



## Research Article

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# To assess the hearing improvement in patients of Chronic Otitis Media Tubotympanic type post tympanoplasty

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## Abstract

**Aim:** To determine hearing improvement in type- 1 tympanoplasty by comparing mean preoperative air bone gap with mean postoperative AB gap. **Material and method:** Patients clinically diagnosed as 75 cases of Chronic Suppurative Otitis Media Tubotympanic Type Disease presenting to the ENT OPD of Chhatrapati Shivaji Hospital attached to Subharti Medical College, Meerut were taken up for study. Detailed clinical examination and history was taken. Pure tone audiometry was conducted, hearing loss and mean AB Gap was noted pre-operatively. X-Ray mastoid B/L Schuller's view was done and findings were noted. Tympanoplasty type 1 with or without mastoidectomy was performed. Cortical mastoidectomy with type 1 Tympanoplasty was performed in patients having granulations & polypoidal middle ear mucosa along with sclerotic mastoid. All these patients were followed up post-operatively at 6 weeks. The status of graft uptake was noted. Pure tone audiometry was performed. Hearing loss and mean AB Gap results were compared with pre-operative findings. **Results:** In our study out of 75 patients, 33 (44%) patients were affected with Right ear and 42 (56%) patients were affected with Left ear. Hearing loss was the chief complaint in all 75 patients (100%) followed by blocking sensation. Post operatively 58 (77.33%) patients had normal hearing followed by 16 (21.33) patients who had mild hearing loss. Only 1 (1.33%) patient had moderately severe hearing loss. Pre-operatively, mean AB Gap was 46.62+/-7.89dB while post-operatively mean AB Gap was 23.43+/-5.52dB with statistically significant difference as p<0.05. **Conclusion:** In our study, the post-operative Mean AB Gap was improved significantly as compared to pre-operative mean AB Gap.

**Keywords:** COM, Tympanoplasty, Tympanic Membrane, AB Gap.

## INTRODUCTION

Introduction: Chronic otitis media (COM), a common condition in otorhinolaryngology, it is characterized by an inflammatory process of the mucoperiosteal lining of the middle ear space and mastoid, characterized by chronic, intermittent, or persistent discharge through a perforated tympanic membrane [1]. The incidence of chronic otitis media (tubotympanic type) is high in developing countries because of lower socioeconomic standards, poor nutrition and lack of health education [2]. It is a major cause of deafness in India. There are two types of Chronic Suppurative Otitis Media i.e. Tubotympanic (safe or mucosal) and B) Atticoantral Type (Unsafe or squamosal) [3].

Chronic Tubotympanic Suppurative otitis media can be managed in two ways, conservative and surgical management. The aim of middle ear surgery is reduction in the patient's hearing disability, not just closure of the air bone gap. Small perforations usually heal spontaneously but surgery is required when the edges of the perforation are covered by stratified squamous epithelium, a perforation becomes permanent and does not heal spontaneously [4].

Tympanoplasty is the surgical operation consists of both eradication of middle ear disease and reconstruction of hearing mechanism including tympanic membrane and ossicles [5]. Type-1 tympanoplasty is performed when there is tympanic membrane perforation without any ossicular damage [6]. Tympanoplasty with or without mastoidectomy is indicated for chronic ear disease process such as tympanic membrane perforation resulting from previous middle ear infections, atelectasis of tympanic membrane, retraction pocket, cholesteatoma, tympanosclerosis, and mastoid granuloma [7].

This is a Prospective and observational study which is focused on Tympanoplasty and reconstruction of the tympanic membrane. The study focused on reconstruction of tympanic membrane and inspection of ossicular apparatus by tympanoplasty alone or tympanoplasty with mastoid surgeries. The aim of the present study was to determine hearing improvement in type- 1 tympanoplasty by comparing mean

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preoperative air bone gap with mean postoperative AB gap.

## MATERIAL AND METHOD

Patients clinically diagnosed as 75 cases of Chronic Suppurative Otitis Media Tubotympanic Type Disease presenting to the ENT OPD of Chhatrapati Shivaji Hospital attached to Subharti Medical College, Meerut were taken up for study. Subjects were included and excluded according to the following criteria:

### Inclusion criteria

1. Patient having Inactive mucosal type of chronic otitis media.
2. Patients having pure conductive hearing loss.
3. In age group of 10 years to 40 years.

### Exclusion criteria

1. Patients suffering from Atticoantral or Squamosal type of chronic otitis media or with complications.
2. Patient having mixed/ Sensorineural hearing loss, drug history.
3. Age less than 10 years and more than 40 years.
4. Patients having subtotal & total perforation.
5. History of previous ear surgery or trauma.

Detailed clinical examination and history was taken. Pure tone audiometry was conducted, hearing loss and mean AB Gap was noted pre-operatively. X-Ray mastoid B/L Schuller's view was done and findings were noted. Tympanoplasty type 1 with or without mastoidectomy was performed. Cortical mastoidectomy with type 1 Tympanoplasty was performed in patients having granulations & polypoidal middle ear mucosa along with sclerotic mastoid. All these patients were followed up post-operatively at 6 weeks. The status of graft uptake was noted. Pure tone audiometry was performed. Hearing loss and mean AB Gap results were compared with pre-operative findings.

### Clinical tests –

Tuning fork test – Rinne's test, Weber test & Absolute bone conduction test were done with 256Hz, 512Hz & 1024Hz tuning forks.

- A. Nose, throat and neck examination.
- B. Indirect Laryngoscopy and posterior Rhinoscopy.

### Investigations

- Patients were then subjected to pure tone audiometry.
- Pure tone audiometry was done using Arphy -2001 Audiometer. Test was done in acoustically treated room. Both air & bone conduction were tested. 5 up & 10 down method was used to obtain threshold frequency.

Degree of deafness was graded according to **WHO classification, 1980:**

0 to 25 dB – Normal hearing

26 to 40dB – Mild deafness

41 to 55 dB– Moderate deafness

56 to 70 dB– Moderately Severe deafness

71 to 90 dB– Severe deafness

>90 dB– Profound deafness

Thereafter, patients were then followed up in the post-operative period to study the graft status or graft success rate and post-operative hearing gain was studied by doing pure tone audiometry. Average follow up period was 6 weeks.

### Statistical analysis

Statistical analysis was done using SPSS software 24.

## RESULTS

Out of 75 patients, 33 patients (44%) were males and 42 patients (56%) were females. Maximum number of patients was found in the age group of 21-30 years (52%) followed by 31-40 years (34.7%). In our study out of 75 patients, 33 (44%) patients were affected with Right ear and 42 (56%) patients were affected with Left ear. Hearing loss was the chief complaint in all 75 patients (100%) followed by blocking sensation was the complaint in 6 patients (8%) and tinnitus was the complaint in 4 patients (5.4%).

In our study, the condition of middle ear mucosa observed preoperatively in which 60 patients had healthy (pink), 7 patients had Granulations (Red), 8 patients had polypoidal (Pale) middle ear mucosa (table 1). In our study all patients had Conductive Deafness.

**Table 1:** Condition of Middle Ear Mucosa (Pre-Operatively)

Middle Ear Mucosa	Colour	No of Patients	%
Healthy	Pink	60	80
Granulations	Red	7	9.4
Polypoidal	Pale	8	10.6
Total		75	100

In our study, in maximum number of patients i.e. 59 (78.67%) type 1 tympanoplasty was done and cortical mastoidectomy with type 1 tympanoplasty was done in 16 (21.33%) patients. In our study, the number of patients with complete graft uptake was 68 (90.67%) and with residual perforation were 7 (9.33%) as shown in table 2.

**Table 2:** Type of Surgery and surgical outcome among the study subjects

Type of Surgery	No of Patients	%
Type 1 Tympanoplasty	59	78.67%
Cortical mastoidectomy + Type 1 Tympanoplasty	16	21.33%
<b>Graft status</b>		
Complete graft uptake	68	90.67
Residual perforation	7	9.33
Total	75	100

In our study, the maximum patients had Moderate (44 patients, 58.66%) type hearing loss followed by Mild (31patients, 41.33%) hearing loss pre-operatively. Post operatively 58 (77.33%) patients had normal hearing followed by 16 (21.33) patients who had mild hearing loss. Only 1 (1.33%) patient had moderately severe hearing loss (table 3).

Pre-operatively, patients with large central perforation were 52 in number and their mean AB Gap was 46.62+/-7.89dB while post-operatively mean AB Gap among patients with large central perforation was 23.43+/-5.52dB with statistically significant difference as p<0.05 (table 4).

**Table 3:** Comparison of Hearing loss Pre and post operatively)

Degree of hearing loss	Pre-operatively		Post-operatively	
	N	%	N	%
Normal	0	0	58	77.33
Mild (26 to 40dB)	31	41.33	16	21.33
Moderate (41 to 55dB)	44	58.66	01	1.33
Moderately Severe (56 to 70dB)	0	0	0	0
Severe (71 to 90dB)	0	0	0	0
Profound (91dB +)	0	0	0	0
Total	75	100	75	100

**Table 4:** Pre and post operatively Air Bone Gap

Size of perforation	N	Pre-Op (In dB)	Post-operative mean AB Gap (In dB)	Mean AB Gap closure (in dB)	p-value (Z-test)
Small central	5	34.43±8.08	19.22±5.72	15.21	.0032*
Medium central	18	36.05±8.05	15.13 ± 2.79	20.92	.0019*
Large central	52	46.62 ± 7.89	23.43± 5.52	23.19	.0011*

\*: statistically significant

## DISCUSSION

The present study was conducted among clinically diagnosed cases of Chronic Suppurative Otitis Media (mucosal/TTD) in age group of 10 to 40 years in both sexes, with the aim of studying the preoperative clinical findings, audiological assessment & X-Ray Mastoid B/L Schuller's View and post-operative success of graft and hearing improvement after tympanoplasty. We have used temporalis fascia as a graft material.

In our study in CSOM (Mucosal/TTD), the age group ranged from 10 to 40 years. Maximum number of patients i.e. 39 were found in the age group of 21-30 years (52%), which is similar to the study done by Jain K et al<sup>8</sup> in which age group ranged from 15 to 40 years. In the study conducted by Jain K et al<sup>8</sup>, maximum number of patients i.e. 16 cases were in the age group of 20-29 years. In the study conducted by Dr.V.P.Narve et al<sup>9</sup>, maximum number of patients were found in age group of 20-40 years. In the study conducted by Latoo et al<sup>10</sup>, maximum number of patients were in the age group of 20-29 years. Varshney S et al<sup>11</sup> found that the most commonly affected age group was between 16-25 years.

In our study, COM (mucosal/TTD) showed female preponderance. There were 33 male patients (44%) and 42 female patients (56%). The male to female ratio was 1:1.2. In the study conducted by Gaurav Batni et al<sup>9</sup>, there were 41 (41%) male patients and 59 (59%) female patients. The male to female ratio was 1:1.4. In the study of Narve et al<sup>9</sup>, there were 38 (38%) patients male and 62 (62%) patients were female. In the study conducted by Jain K et al<sup>8</sup>, there were 24 (53.3%) male and 21 (46.66%) were female. In the study conducted by Latoo et al<sup>10</sup>, the male and female ratio was 1.2:1. It was noted in many studies that the male to female ratio was similar to our study, whereas males were found to be more affected than females.

In our study, the main presenting complaint was hearing loss in all patients (100%), blocking sensation in 6 patients (8%) and tinnitus in 4 patients (5.4%) which is in accordance with the study conducted by Latoo et al<sup>10</sup> in which decreased hearing was the presenting complaint in all the patients (100%). According to the selection criteria we had taken patients with inactive mucosal type of chronic otitis media. Hence, their presenting complaints were hearing loss along

with blocking sensation and tinnitus. Varshney S et al<sup>11</sup> did a similar study where primary complaints of the patients was ear discharge in 100% patients and hearing loss in 88.67% patients. This is in accordance with Sade et al<sup>12</sup> who found ear discharge was the first symptom in 62.0% of the cases and hyperacusis in 11.0% cases.

In our study, 31 patients (41.33%) had mild degree of hearing loss, 44 (58.67%) patients had moderate hearing loss. None of the patients had Moderately Severe, Severe & Profound hearing loss. The possible reason for majority of patients being presented with mild and moderate hearing loss was that all the patients had central perforation and intact ossicular chain was found pre-operatively. Patients with sensorineural hearing loss were excluded. According to Latoo MA et al<sup>10</sup>, pre-operative pure tone audiometric calculations in the subjects showed 29 (48.33%) patients had mild degree of hearing loss, 18 (30.0%) patients had moderate degree of hearing loss and 10 (16.67%) patients had moderately severe hearing loss. In our study all patients had conductive hearing loss which was assessed by tuning fork test, which was seen in 100% patients. The cause of conductive loss was due to loss of conductive mechanism because of tympanic membrane perforation. Audiological assessment i.e. pure tone audiometry (PTA) was done in all of the patients of COM (mucosal/TTD) and were found to have pure conductive hearing loss.

In our study, 68 out of 75 patients had intact and completely healed grafts at 6 weeks post operatively (success rate of 90.6%). In the study conducted by Glasscock et al<sup>13</sup>, the graft uptake rate was 93%. In the study conducted by Kripa Dangol and Rakesh Prakash Shrivastav<sup>14</sup>, the graft uptake rate was 83.1% after 1 year follow up. In the study conducted by Jackler and Schindler<sup>15</sup>, the graft uptake rate was 85.4%. It was noted in many studies that the graft uptake rate was more than 90% in accordance with our study.

After comparing the pre & post-operative AB Gap findings, it was found in our study that mean AB Gap closure was 15.21dB in patients with small central perforation, 20.92dB in medium central perforation and 23.19dB in large central perforation. P value was significant i.e. <0.01. In the study conducted by V.P. Narve et al<sup>9</sup>, the mean gain achieved for large central perforation was 15.67dB, for medium central perforation was 12.75dB and for small central perforation was 7.39dB respectively with p value of 0.00. In the study conducted by Gaurav Batni and Goyal R<sup>16</sup>, the post-operative mean air bone gap was 11.60+/-7.70dB, whereas the mean gain in air bone gap was 11.94+/-7.88dB. In the study conducted by Kripa Dangol and Rakesh Prakash Shrivastav<sup>14</sup>, the mean air bone gap was 21.18dB with p value of <0.001. Adequate hearing has been obtained in significant percentage of cases and the results are comparable to those of other authors.

## CONCLUSION

In our study, the post-operative Mean AB Gap was improved significantly as compared to pre-operative mean AB Gap. So this study concludes that after careful selection of the patients and meticulous surgical technique by the surgeons should achieve successful closure of the perforation in more than 90.67% of cases with significant hearing improvement in more than 90% of cases.

## Conflict of Interest

None declared.

## Acknowledgement

None declared.

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