

Ossiculoplasty in 64 patients- A prospective study at tertiary health care Centre**Shivendra Pandey¹, Divya Singh², Bhanu Pratap Singh³, Pragati Sharma^{4*}**¹Assistant Professor, Department of ENT, Hind Institute of Medical Sciences, Safedabad, Barabanki, U.P., India²Associate Professor, Dental Department, Hind Institute of Medical Sciences, Safedabad Barabanki, U.P., India³Associate Professor, Department of ENT, Hind Institute of Medical sciences, Ataria, Sitapur, U.P., India⁴Assistant Professor, Department of ENT, Hind Institute of Medical sciences, Safedabad, Barabanki, U.P., India

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Abstract**Background:** The present study was conducted to determine ossiculoplasty using auto-graft malleus and incus.**Materials & Methods:** The present study was conducted on 64 patients selected for ossiculoplasty of both genders. Based on ossicular defects, the type of ossiculoplasty was planned. **Results:** Age group 0-20 years had 4 males and 3 females, 20-40 years had 8 males and 5 females, 40-60 years had 10 males and 8 females and >60 years had 14 males and 12 females. Pre-operatively mean ABG in age group 0-20 years was 34.50 and post-operatively was 12.94 and ABG gain was 21.56, in age group 20-40 years was 35.72, 12.24 and 23.48 pre-operatively, post-operatively and ABG gain respectively. In age group 40-60 years was 34.65, 13.26 and 21.39 pre-operatively, post-operatively and ABG gain respectively. Incus and stapes were involved in 16 cases, pre-operative ABG (dB) was 38.52 and post-operative ABG (dB) was 17.24, only incus in 34, pre-operative ABG (dB) was 33.60 and post-operative ABG (dB) was 11.58, all involved in 5 cases, pre-operative ABG (dB) was 41.20 and post-operative ABG (dB) was 20.24 and incus and malleus were involved in 9 cases, pre-operative ABG (dB) was 29.62 and post-operative ABG (dB) was 12.06. **Conclusion:** Authors found that maximum gain was achieved with only incus followed by incus and stapes, all involved and incus and malleus.**Keywords:** Incus, Malleus, Ossiculoplasty.

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Introduction

There are five sense organs in the body and auditory is one of the sensations. Any injury to such a vital sensation lead to difficulty in performing function[1]. Chronic otitis media can result into ossicular discontinuity ultimately resulting into hearing loss. It is evident that approximately 62%-80% otology patients experience conductive hearing loss because of ossicular defect[2]. Among various procedures in lack of health education in rural population. Middle ear surgery, reconstruction of the conductive mechanism is most commonly discussed. It was Mat

who performed first myringostapedioplasty (1901). Various researches has been done to look for ideal middle ear implant with the understanding that the middle ear area in chronic ear disease is most likely the main factor in evaluating treatment outcome[3]. Numerous ENT aids are available. The ideal requisite is that it should be capable of reproducing and possibly improve the natural impedance matching system at key hearing frequencies with predictable results[4]. Earlier otologists were relying on autografts and allografts as the ossicular replacement material however, due to the risk of prion disease, allografts use was stopped [5]. In last few years, bio-inert prosthetic materials have emerged as more superior with better outcome. Nowadays, the otologist has a wide range of middle ear implants[6]. The present study was conducted to determine ossiculoplasty using auto-graft malleus and incus.

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Materials & Methods

The present study was conducted in the department of ENT. It comprised of 64 patients selected for ossiculoplasty of both genders. The study was started after obtaining institutional ethical clearance and consent from all patients. Patient information such as name, age, gender etc. was recorded in case history

performa. ENT surgeon performed examination such as otoscopy, tuning fork tests using microscope. Other investigations such as complete blood count, audiogram and ECG were also performed. Based on ossicular defects, the type of ossiculoplasty was planned. Results of the study was collected, aggregated and subjected to statistical analyzed. The level of significance was set below 0.05.

Results

Table 1: Patient distribution based on age and gender

Age groups (Years)	Males	Females
0-20	4	3
20-40	8	5
40-60	10	8
>60	14	12
Total	36	28

Table 1 shows that age group 0-20 years had 4 males and 3 females, 20-40 years had 8 males and 5 females, 40-60 years had 10 males and 8 females and >60 years had 14 males and 12 females.

Table 2: Assessment of air- bone gap

Age groups (Years)	Pre- operative ABG (dB)	Post- operative ABG (dB)	ABG gain (dB)
0-20	34.50	12.94	21.56
20-40	35.72	12.24	23.48
40-60	34.20	13.80	20.40
>60	34.65	13.26	21.39

Table 2 shows that pre- operatively mean ABG in age group 0-20 years was 34.50 and post- operatively was 12.94 and ABG gain was 21.56, in age group 20-40 years was 35.72, 12.24 and 23.48 pre- operatively, post- operatively and ABG gain respectively. In age group 40-60 years was 34.65, 13.26 and 21.39 pre- operatively, post- operatively and ABG gain respectively.

Table 3:Ossicular involvement and air-bone gap

Ossicles	Frequency	Pre- operative ABG (dB)	Post- operative ABG (dB)	ABG gain (dB)
Incus and stapes	16	38.52	17.24	21.28
Only incus	34	33.60	11.58	22.02
All involved	5	41.20	20.24	20.96
Incus and malleus	9	29.62	12.06	17.56

Table 3, Fig 1 shows that incus and stapes were involved in 16 cases, pre- operative ABG (dB) was 38.52 and post- operative ABG (dB) was 17.24, only incus in 34, pre- operative ABG (dB) was 33.60 and post- operative ABG (dB) was 11.58, all involved in 5 cases, pre- operative ABG (dB) was 41.20 and post-

operative ABG (dB) was 20.24 and incus and malleus were involved in 9 cases, pre- operative ABG (dB) was 29.62 and post- operative ABG (dB) was 12.06. Maximum gain was achieved with only incus followed by incus and stapes, all involved and incus and malleus.

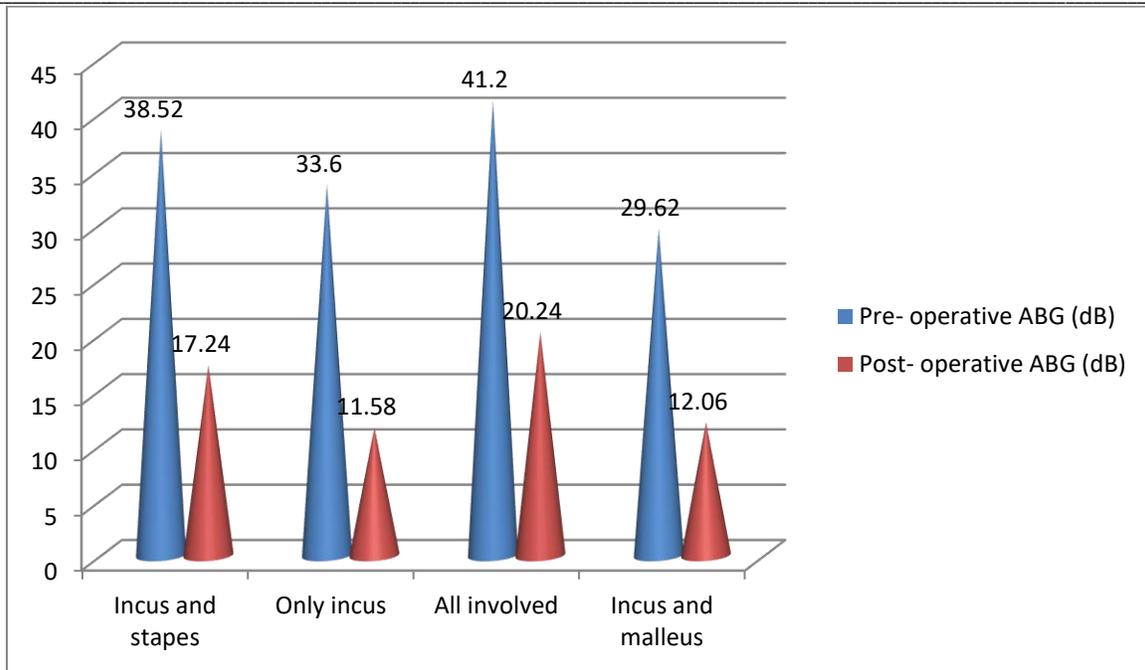


Fig 1:Ossicular involvement and air-bone gap

Discussion

Numerous materials has been invented to re-create the middle ear sound-conducting mechanism[7]. Both biologic and alloplastic materials have been used for ossicular substitution or reconstruction with the biologic materials including autograft or homograft ossicles, cortical bone, teeth, and cartilage. In many surgeries, incus body is the material of graft which resulted into better outcome by reshaping the fit between the manubrium of the malleus and the stapes capitulum[8]. The most commonly used materials for ossicular reconstruction today are the Alloplastic variety, which can be classified as biocompatible, bioinert, or bioactive[9]. Most of the grafts have their advantages and disadvantages. The selection of material should be focused on compatibility, ease of configuring the prosthesis during surgery, surgeon experience and the environment in which the prosthesis is going to be placed[10]. The present study was conducted to determine ossiculoplasty using auto-graft malleus and incus. In this study, age group 0-20 years had 4 males and 3 females, 20-40 years had 8 males and 5 females, 40-60 years had 10 males and 8 females and >60 years had 14 males and 12 females. Chavan et al[11] conducted a study on 50 patients who underwent ossiculoplasty over the period of 3 years. It was found that the average post-operative air bone gap was 12.92 dB. The mean post-operative ABG was within 20 dB in

both primary and revision cases. Average air-bone closure in patients with normal mucosa was 32.1 dB and that of adhesive mucosa was 18 dB. Results found a significant improvement in post-operative air-bone closure. We found that pre- operatively mean ABG in age group 0-20 years was 34.50 and post- operatively was 12.94 and ABG gain was 21.56, in age group 20-40 years was 35.72, 12.24 and 23.48 pre- operatively, post- operatively and ABG gain respectively. In age group 40-60 years was 34.65, 13.26 and 21.39 pre- operatively, post- operatively and ABG gain respectively. Chavan et al[12] did a prospective study in ENT department on 80 patients who underwent ossiculoplasty using total ossicular replacement prosthesis, partial ossicular replacement prosthesis and refashioned incus. Results showed that the maximum patients were of middle age with moderate conductive hearing loss. Most susceptible ossicle was incus. There was 80% success rate with an average change of 15.76 dB in ABG. We found that incus and stapes were involved in 16 cases, pre- operative ABG (dB) was 38.52 and post- operative ABG (dB) was 17.24, only incus in 34, pre- operative ABG (dB) was 33.60 and post- operative ABG (dB) was 11.58, all involved in 5 cases, pre- operative ABG (dB) was 41.20 and post- operative ABG (dB) was 20.24 and incus and malleus were involved in 9 cases, pre- operative ABG (dB) was

29.62 and post-operative ABG (dB) was 12.06. The shortcoming of the study is small sample size.

Conclusion

Authors found that maximum gain was achieved with only incus followed by incus and stapes, all involved and incus and malleus.

References

1. Mostafa BE, Fiky LE, Hassan O. Functional results in ossiculoplasty with different titanium prostheses. *Egyptian J Ear, Nose, Throat All Sci.* 2013;14(2):79–84.
2. Zollner F. The principles of plastic surgery of the sound conducting apparatus. *J Laryng.* 1955;69:637.
3. Nikolaou A, Bourikas Z, Maltas V, Aidonis A. Ossiculoplasty with the use of autografts and synthetic prosthetic materials: a comparison of results in 165 cases. *J Laryngol Otol.* 1992; 106(8):692-4.
4. Zheng C, Guyot JP, Montandon P. Ossiculoplasty by interposition of a minor columella between the tympanic membrane and stapes head. *Am J Otol.* 1996;17(2):200-2.
5. Chavan SS, Jain PV, Vedi JN, Rai DK, Kadri H. Ossiculoplasty: A Prospective Study of 80 Cases. *Iran J Otorhinolaryngol.* 2014;26(76):143–50.
6. O'Reilly RC, Cass SP, Hirsch BE, Kamerer DB, Bernat RA, Poznanovic SP. Ossiculoplasty Using Incus Interposition: Hearing Results and Analysis of the Middle Ear risk Index. *Otol Neurotol.* 2005;26:853–8.
7. Mishiro Y, Sakagami M, Kitahara T, Kakutani C. Prognostic factors of long-term outcomes after ossiculoplasty using multivariate analysis. *Eur Arch Otorhinolaryngol.* 2010;267(6):861-5. 8
8. Iurato S, Marioni G, Onofri M. Hearing Results of Ossiculoplasty in Austin-Kartush Group A Patients. *Otol & Neurotol.* 2001;22:140–4.
9. Naderpour M, Jabbari-Moghaddam Y, Radfar R, Zarrintan S, Pourfathi H. Results of single stage ossicular reconstruction by incus transposition in patients with chronic otitis media. *Rawal Med J.* 2007;32(2):179-83.
10. Ceccato SB, Maunsell R, Morata GC, Portmann D. Comparative results of type II ossiculoplasty: incus transposition versus titanium PORP (Kurz)]. *Rev Laryngol Otol Rhinol (Bord).* 2005; 126(3):175-9.
11. Chavan RP, Ingole SM, Birajdar SN. Ossiculoplasty: study of hearing results in 50 patients. *Int J Otorhinolaryngol Head Neck Surg* 2017; 3:216-21.
12. Chavan SS, Jain PV, Vedi JN, Kumar Rai D, Kadri H. Ossiculoplasty: a prospective study of 80 cases. *Iranian journal of otorhinolaryngology.* 2014;26(76):143.

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