2019.5.2.015