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Original Research Article

# A Comparative Evaluation between Tympanoplasty with or Without Cortical Mastoidectomy

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Yavatmal, Maharashtra, India**\*Article History:****Received:** 19/07/2017**Revised:** 25/07/2017**Accepted:** 26/07/2017**DOI:** <https://doi.org/10.7439/ijbar.v8i7.4317>**Abstract****Aims and Objectives:** To compare the results of tympanoplasty alone and tympanoplasty with cortical mastoidectomy in chronic suppurative otitis media (CSOM) patients in terms of graft uptake, perforation closure and improvement in hearing.**Method:** The study enrolling total 60 patients of either sex, age between 15 to > 45 years and were divided in two equal groups. Group A operated by type 1 tympanoplasty alone and group B operated by type 1 tympanoplasty with cortical mastoidectomy. The graft uptake rate and hearing improvement was compared between these two groups based on follow up and repeat audiogram on 12<sup>th</sup> postoperative week.**Results:** In the present study, majority of patients were in the age group of 26-35 years with female predominant by male to female ratio of 1: 3.6. Graft uptake success rate were more in group B (93.3 %) than in group A (90 %). Three months after the surgery, 22 (73.33%) patients showed hearing improvement in group A and 25 (83.3%) patients in group B which was not statistically significant.**Conclusion:** The graft uptake and hearing improvement were clinically better in group B but difference in two groups was statistically insignificant. Combining cortical mastoidectomy with tympanoplasty does not give additional benefit in terms of hearing improvement or graft uptake but ABC closure after 3 months of surgery was significantly better in group B.**Keywords:** Tympanoplasty, Cortical mastoidectomy, Chronic suppurative otitis media, Graft uptake, Perforation closure.**1. Introduction**

Among the various causes of ear diseases, chronic suppurative otitis media is the major disorder in our country. It is the chronic inflammation of the middle ear cleft which is composed of Eustachian tube, hypotympanum, mesotympanum, epitympanum, aditus and mastoid air cells. It presents with recurrent ear discharge through tympanic perforation [1]. The prevalence surveys which vary widely in definition and sampling methods show that the global burden of illness from CSOM involves 65-330 million individuals with draining ears, 60% (39-200 million) of whom suffer from significant hearing impairment [2].

Standard treatment of CSOM is conservative management with aural toilet, topical antibiotics, systemic antibiotics and dry ear precautions [3]. In those who do not

resolve or do not result in spontaneous healing of tympanic membrane with conservative measures, surgical intervention is done. Surgical intervention for safe/tubotympanic/Non cholesteatomatous CSOM is tympanoplasty [4]. The two opposing demands of tympanoplasty namely removal of all disease process and at same time trying to maintain as much of normal tissue as possible to facilitate reconstruction of hearing mechanism is a demanding task. Holmquist and Bergstrom first suggested that mastoidectomy improves the chance of successful tympanoplasty for patient with non cholesteatomatous chronic otitis media. They mentioned that creation of an aerated mastoid enhances success in patients with poor tubal function or a small mastoid air cell system [5].

The surgical treatment of CSOM is still controversial. It is well accepted that the main purpose of operation is to obtain a permanently dry ear and close the perforation. Tympanoplasty with mastoidectomy has been identified as an effective method of treatment of chronic ear infection resistant to antibiotic therapy, but the effect of mastoidectomy on patients without evidence of active infectious disease remains highly debated and unproven [6]. There are three opinions in this issue. The first is that mastoidectomy is useful for both infected and dry ears [7]. The second is that mastoidectomy is useful for infected ears, but not for dry ears [8]. The third is that mastoidectomy is not useful for either infected or dry ears [9]. Whether mastoidectomy is useful with tympanoplasty for chronic otitis media (COM) remain controversial.

An attempt was made in this study to analyze the role of cortical mastoidectomy in the surgical outcome of tympanoplasty.

## 2. Material and Method

This prospective, randomized, single blinded interventional study was conducted on 60 patients of either sex, age between 15 to > 45 years, in the Ear, Nose and Throat Out Patient Department, over a period of two years. The study included patients having central perforation with minimum of six weeks elapsed since last episode of ear discharge with mild to moderate conductive hearing loss, normal cochlear functions requiring Type I tympanoplasty with good Eustachian tube function and no evidence of infection in nose, paranasal sinuses, nasopharynx and throat, X ray Mastoid Schuller's view suggestive of sclerotic mastoid in above patients. Whereas exclusion criteria included patients having granulation tissue, cholesteatoma or polyp in the ear prior to surgery, ossicular destruction or requiring any other type of tympanoplasty other than type I, multiple tympanic membrane perforations total or marginal perforation of pars tensa, complications of otitis media, patients with aged below 12 years, patients having mixed hearing loss or sensor neural hearing loss, traumatic perforation and having immunocompromised status.

The patients were randomized in two groups of 30 patients in each group. Group A patients underwent tympanoplasty and group B patients underwent cortical mastoidectomy with tympanoplasty. A detailed history, general, systemic and ENT examination and all relevant investigations including hematological investigations, X-ray Mastoid Schuller's view, X-ray PNS Water's view, HRCT temporal bone (if needed), Pure Tone Audiometry were done for all the patients.

Any infection of sinuses, tonsils or adenoids was treated. All cases were subjected to routine preanaesthetic checkup. Group A patients were operated under local

anesthesia with intravenous sedation while group B were operated under general anesthesia. Tympanoplasty and cortical mastoidectomy was done in all patients via postaural approach. Temporalis fascia was used as a graft material and graft was placed by underlay technique. End point of the study was considered by two points, first, dry ear with graft uptake at the end of three months, and second, post-operative hearing improvement. Data obtained was analyzed according to Chi square test, Paired and Unpaired t- test.

## 3. Observations and Results

Sixty patients were selected for the study, divided into Group 'A' and Group 'B'. In Group 'A' there were 83.33% females and 16.67% males whereas in the group 'B' there was 73.33 % females and 26.67% males. The male: female ratio was 1: 3.6. All patients were of age between 15 to >45 years and most of them were in the age group of 26-35 years (Table 1).

**Table 1: Age distribution of patients**

| Age groups (years) | Group A     | Group B     | P value |
|--------------------|-------------|-------------|---------|
| 15 to 25           | 10 (33.33%) | 8 (26.67%)  | 0.752   |
| 26 to 35           | 12 (40%)    | 10 (33.33%) |         |
| 36 to 45           | 6 (20%)     | 9 (30%)     |         |
| > 45               | 2 (6.67%)   | 3 (10%)     |         |

Majority [37 (61.67%)] of patients were affected on left side among them 20 (66.67%) from group A and 17(56.67%) from group B whereas right side was affected in total 23 cases (38.33%) among them 10 (33.33%) from group A and 13 (43.33%) from group B, (P value-0.426).Size of perforation and degree of hearing loss was statistically insignificant in both the groups, (Table 2).

**Table 2: Size of perforation and Preoperative hearing loss**

| Size of perforation                | Group A     | Group B     | Total       | P value |
|------------------------------------|-------------|-------------|-------------|---------|
| Large                              | 9 (30%)     | 8 (26.67%)  | 17 (28.33%) | 0.870   |
| Moderate                           | 11 (36.67%) | 13 (43.33%) | 24 (40%)    |         |
| Small                              | 10 (33.33%) | 9 (30%)     | 19 (31.67%) |         |
| <b>Degree of hearing Loss (dB)</b> |             |             |             |         |
| Mild (26-40)                       | 9 (30%)     | 13 (43.33%) | 22 (36.67%) | 0.284   |
| Moderate (41-60)                   | 21 (70%)    | 17 (56.67%) | 38 (63.33%) |         |

Postoperatively, after 3 months it had been observed that graft uptake was seen in total 55 (91.67 %) cases of both the groups. In group A, 27 (90%) had intact graft and in group B 28 (93.33%) cases had intact graft. Difference between two groups was not statistically significant, (Table 3).

**Table 3: Graft uptake after 3 months**

| Graft         | Group A  | Group B     | Total       | P value |
|---------------|----------|-------------|-------------|---------|
| Intact graft  | 27 (90%) | 28 (93.33%) | 55 (91.67%) | 0.082   |
| Graft failure | 3 (10%)  | 2 (6.67%)   | 5 (8.33%)   |         |

At the end of 3 months, hearing improvement was seen in 47 (78.33 %) cases out of which 22 (73.33 %) cases were from group A and 25 (83.33%) cases were from group B. In 13 (21.67 %) cases out of 60 there was no improvement in hearing which includes 2 static and 11 worsened hearing. When comparing two groups, there was no statistically significant difference observed (Table 4). But when ABG closure after 3 months of surgery was compared, it was significantly better in group B (Table 5).

**Table 4: Overall hearing improvement after 3 months**

| Hearing status | Group A        | Group B        | Total          | P value |
|----------------|----------------|----------------|----------------|---------|
| Improved       | 22<br>(73.33%) | 25<br>(83.33%) | 47<br>(78.33%) | 0.347   |
| Not improved   | 8<br>(26.67%)  | 5<br>(16.67%)  | 13<br>(21.67%) |         |

**Table 5: Air bone gap closure after 3 months of surgery**

| Groups  | Mean preoperative ABG | Mean postoperative ABG | P value |
|---------|-----------------------|------------------------|---------|
| Group A | 38.6 ± 7.77           | 35.62 ± 10.08          | 0.015   |
| Group B | 36.49 ± 10.10         | 30.36 ± 8.77           | < 0.001 |

## 4. Discussion

Chronic suppurative otitis media represents the most common disease of the middle ear cleft. Tympanoplasty with or without mastoidectomy is performed to eradicate middle ear disease and reconstruct the conductive hearing mechanism. Mastoid factors include the extent of mastoid pneumatization and the presence of inflammatory disease in the mastoid [10]. But there are differing opinions regarding doing mastoidectomy with tympanoplasty in these patients.

In the present study, the cases selected were between 15 years to more than 45 years. Patients aged between 26-35 were more in the study group i.e. 22 patients (36.67%). 18 (30%) patients were found in the age group of 15-25 years, 15 (25%) patients in age group of 36-45 years and 5 (8.33%) patients were among age group of >45 years. Our results were comparable with other studies [11-13]. Females were more in the study group, 25 patients (83.33%) in group A and 22 patients (73.33%) in group B. This correlates with study of Lasisi *et al* [13] in which male to female ratio was 2: 3. There is no definitive evidence for the higher incidence in the female patients in the literature. Probable poor socio economic status, overcrowding in the residing places and close contact with children having upper respiratory tract disease, and higher incidence of CSOM

discharge during pregnancy could be the reasons for higher female preponderance.

Left ear was operated more i.e. 20 cases (66.67%) in group A and 17 cases (56.67%) in group B. We couldn't find any reason for more involvement of left ear. Small central perforation was seen in 19 patients (31.67%), medium sized perforation was found in 24 (40%) patients and large central perforation was seen in 17 (28.33%). We didn't come across any subtotal perforation during study of all these selected 60 patients. Our results were comparable with previous studies [14-16]. The maximum number of patients from both the groups was having moderate conductive hearing loss i.e. 41 – 60 decibel and all over patients included in the study had maximum conductive hearing loss up to 50 decibel. Though according to WHO moderate conductive hearing loss ranges from 41 – 60 decibel, maximum hearing loss in tympanic membrane perforation without ossicular chain involvement ranges from 40 – 50 decibel [17]. In our study middle ear mucosa was normal in 100% of patients and no pathology like aditus block was found in antrum.

Temporalis fascia was used in every case because it is thin but tough, can be obtained in same incision, has low O<sub>2</sub> demand i.e. Low metabolic rate, after healing looks like normal TM [18]. Total 27 cases (90%) from group A and 28 cases (93.33%) from group B were having graft in situ at the end of 3 months. In total 5 patients (8.33%) graft was displaced. So our results were comparable with other studies [9,12,13,19].

Aim of the study was to assess hearing improvement and graft uptake at the end of 3 months of surgery. The hearing improvement was 73.33% in group A and 83.33 % in group B. In type 1 tympanoplasty alone the surgical success rate dropped to 80-75% but there was more closure of AB gap (6.70dB) indicating greater degree of improvement of hearing. Krishnan *et al* [19] reported 75% postoperative hearing gain in both groups. In study by Mishiro *et al* [9] hearing improvement was 90.4% and 81.6% in patients underwent tympanoplasty alone and with cortical mastoidectomy respectively. In a study conducted by Saha *et al* [20], Type 1 tympanoplasty with cortical mastoidectomy showed excellent surgical success rate (100%) but lesser degree of improvement of hearing.

## 5. Conclusion

Graft uptake in patients of group A was 90 % and that of group B was 93.3 %. Hearing improvement following type 1 tympanoplasty alone was 73.3 % and type 1 tympanoplasty with cortical mastoidectomy was 83.3 %. Results regarding both graft uptake and hearing improvement were clinically better in group B but difference in two groups was statistically

insignificant. Combining cortical mastoidectomy with tympanoplasty does not give additional benefit in terms of hearing improvement or graft uptake but ABG closure after 3 months of surgery was significantly better in group B.

Our study was with limited patients and time bound so shows limited advantage of cortical mastoidectomy over type 1 tympanoplasty alone. Longer duration and large sample size will definitely give established result.

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