

Original Research Article

Risk of hearing loss in non-operated ear due to mastoid drilling

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ABSTRACT

Background: The study purpose is to evaluate the effect of drill-generated high intensity noise on hearing sensitivity in contralateral ear.

Methods: Sixty patients who underwent mastoidectomy were studied to see the effect of mastoid drilling on hearing sensitivity in normal ear using pure tone audiometry (PTA) and distortion product otoacoustic emission (OAE) values recorded preoperatively and postoperatively.

Results: For PTA, there is no significant hearing loss for 0.25 kHz and 0.50 kHz for all PODs. For 1 kHz, 2 kHz and average PTA there is significant temporary hearing loss from POD 1 to POD 7 which normalizes around POD 30. However, there is significant temporary threshold shift for 4 kHz and 8 kHz from POD 1 to POD 5 and the hearing sensitivity improves to preoperative levels at POD 7. For OAE, 1 kHz, 4 kHz and average OAE there is significant temporary hearing loss from POD 1 to POD 7 which normalizes around POD 30. However, there is significant temporary threshold shift for 2 kHz and 6 kHz from POD 1 to POD 5 and hearing sensitivity improves to preoperative levels at POD 7. There is a significant correlation between drilling duration and PTA averages and OAE averages.

Conclusions: Sensorineural hearing loss is more prevalent following modified radical and radical mastoidectomy as compared to canal wall up mastoidectomy. The factors influencing postoperative contralateral ear sensorineural hearing loss are type and size of burr and the duration of burr use.

Keywords: Normal ear, Mastoidectomy, Drill generated noise, Distortion product OAEs, PTA, Temporary threshold shift

INTRODUCTION

Hearing loss may result from genetic causes, complications at birth, certain infectious diseases, chronic ear infections, the use of particular drugs, exposure to excessive noise, and ageing.¹

Noise induced hearing loss refers to reduction in auditory acuity as a consequence of excessive noise exposure. Noise induced hearing loss can either be a temporary threshold shift or a permanent threshold shift.

Chronic suppurative otitis media (CSOM) is defined as chronic inflammation of the mucoperiosteal lining of the middle ear cleft, causing persistent ear discharge,

progressive deafness and the patient is prone to develop intracranial and extracranial complications.^{2,3}

There are various surgical procedures performed in cases of CSOM and these include mastoidectomy. Various authors have theorised that mastoidectomy can lead to sensorineural hearing loss (HL) due to noise generated by the drill during surgery.^{4,5}

Exposure to short duration, high level noise can cause either temporary or permanent hearing loss depending on the level, duration and spectral content of the traumatising stimulus.⁶

The possible contribution of drill-generated noise during tympanomastoid surgery to postoperative sensorineural

HL is excess of 100 dB.⁷ Although, the amount of energy transmitted to the cochlea depends on the noise levels produced and the duration of exposure.^{6,8} The frequency of a permanent sensorineural HL after tympanomastoid surgery is 1.2-4.5% in the operated ear.^{9,10} The effect of drill-induced trauma on the cochlea in ear surgery has been investigated previously using PTA, high frequency audiometry, OAEs, and electrocochleography.^{2,11-14}

OAE is behavioural test for outer hair cell function. OAE are low level sounds that are recordable in external auditory canal and reflect the active mechanism of outer hair cells in cochlea.¹⁴ Low sounds are absent in case of damaged outer hair cells, should combine tympanometry with OAE to rule out middle ear pathology.¹⁵

Henderson et al. noted that the individual variability in human susceptibility to noise induced hearing loss was so great that the situation is complex and much further research, both animal and human is needed to substantiate fully the effect of other factors on it.¹⁶

The effect of drill-generated noise on the non-operated ear has been discussed very less. Although there is only a 5-10 dB decreases in noise intensity on the contralateral side.^{10,17} A drill-induced noise is transmitted to the non-operated ear in two ways: Through the skull and around the ear.¹² Transcranial vibration represents a complex interaction between transmission and damping effects of the skull, cranial content and surrounding soft tissue. Since interaural attenuation of the skull is minimal, the noise generated by the drill during the mastoid surgery may be transmitted directly to both cochleae via bone vibration. The otologic drill is not only the source of noise, but also a strong vibration generator. During otologic drilling, a strong oscillation is transmitted into the cochlea. Movement of the cochlear sections in the presence of burr noise stimulation can cause more damage to the cochlea than noise alone.^{10,11}

The study of the effect of drilling on hearing in the normal contralateral ear assumes importance as contralateral hearing is often thought to be unaffected during surgery on the other ear. In addition, there are confounding factors when investigating the effect of drilling on the operated ear, such as actual contact of the ossicular chain with the high-speed drill and resultant sensorineural hearing loss. Thus, to test the non-operated ear to evaluate noise- and vibration-induced hearing loss leading to cochlear damage during ear surgery is necessary.

METHODS

Study and target population

The present study was carried out in the department of otorhinolaryngology and head and neck surgery, Netaji Subhash Chandra Bose medical college and hospital, Jabalpur, Madhya Pradesh, India.

Inclusion criterion

All patients attending the otorhinolaryngology OPD with complaint of unilateral ear disease including CSOM with cholesteatoma and CSOM with complications with normal hearing and intact tympanic membrane in contralateral ear preoperatively.

Sample size

This study included 60 patients who had undergone mastoidectomy during 2019 and 2020, who were enrolled after the ethical committee clearance.

Sampling method

Prospective observational study method was used.

Exclusion criterion

Patients above age of 60 years (due to increased susceptibility to noise induced trauma), previous history of ear surgery, abnormal hearing in contralateral ear and patients with contraindications to surgery.

Data collection method

Written consent was taken from all subjects participating in study. Cases selected from in and OPD who presented with complaints of unilateral ear disease.

Clinical evaluation

Cases selected for the study were subjected to detailed history and examination, the finding of which were recorded in a structured proforma. Diseased ear findings like cholesteatoma, granulation, perforation, retraction, discharge etc. were recorded using otoscope and oto-endoscope. Normal contralateral ear findings were recorded with emphasis on intact tympanic membrane and normal hearing sensitivity.

Clinical investigation

All patients were subjected to basic pre-operative investigation including haematological tests, otoscopy or oto-endoscopy, tuning fork test, PTA, distortion product OAE (DPOAE), plain X-ray mastoid (LAW's view), HRCT in selected cases.

Surgical procedures

All patients underwent tympanomastoid exploration under general anaesthesia. Out of 60 patients, 47 patients underwent modified radical mastoidectomy (MRM), 6 patients underwent radical mastoidectomy (RM) and 7 patients underwent canal wall up mastoidectomy with varying types of tympanoplasty. Drilling was performed using Karl Storz endoscope unidrive II Electrical Drill and Marathon Drilling machine. The burr used were

mainly round stainless-steel cutting burr followed by tungsten carbide cutting burr and round diamond burr which were used for very short period of time to control active bleeding to remove the disease near the facial, retro-facial and semi-circular canal region. Drilling time were recorded in each case. Intraoperative diseased ear mastoid status was recorded and opposite ear mastoid pneumatisation were noted radiologically using X-ray mastoid and HRCT Temporal Bone. Post-operative PTA and distortion product OAE assessment were done by Audiologist in the Audiology section of the department using Piano Inventis audiometer and Mimosa HearID respectively on POD 1, POD 3, POD 5, POD 7 and POD 30. PTA were measured at 0.25, 0.5, 1, 2, 4, 8 kHz and compared pre operatively and post operatively, and bone conduction more than 20 dB were marked as abnormal. DPOAE were measured at 1,2,4,6 kHz and threshold of less than 6 dB at any frequency was marked as abnormal.

RESULTS

The study could enrol 60 patients during the study period fulfilling inclusion criterion. 50% patients in present study were male and other 50% were female. Majority of patients were student (56.67%), others were housewife (25%), labour (11.67%) and farmer (06.67%).

30% patients belonged to 0-15 years of age, 43.33% belonged to 16-30 years of age, 15% belonged to 31-45 years of age and 11.67% belonged to 46-60 years of age. Minimum age of a patient was 07 years and maximum age was 60 years. Average age was 24 years.

The 78.33% patients underwent modified radical mastoidectomy, 11.67% patients underwent canal wall up

mastoidectomy and 10.00% patients underwent radical mastoidectomy.

Based on paired sample t test values for pre-operative PTAs and POD 1, 3, 5, 7 and 30 PTAs, there is no significant hearing loss for 0.25 kHz and 0.50 kHz for all PODs. For 1 kHz, 2 kHz and average PTA, there is significant temporary hearing loss from POD 1 to POD 7 which normalizes around POD 30. However, there is significant temporary threshold shift for 4 kHz and 8 kHz from POD 1 to POD 5 and the hearing sensitivity improves to preoperative levels at POD 7 (Table 1 and 2).

Based on paired sample t test values for pre operative OAEs and POD 1, 3, 5, 7 and 30 OAEs; for 1 kHz, 4 kHz and average OAE there is significant temporary hearing loss from POD 1 to POD 7 which normalizes around POD 30. However, there is significant temporary threshold shift for 2 kHz and 6 kHz from POD 1 to POD 5 and the hearing sensitivity improves to preoperative levels at POD 7 (Table 3 and 4).

Average drilling duration was 01:18 hours. Minimum and maximum drilling duration was 00:30 hours and 02:40 hours respectively, 45.00% patients required less than one hours of drilling time, 38.33% patients required drilling time between 1 and 2 hours and 16.67% patients required drilling time between 2 and 3 hours.

There is a significant correlation between drilling duration and PTA averages of POD 1, 3, 5 and non-significant correlation with POD 7, 30. There is a significant correlation between Drilling Duration and OAE averages of POD 1, 3, 5 and non-significant correlation with POD 7, 30 (Table 5).

Table 1: Pre-operative and post-operative PTA for different frequencies.

Frequency (kHz)	Pre-op (mean $\pm$ SD)	POD 1 (mean $\pm$ SD)	POD 3 (mean $\pm$ SD)	POD 5 (mean $\pm$ SD)	POD 7 (mean $\pm$ SD)	POD 30 (mean $\pm$ SD)
0.25	9.13 $\pm$ 1.82	9.32 $\pm$ 1.64	9.22 $\pm$ 1.93	9.18 $\pm$ 1.94	9.63 $\pm$ 2.79	9.25 $\pm$ 2.46
0.50	8.92 $\pm$ 2.24	8.98 $\pm$ 2.38	8.90 $\pm$ 2.59	8.78 $\pm$ 2.29	9.05 $\pm$ 2.59	8.87 $\pm$ 2.48
1.00	9.08 $\pm$ 2.69	16.35 $\pm$ 7.46	15.50 $\pm$ 6.96	11.33 $\pm$ 5.15	9.92 $\pm$ 3.06	9.17 $\pm$ 2.88
2.00	8.98 $\pm$ 2.52	17.12 $\pm$ 7.35	16.37 $\pm$ 7.76	12.17 $\pm$ 4.87	9.83 $\pm$ 3.21	9.13 $\pm$ 2.65
4.00	8.92 $\pm$ 2.78	16.50 $\pm$ 7.59	15.50 $\pm$ 7.61	11.62 $\pm$ 5.52	9.33 $\pm$ 2.66	9.27 $\pm$ 2.98
8.00	9.10 $\pm$ 2.82	15.00 $\pm$ 6.96	14.57 $\pm$ 7.01	11.73 $\pm$ 5.79	9.37 $\pm$ 3.75	9.02 $\pm$ 3.23
Average	9.02 $\pm$ 1.76	13.87 $\pm$ 4.80	13.34 $\pm$ 4.83	10.80 $\pm$ 3.45	9.52 $\pm$ 2.22	9.12 $\pm$ 2.05

Table 2: Paired sample T Test for PTA.

Frequency	Statistical measures	Pre-op vs POD 1	Pre-op vs POD 3	Pre-op vs POD 5	Pre-op vs POD 7	Pre-op vs POD 30
0.25 kHz	Mean	-0.183	-0.083	-0.05	-0.5	-0.117
	SD	0.892	0.869	0.852	2.652	1.914
	SEM	0.115	0.112	0.11	0.342	0.247
	Sig. (2-tailed)	0.117	0.461	0.651	0.15	0.639
0.50 kHz	Mean	-0.067	0.017	0.133	-0.133	0.05
	SD	0.861	0.854	0.769	0.812	1.926
	SEM	0.111	0.11	0.099	0.105	0.249
	Sig. (2-tailed)	0.551	0.88	0.185	0.209	0.841

Continued.

Frequency	Statistical measures	Pre-op vs POD 1	Pre-op vs POD 3	Pre-op vs POD 5	Pre-op vs POD 7	Pre-op vs POD 30
1.00 kHz	Mean	-7.267	-6.417	-2.25	-0.833	-0.083
	SD	7.719	7.11	4.973	2.799	1.66
	SEM	0.997	0.918	0.642	0.361	0.214
	Sig. (2-tailed)	0	0	0.001	0.025	0.699
2.00 kHz	Mean	-8.133	-7.383	-3.183	-0.85	-0.15
	SD	7.264	7.825	4.339	2.839	1.956
	SEM	0.938	1.01	0.56	0.367	0.252
	Sig. (2-tailed)	0	0	0	0.024	0.555
4.00 kHz	Mean	-7.583	-6.583	-2.7	-0.417	-0.35
	SD	6.877	6.708	4.767	2.173	2.335
	SEM	0.888	0.866	0.615	0.281	0.301
	Sig. (2-tailed)	0	0	0	0.143	0.25
8.00 kHz	Mean	-5.9	-5.467	-2.633	-0.267	0.083
	SD	6.139	6.077	4.998	2.922	2.25
	SEM	0.793	0.785	0.645	0.377	0.29
	Sig. (2-tailed)	0	0	0	0.482	0.775
Average	Mean	-4.856	-4.319	-1.781	-0.5	-0.094
	SD	4.27	4.24	2.74	1.357	0.957
	SEM	0.551	0.547	0.354	0.175	0.124
	Sig. (2-tailed)	0	0	0	0.006	0.448

Table 3: Pre-operative and post-operative OAE for different frequencies.

Frequency (kHz)	Pre-op (mean $\pm$ SD)	POD 1 (mean $\pm$ SD)	POD 3 (mean $\pm$ SD)	POD 5 (mean $\pm$ SD)	POD 7 (mean $\pm$ SD)	POD 30 (mean $\pm$ SD)
1.00	12.40 $\pm$ 2.30	8.15 $\pm$ 3.79	8.30 $\pm$ 3.74	9.78 $\pm$ 3.22	11.52 $\pm$ 2.25	12.43 $\pm$ 1.98
2.00	12.25 $\pm$ 2.29	7.77 $\pm$ 3.69	7.97 $\pm$ 3.87	9.97 $\pm$ 3.52	11.88 $\pm$ 2.58	12.05 $\pm$ 2.38
4.00	10.87 $\pm$ 2.43	6.48 $\pm$ 3.56	7.05 $\pm$ 4.01	9.05 $\pm$ 3.46	10.13 $\pm$ 2.59	10.45 $\pm$ 2.32
6.00	9.67 $\pm$ 2.38	5.65 $\pm$ 3.51	6.17 $\pm$ 3.81	7.82 $\pm$ 3.47	9.50 $\pm$ 2.64	9.80 $\pm$ 2.46
Average	11.29 $\pm$ 1.88	7.01 $\pm$ 3.50	7.37 $\pm$ 3.68	9.15 $\pm$ 3.02	10.76 $\pm$ 1.99	11.28 $\pm$ 1.76

Table 4: Paired sample T test for OAE.

Frequency	Statistical measures	Pre-op vs POD 1	Pre-op vs POD 3	Pre-op vs POD 5	Pre-op vs POD 7	Pre-op vs POD 30
1.00 kHz	Mean	4.25	4.1	2.617	0.883	-0.033
	SD	3.525	3.718	3.043	1.786	1.248
	SEM	0.455	0.48	0.393	0.231	0.161
	Sig. (2-tailed)	0	0	0	0	0.837
2.00 kHz	Mean	4.483	4.283	2.283	0.367	0.2
	SD	3.377	3.479	2.598	1.904	1.56
	SEM	0.436	0.449	0.335	0.246	0.201
	Sig. (2-tailed)	0	0	0	0.141	0.325
4.00 kHz	Mean	4.383	3.817	1.817	0.733	0.017
	SD	3.479	3.661	3.034	1.593	0.854
	SEM	0.449	0.473	0.392	0.206	0.11
	Sig. (2-tailed)	0	0	0	0.001	0.88
6.00 kHz	Mean	4.017	3.5	1.85	0.167	-0.133
	SD	3.387	3.601	3.282	1.915	1.308
	SEM	0.437	0.465	0.424	0.247	0.169
	Sig. (2-tailed)	0	0	0	0.503	0.433
Average	Mean	4.28333	3.925	2.14167	0.5375	0.0125
	SD	3.15841	3.26749	2.44098	1.07241	0.5072
	SEM	0.40775	0.42183	0.31513	0.13845	0.06548
	Sig. (2-tailed)	0	0	0	0	0.849

Table 5: Correlation between drilling duration and PTA averages/ OAE averages.

Variables	PTA averages		OAE averages	
	Pearson correlation coefficient	Sig. (2-tailed)	Pearson correlation coefficient	Sig. (2-tailed)
Drilling duration vs POD 1	0.645	0	0.696	0
Drilling duration vs POD 3	0.554	0	0.686	0
Drilling duration vs POD 5	0.334	0.009	0.5	0
Drilling duration vs POD 7	0.16	0.221	0.177	0.175
Drilling duration vs POD 30	0.046	0.725	0.148	0.26

DISCUSSION

The present study is an observational prospective study of 60 patients with chronic otitis media with cholesteatoma and normal contralateral ear. The study was to find out the drilling effect of disease ear temporal bone to the opposite ear hearing sensitivity. Drilling of temporal bone is the main component of tympanomastoidectomy in order to eradicate the ear diseases.

Parkin et.al found that simultaneous drilling and suction irrigation generates noise levels ranges from 91 to 108 dB and the cutting burrs up to 9 dB higher than the diamond burrs.¹⁸ Kylen and Arlinger calculated the drill induced noise levels in the cochlea from vibration measurement performed on intact skulls and temporal bones of human cadavers. They conclude the ipsilateral cochlea was exposed to a noise level of 100 dB and the contralateral cochlea to levels 5 to 10 dB lower.⁴ In present study we used cutting burrs and very rarely diamond burrs which is showing effect as temporary threshold shift in both PTA and OAE.

Mastoid surgery may cause noise induced hair cell damage and sensorineural hearing loss with a probability between 1.2 and 4.5 percent.¹⁰

Drill-induced noise can cause sensorineural hearing loss in the contralateral normal hearing ear.¹⁰ The otologic drill is not only the source of the noise, but also a strong vibration generator. During otologic drilling, a strong oscillation is transmitted into the cochlea. Movement of the cochlear sections in the presence of burr noise stimulation can cause more damage to the cochlea than noise alone.¹¹ The sound and vibrations generated by the burr during drilling of the mastoid has evidence that it exceeds a safe level.

As outer hair cells are the initial target of noise- induced cochlear damage, it seems logical to assess hearing in the normal contralateral ear using OAEs and audiometry.¹⁹ Various studies have been published, to see the effect of mastoid drilling on opposite ear hearing sensitivity using high frequency audiometry, PTA electrocochleogram, auditory brainstem response, and OAE measurement.^{3,11,12,20,21}

OAE measurements have the capability to differentiate the mild variations in the cochlea on exposure to noise.²²

The present study reveals the DPOAE significantly helps in measurement of outer hair cells function damaged in mastoidectomy due to drill noise. OAE study have the capability to differentiate the mild variations in the cochlea on exposure to noise. Shenoy et al study in which they had demonstrated a reduction in the DPOAE post operatively in 45 patients' contralateral normal ear and observed maximum change in 2 and 4 kHz frequency.⁴ they observed changes at 2 and 4 kHz and concluded the depiction to be related to the sensitivity of the tonotopical areas of the cochlea to the drilling.

They had concluded DPOAE changes in mastoidectomy patients may be due to the increased permeability of blood supply of stria vascularis with injury of the organ of Corti due to vibration during mastoidectomy.¹¹ Ferber Viart et al noticed similar results in contralateral normal ear using transient evoked OAE.²³

Farzanegan et al found that the noise level in the cochlea is calculated from vibration measurements on intact skulls of human cadavers and temporal bones when a drill is used during mastoid surgery.²⁴

In the present study, patients who underwent mastoidectomy have compromised hearing sensitivity in the diseased ear, either conductive or mixed type, hence the other ear hearing sensitivity is important. Hearing loss which may be temporary or permanent in contralateral ear due to drill induced noise will affect patient's psychological and mental health status for that particular duration.

Jerath et al conducted a study on 25 individuals to see the effect of mastoid drilling with PTA and transitory evoked OAE (TEOAE) on POD 1 and POD 7. They concluded that there are statistically significant effects of drill noise on the inner ear functions on the contralateral ear as detected by TEOAE. However, the effects were not detectable on PTA.²⁵ In present study we observed statistically significant effect of drill noise on the contralateral ear with PTA and DPOAE on POD 1, 3, and 7.

Singh et al evaluated the outer hair function of non-operated ear after mastoid drilling with DPOAE. Total 62 patients underwent mastoidectomy out of which 34 underwent cortical mastoidectomy and 28 underwent MRM. They observed that out of 62 patients in which

DPOAE were present preoperatively, in 30 patients DPOAE was absent immediately after operation. On repeat testing DPOAE were absent in 20 patients after one hour of operation and in 8 patients after one day of operation. On re-evaluation of these 8 patients after one week, all of them had regained the DPOAE. In terms of duration of drilling, 66.6% patients in immediate post-operative period, 90% patients in one-hour post-operative and 100% patients on post-operative day 1, having absent TPOAE had drilling time more than 60 minutes. They concluded that the non-operated ear does have the effect of acoustic and mechanical trauma by vibration transmitted from another side during drilling of the operated ear mastoid bone. This effect is temporary and depends on the duration of drilling also.²⁶

Pal evaluated the effect of drilling on hearing in ear surgery. They had 44 patients with unilateral disease. They measured PTA and OAE in both ears pre-operatively and post-operatively. They concluded that patient developed ipsilateral sensorineural hearing loss and no contralateral hearing loss.²⁷ Our findings are in contrast to the above-mentioned study. With the help of PTA and OAE data of 60 patients we observed temporary threshold shift from POD 1 to POD 7 in contralateral ear.

The 110 patients with CSOM who underwent mastoidectomy were included in Badkar et al study. In this study pre-operative PTA and Bone Conduction Threshold were compared with POD 1, 3, 30 and 90. They concluded that tympanomastoid surgery and drilling during ear surgery can cause significant acoustic trauma and transient sensory hearing loss to the contralateral ear.²⁸ Our finding corroborates with their conclusion as we also observed temporary threshold shift from POD 1 to POD 7 in contralateral ear.

Abtahi et al studied the effect of drill induced noise on hearing in non-operated ear in 23 patients who had undergone mastoidectomy using PTA and DPOAE. They concluded that tympanomastoid surgery and drilling during ear surgery has the potential to cause significant acoustic trauma and transient sensory hearing loss to the contralateral ear which aligns with our study.²⁹

A study was conducted by Latheef et al on 50 patients to evaluate hearing of the contralateral ear before and after mastoidectomy using PTA and DPOAE on POD 1 to POD 7 and follow up after 1 month, 3 months and 6 months. There was an increase in the absence of high frequency DPOAE on the first and second post-operative days, but this increase is higher than that of low frequency DPOAE and gradually returns to normal by 72 hours. The OAE was more sensitive at diagnosing and tracking the progress of affected patients. All affected ears only had temporary post-operative hearing loss in hearing threshold of the contralateral normal ear.³⁰ Our study also correlates with their findings as temporary threshold shift was noticed but we observed a delayed

recovery of POD 7 in contrast to 72 hours observed by the above said study.

The duration of drilling during mastoidectomy were also recorded in the present study and compared with the PTA and DPOAE values. We were able to observe statistically significant relation between time taken for the drilling and the values of PTA and DPOAE. Above observation corroborates with Palva et al study who concluded that hearing loss occurred more frequently and more severely in patients with increased drilling times.³¹ Similar observations were also seen in Shenoy et al. study.³²

Most of the literature confirm that drill induced noise can cause sensorineural hearing loss in a wide range of frequencies. We included the type of mastoidectomy, duration of drilling and used cutting burr most of the time but did not include intra-operative noise measurement produced by drill and suction in contralateral normal ear. These parameters can affect the hearing sensitivity of the normal non-operated ear. Parkin et al study evaluated effects of various variables such as diamond burr, cutting burr, 2 different air drills, with/without suction irrigation. The suction irrigation was the single factor for the highest noise level.¹⁸ In present study we used suction irrigation in each and every case while performing mastoidectomy.

CONCLUSION

Sensorineural hearing loss is more prevalent following modified radical and radical mastoidectomy as compared to canal wall up mastoidectomy. The factors influencing postoperative contralateral ear sensorineural hearing loss are type & size of burr and the duration of burr use, which produced significant amount of noise, vibration and heat. ENT surgeons should use appropriate size and type of burr. The temporary threshold shift in postoperative normal contralateral ear may become permanent if control measures are not taken. ENT surgeons should limit the drilling time during mastoidectomy to minimise the acoustic trauma to the ear. This can be achieved by practising this microsurgery on cadavers.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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