

## ORIGINAL RESEARCH

**Influence of Otorrhoea and Ossicular Condition on Tympanoplasty Outcomes****<sup>1</sup>Dr. Shivendra Pandey, <sup>2</sup>Dr. Bhanu Pratap Singh, <sup>3</sup>Dr. Divya Singh, Dr. Bharti Tyagi**<sup>1</sup>Associate Professor, Department Of Ent Hind Institute Of Medical Sciences Safedabad, Barabanki  
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**ABSTRACT****Background:** The primary aim of this study was to evaluate how otorrhoea, ossicular condition, and the state of the middle ear influence both anatomical and functional outcomes in individuals who undergo tympanoplasty, with or without mastoidectomy, as a treatment for chronic otitis media mucosal disease.**MATERIALS AND METHODS:** This prospective study involved 200 patients presenting with otological issues, such as otorrhoea and hearing loss. Each patient underwent a comprehensive assessment that included a general physical examination, otoneurological evaluation, and hearing assessment through pure-tone audiometry before their surgical procedure. In accordance with the Medical Evaluation Research Instrument (MERI) guidelines, patients were evaluated for specific factors both before and during the surgery. After the procedure, follow-up assessments were conducted at the 3-month and 6-month marks to determine the success of the surgery in terms of structural outcomes (graft take-up) and functional improvements (hearing enhancement).**RESULTS:** The most frequently reported complaint among patients was otorrhoea, which was observed in 46% of cases. When applying Belluci's classification of otorrhoea, it was found that the majority of patients (52%) had a dry ear, while 42% presented with wet ears, and a smaller portion (6%) had persistently wet ears. In accordance with the Austin-Kartush classification, 80 patients exhibited an intact ossicular chain, 46 patients had defects in the incus, and 37 patients showed defects in both the malleus and incus, as well as the stapes and incus. Notably, a significant majority, 70% of the patients, had a normal middle ear status, whereas 30% of them had middle ear effusion.**CONCLUSIONS:** The success of tympanoplasty appears to be influenced by the presence of otorrhoea and the status of the middle ear cleft, with these factors playing a notable role. However, the status of the ossicles did not demonstrate a significant impact on the overall outcome of the procedure.**Keywords:** Otorrhoea, Ossicular status, Tympanoplasty**INTRODUCTION:**

Chronic suppurative otitis media is a prevalent otorhinolaryngeal issue on a global scale, particularly in developing nations. It's worth noting that approximately 9.8% of the Indian population grapples with this infection<sup>1</sup>. This condition exhibits a higher prevalence in rural regions compared to urban areas and is closely linked to factors such as inadequate hygiene practices and lower levels of literacy. Additionally, it tends to affect individuals within the middle and lower income brackets.<sup>2</sup> Chronic suppurative otitis media is characterized by persistent inflammation within the middle ear cleft, often resulting in recurrent otorrhoea (discharge from the ear) through a perforated tympanic membrane. Prolonged or untreated cases of this condition can additionally lead to hearing impairment. The management of chronic suppurative otitis media (COM) primarily revolves around two fundamental principles: the elimination of infection and the closure of tympanic membrane perforation. This is typically achieved through surgical procedures like tympanoplasty, with or without mastoidectomy. Despite the availability of a wide array of antibiotics, advanced surgical techniques, and newly developed prosthetic materials, achieving 100% success in tympanoplasty, particularly in terms of graft uptake and hearing improvement, remains challenging. This difficulty can be attributed to the extent of pathology within the middle ear.

**MATERIALS AND METHODS:**

**Selection criteria:** Inclusion criteria encompassed individuals aged 12 years and above who expressed a willingness to undergo surgery and had received a diagnosis of COM mucosal disease. Exclusion criteria applied to patients unwilling or medically unfit for surgery, cases involving squamous disease, revision tympanoplasty cases, and those with complicated otitis media.

**Study procedure:** All subjects meeting the inclusion criteria were taken into consideration. During the assessment, particular attention was given to the patient's medical history, focusing on factors such as hearing loss, ear discharge (otorrhoea), previous otological procedures, tinnitus, ear pain (otalgia), vertigo, and facial paralysis. Comprehensive evaluations were conducted, including general physical examinations, ear examinations using an otoscope, and tuning fork tests at frequencies of 256 Hz, 512 Hz, and 1024 Hz. Pure tone audiometry tests were administered by a certified and trained audiologist within a soundproof room. The Hugson and Westlake technique was employed for audiometric assessments, encompassing both air and bone conduction. Air conduction testing included frequencies at 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 4000 Hz, and 8000 Hz. A four-frequency pure tone average was calculated from 500 Hz, 1000 Hz, 2000 Hz, and 3000 Hz. These tests were conducted within five days before surgery, during the second month after surgery, and again during the eighth month after surgery<sup>3</sup>. All results were meticulously recorded in a pre-designed audiological evaluation sheet, both pre- and post-operatively. All patients presenting with ear discharge or an unhealthy middle ear condition underwent cortical mastoidectomy. When a diagnosis of COM mucosal disease was established, these patients were provided with counseling regarding the surgical option. Patients undergoing surgical correction, specifically tympanoplasty with or without mastoidectomy, underwent pre-operative and intraoperative assessment using the MERI scoring system. This assessment aimed to classify and identify the disease category, as outlined in Table 1

**Table 1: MERI scoring system**

Otorrhea	DRY	0
	OCCASIONALLY WET	1
	PERSISTENTLY WET	2
	WET,CLEFT PALATE	3
Perforation of ear drum	NONE	0
	PRESENT	1
Cholesteatoma	NONE	0
	PRESENT	2
Ossicular chain status	Malleus, incus and stapes present	0
	Defect of incus	1
	Defect of incus and stapes	2
	Defect of incus and stapes	3
	Defect of malleus, incus and stapes	4
	Ossicular head fixation	2
	Stapes fixation	3

**STATISTICAL ANALYSIS:** The data was inputted into a Microsoft Excel spreadsheet. Categorical data was expressed as frequencies and proportions, and the significance of the findings was assessed using the chi-square test.  $p < 0.05$  was considered as statistically significant.

**RESULTS:**

The study encompassed a total of 200 patients who underwent cortical mastoidectomy

**TABLE 2: Frequency Of Study Participants In Different Age Groups**

CHARACTERISTICS	FREQUENCY {n=200}
<b>AGE{YEARS}</b>	
<15	10
16-30	122
31-40	50
>40	18
<b>SEX</b>	
MALES	92
FEMALES	108

The largest proportion of patients fell within the age group of 16-30 years, accounting for 61% of the total, followed by the 31-40 age group, which comprised 25% of the patients. Patients aged above 40 years constituted 9%, while those under 15 years were the smallest group, making up only 7%. In terms of gender distribution, the majority of patients were female, constituting 54%, while males accounted for 46% of the total.<sup>4,5</sup>

Following Bellucci's classification of otorrhoea, patients were categorized into four groups: dry ear, occasionally wet, persistently wet, and persistently wet with a cleft palate. The majority of patients, comprising 52%, were classified as having a dry ear. Approximately 42% had occasionally wet ears, while a smaller proportion, 6%, were classified as persistently wet.

Table 3: Bellucci's classification of otorrhoea.

Category of otorrhoea	Frequency (N=200)
dry	104
Ocasionally wet	84
Persistently wet	12
Persistently wet with cleft palate	0

After surgery, successful graft uptake was observed in 128 patients, which accounts for 64% of the total. However, in 72 patients, graft-related issues were noted. Among these, graft failure occurred in 53 patients, while 19 patients experienced reperforation. In terms of hearing improvement, the assessment was conducted using the Belfast rule of thumb, which indicates that postoperative hearing benefit is considered significant if the operated ear's hearing is improved to 30 dB or better or brought within 15 dB of the contralateral ear. Based on this criterion, a total of 78 patients experienced hearing improvement in the study group. The ossicular status in our study did not demonstrate a significant role in the successful outcome of surgery, as indicated by a p-value greater than 0.05. Nonetheless, it is essential to conduct a thorough assessment of the ossicular status to plan the surgery effectively and provide the patient with adequate post-operative hearing benefits<sup>6,7</sup>. The condition of the middle ear was considered a critical factor in determining surgical outcomes. Ensuring the thorough clearance of middle ear disease is crucial for achieving a disease-free post-operative status, which, in turn, promotes successful graft uptake. Additionally, assessing the pre-operative patency of the Eustachian tube is vital for evaluating the middle ear cleft status, which can predict the surgical outcome. Patients with lower MERI scores tended to have a more successful surgical outcome, while those with higher scores had a reduced likelihood of successful surgery. Specifically, among the 200 patients in the study, 120 patients belonging to the mild MERI risk group and 60 from the moderate risk group experienced a successful surgery. However, in the severe category, only 20 patients achieved a successful surgical outcome.

## DISCUSSION:

Chronic otitis media (COM) is an inflammatory condition affecting the middle ear cleft, characterized by enduring perforations of the tympanic membrane and persistent otorrhea.<sup>8,9</sup> This condition can result in the thickening of the middle ear mucosa and the development of mucosal polyps. It is typically categorized into two main types: COM squamous and COM mucosal. When left untreated, COM can give rise to a range of health issues and, in certain instances, may lead to severe complications involving the temporal bone and intracranial structures. The MERI score comprises factors that have a significant impact on the surgical outcome. In this study, we aim to assess the effectiveness of the MERI score in predicting surgical outcomes<sup>10,11</sup>. Additionally, we will investigate how otorrhoea, ossicular status, and the condition of the middle ear influence the success of tympanoplasty, whether performed alone or in combination with mastoidectomy. In our study, the majority of patients (52%) presented with a dry ear, while 42% had occasionally wet ears, and a smaller proportion, 6%, had persistently wet ears. Notably, among patients who had a discharge-free period exceeding three months, a 100% graft uptake rate was observed. The success of reconstructing the hearing mechanism is significantly influenced by the pre-operative ossicular status. A favorable outcome is often associated with an intact ossicular system with only a perforation in the tympanic membrane. It's worth noting that the long process of the incus is particularly vulnerable to erosion due to its blood supply and is the most commonly affected ossicle. In our study, we observed incus erosion in 46 Patients, while erosion of both the incus and stapes, as well as the incus and malleus, was each noted in 7% of cases. Interestingly, we found an intact ossicular chain in 100 patients, accounting for 50% of the cases. These findings align with the observations made by Mohammadi et al. and Ahmed et al.<sup>12,13</sup> Nevertheless, several studies emphasize the importance of the presence of the malleus handle as a crucial factor affecting the surgical outcome. Therefore, a defect in the malleus is assigned a higher MERI score compared to a defect in the incus or stapes. Research conducted by Wilson et al. supports the notion that the presence of the malleus handle before surgery is associated with a better postoperative hearing outcome.

They found that the presence of an intact stapes did not significantly impact initial hearing outcomes. However, patients with an intact stapes tended to have better long-term hearing outcomes than those with stapes erosion. It's important to note that ossicular fixation is less common in chronic suppurative otitis media (CSOM) compared to ossicular necrosis. In our study, no cases of ossicular fixation were observed, and we did not find a significant relationship between ossicular status and the surgical outcome. Hearing benefit was evaluated through various methods, including the application of the Belfast rule of thumb, which deems postoperative hearing benefit as significant when the air conduction threshold within the speech frequency range reaches 30 dB or when the interaural difference equals 15 dB.<sup>13-16</sup> In some studies, only the air conduction threshold is taken into consideration. In our study, we opted to measure the average air-bone gap closure at speech frequencies, specifically at 500 Hz, 1 kHz, 2 kHz, and 3 kHz. This measurement was conducted following the guidelines provided by the Committee on Hearing and Equilibrium. This was similar to the studies of Kalyanasundharam et al.<sup>17</sup> He noted that the overall success rate of tympanoplasty is 74% according to graft status.

### CONCLUSION:

The study's findings led to the conclusion that otorrhoea and the condition of the middle ear cleft significantly influence the success of the surgery, whereas the status of the ossicles did not have a significant impact on the outcome. The MERI scoring system was recognized as a valuable tool for pre-operative and intraoperative assessment, aiding in the prediction of surgical outcomes.

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