

**Predictive Factors in Assessing Outcomes of Middle Ear Surgeries****Bhaumik Shah****Assistant Professor, Department of Oto-rhinolaryngology, Swaminarayan Institute of Medical Sciences & Research, Kalol, Gandhinagar, Gujarat****Received: 25-07-2024 / Revised: 23-08-2024 / Accepted: 26-09-2024****Corresponding Author: Dr. Bhaumik Shah****Conflict of interest: Nil****Abstract:**

To research a number of factors, such as the Middle Ear Risk Index (MERI), and how they relate to the results of middle ear surgery. The study was carried out at our institute's Department of Otolaryngology. 185 cases of a safe kind of persistent suppurative otitis media were included. These patients were admitted, given surgical care, and had follow-up records maintained for at least three months following the procedure. The study found a strong link between the outcome of tympanoplasty and MERI.

**Keywords:** Chronic otitis media, Middle ear risk index, Tympanoplasty, Ossiculoplasty.

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**Introduction**

Chronic suppurative otitis media is chronic infection of middle ear cleft i.e. the Eustachian tube, middle ear and mastoid in which permanent perforation and associated otorrhoea is present. It is more common among developing countries and poor rural population due to poor nutrition and lack of education and resources, over-crowding, leading to poor hygiene and frequent upper respiratory tract infections, ignorance, poor access for medical care and lack of adequate treatment [1]. It is common among children and young adults, due to recurrent upper respiratory tract infections, acute otitis media, and adenoiditis or as a sequelae of serous otitis media [2].

Chronic suppurative otitis media can lead to extracranial as well as intracranial complications, including, mastoid abscess, hearing loss, facial nerve paralysis, labyrinthitis, lateral sinus thrombosis, meningitis, encephalitis and intracranial abscess [3].

Management aims at early diagnosis with appropriate treatment, whether, medical or surgical, to eradicate the disease or reduce its complications. Treatment can be conservative including regular aural toileting, use of topical or oral antibiotics and the use of hearing aids for rehabilitation or it can be surgical [4]. For the patients opting for surgery, it is necessary to explain the patient about the disease, its severity, treatment options, their outcome and prognosis. The goal of successful tympanoplasty is to create a sound-conducting mechanism in a well-aerated, mucosal-lined middle ear cleft. Various

prognostic factors for tympanomastoid surgery have been studied in previous studies. Belluci staged otorrhoea into four parts for prognosis of tympanoplasty. Austin proposed a prognostic stratification based on ossicle status and more recently Kartush developed middle ear risk index (MERI). Becvarovski and Kartush revised and updated MERI in 2001. It involved Belluci's criteria for otorrhoea, Austin-Kartush classification for ossicular status, middle ear factors, including, tympanic membrane perforation, presence of cholesteatoma, middle ear granulation, previous surgery and smoking [5]. In this study we have studied various parameters prognosticating the results of middle ear surgeries. Also we have used middle ear risk index (MERI) to stratify patient groups according to severity of disease and to evaluate the efficiency of MERI score in predicting the outcome of tympanoplasty (Table 1).

**Aims and Objectives**

1. To observe and evaluate the impact of various prognostic parameters affecting the outcome of middle ear surgeries, namely: age, chronicity of disease, presence of active discharge, duration of inactivity, status of middle ear, presence of bilateral disease, ossicular status and smoking.
2. To assess the result of surgical treatment of chronic suppurative otitis media and its relation to the MERI (middle ear risk index).

**Table 1: Middle ear risk index**

Risk factor	Risk value
1. Otorrhoea (Belluci criteria)	
Dry	0
Occasionally wet	1
Persistently wet	2
Wet with cleft palate	3
2. Perforation	
Absent	0
Present	1
3. Cholesteatoma	
Absent	0
Present	2
4. Ossicular status (Austin/Kartus)	
M+I+S+	0
M+S+	1
M+S-	2
M-S+	3
M-S-	4
Ossicles head fixed	2
Stapes fixation	3
5. Middle ear granulations/effusion	
No	0
Yes	2
6. Previous surgery	
None	0
Staged	1
Revision	2
7. Smoking	
No	0
Yes	2

### Materials and Methods

The study was conducted in our institute. 185 cases of safe type of chronic suppurative otitis media with adequate cochlear reserve were included in the study. These patients were admitted and treated surgically and record was kept for at least 3 months follow-up in post-operated period. Tympanoplasty is defined as successful when the graft is accepted and intact after 3 months. Delayed failure was defined as perforation or atelectasis that occurred after 3 months.

### Selection of patients for study

#### Inclusion criteria

1. Patients of all age groups, above 10 years.
2. Patients with mucoid type of chronic suppurative otitis media.
3. Presence of conductive hearing loss with no sensorineural hearing loss.
4. Good general physical condition. Exclusion criteria

#### Exclusion Criteria

1. Patients with age less than 10 years.
2. Patients with acute suppurative otitis media

and otitis externa.

3. Patients with squamous type of chronic suppurative otitis media.
4. Patients with sensorineural hearing loss.
5. Congenital deformity for ear, nose or throat.
6. Severe systemic disease.

### Results

185 cases of safe type of chronic suppurative otitis media were included in the study. The patients ranged in age from 11 to 60 years; maximum number of cases were in age group 21–30 years (43.2%), 102 were female (55.1%) and 83 were male (44.9%), most of them belonged to rural areas 147 (79.5%) and were from lower socioeconomic group 122 (66%). 26 (14%) of them were smokers. Common presenting symptoms were ear discharge in 182 (98.4%), decreased hearing in 165 (89.2%), tinnitus in 46 (24.9%) and earache in 16 (8.7%) cases. Out of them, 68 cases (36.8%) cases had bilateral disease while 117 cases (63.2%) had unilateral disease. Most of them had ossicular chain intact and mobile and underwent type 1 tympanoplasty (159 cases, 86.0%), incus or lenticular process of incus was eroded in 15 cases (8.1%), malleus was eroded in 8 cases (4.3%), all ossicles except

stapes footplate were absent in 3 cases (1.6%) while ossicles were fixed in 1 case (0.5%).

In our study, overall graft acceptance rate was 80.5%. Various factors which were found to be significantly associated with graft uptake rate were socioeconomic status ( $\chi^2 = 8.255$ ;  $p = 0.016$ ), smoking ( $\chi^2 = 13.75$ ;  $p = 0.0002$ ), middle ear mucosa ( $\chi^2 = 8.275$ ;  $p = 0.004$ ), duration of inactivity ( $\chi^2 = 12.523$ ;  $p = 0.028$ ). Whereas, size of perforation ( $\chi^2 = 6.643$ ;  $p = 0.156$ ) and duration of disease ( $\chi^2 = 6.018$ ;  $p = 0.304$ ) were found to have no association with graft uptake rate (Tables 2, 3, 4, 5, 6, 7). The total number of patients with MERI score 1–3 (mild disease) were 67%, with score 4–6 (moderate disease) were 24.3% and with score 7–12 (severe diseases) were 8.7%. Patients

with score 1–3 had graft acceptance of 83.9%, with score 4–6 had graft acceptance 82.2% and with score 7–12 had 50% success ( $\chi^2 = 12.60$ ;  $p = 0.005$ ). Before surgery, hearing loss  $\geq 40$  dB was found in 8.1% cases with MERI 1–3, in 24.4% cases with MERI 4–6 and in 68.8% cases with MERI 7–12 ( $\chi^2 = 12.868$ ;  $p = 0.045$ ).

After surgery, hearing loss  $\geq 40$  dB was found in 2.4%, 11.1% and 25% cases with MERI 1–3, 4–6 and 7–12, respectively ( $\chi^2 = 29.893$ ;  $p = 0.001$ ). Hence from the present study it can be concluded that MERI scoring can be useful in predicting the outcome of tympanoplasty and for prognosticating the patients for graft acceptance rate and hearing improvement after surgery (Tables 8, 9).

**Table 2: Socioeconomic status**

	Graft failure	Graft accepted	Total
Lower	31 (25.4)	91 (74.6)	122
Middle	3 (6.7)	42 (93.3)	45
Upper	2 (11.1)	16 (88.9)	18
Total	36 (19.5%)	149 (80.5%)	185

**Table 3: Smoking versus graft uptake**

Smoking	Graft failure	Graft accepted	Total
No	24 (15.1%)	135 (84.9%)	159
Yes	12 (46.1%)	14 (53.9%)	26
Total	36 (19.5%)	149 (80.5%)	185

**Table 4: Middle ear mucosa versus graft uptake**

Middle ear mucosa status	Graft failure	Graft accepted	Total
Normal	25 (15.9%)	132 (84.1%)	157
Unhealthy	11 (39.3%)	17 (60.7%)	28
Total	36 (19.5%)	149 (80.5%)	185

## Discussion

The study “Prognostic parameters and their relevance in outcome of middle ear surgeries” was conducted from in our institute. 185 cases of mucoid type of chronic suppurative otitis media were admitted and investigated. The preoperative, operative and postoperative follow-up data was compiled, analysed and compared with previous studies.

Otitis media has been categorized as a neglected tropical disease with highest prevalence in India, approx. 6% (according to WHO report 2015). Young rural population with low socio-economic class are the most common sufferers of chronic suppurative otitis media. Tympanic membrane perforations are long standing and they are poorly treated by general practitioners. Treatment can be conservative including aural toileting, topical or oral antibiotics or it can be surgical, including tympanoplasty with or without mastoid exploration, depending on persistent otorrhoea, ossicular status and extent of disease [5]. Similar to previous stud-

ies, we also found that most affected population were young age-group, those belonging to rural areas and from a poor socioeconomic group. Most common presenting symptoms were recurrent otorrhoea and decreased hearing [5–7].

In our study, overall graft acceptance rate was 80.5%. Various factors which were found to be significantly associated with graft uptake rate were socioeconomic status, smoking, middle ear mucosa and duration of inactivity. Whereas, size of perforation and duration of disease were found to have no association with graft uptake rate. In the study conducted by Pinar et al. [8], bilateral disease and type of surgery were found to be statistically significant with result of tympanoplasty while size and site of perforation had no significant association.

While Onal et al. [9], showed size of perforation, smoking and contralateral disease had significant association with results of surgery and type of surgery, duration of dry ear and active ear during surgery had no association with results of surgery. Similar to other studies, we also concluded that a

significant association exists between the MERI score and success rate of tympanoplasty [10].

### Conclusion

By this study, we conclude that a good correlation exist between MERI and result of tympanoplasty and hearing improvement and it can further be useful for preoperative risk stratification, counselling of the patient regarding graft uptake and hearing improvement after surgery. Shortcomings of this study were short period of follow-up, patients lost to follow-up, and lack of uniformity in disease severity among patients.

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