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THE PROGNOSTIC IMPORTANCE OF MIDDLE EAR RISK INDEX IN PATIENTS UNDERGOING TYMPANOPLASTY

KEY WORDS: Chronic Otitis Media, Tympanoplasty, Middle Ear Risk Index

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ABSTRACT

Background: Tympanoplasty, with or without mastoidectomy, is a standard surgical procedure for Chronic Otitis Media. This study aims to identify the importance of Middle Ear Risk Index (MERI) in predicting the surgical outcome in patients undergoing Tympanoplasty. **Materials And Methods:** A total of 105 patients with Chronic Suppurative Otitis Media (CSOM) recruited for tympanoplasty with or without mastoidectomy between September 2020 and November 2021 were included. Their MERI score was calculated and patients were followed up at 1st and 3rd month for hearing assessment and graft status. **Results:** The graft success rate at 1st and 3rd month was 91.42% and 76.18% respectively. Graft uptake was successful in 87.27% cases with mild MERI score, 69.76% cases with moderate score and 28.57% cases with severe score. Hearing benefit was found in 52.38% cases. Majority (45.71%) experienced hearing gain of 1-10dB. Hearing benefit was seen in 67.27% cases with mild score and 41.86% cases with moderate score while no benefit was found in patients with severe MERI score. **Conclusion:** There is a significant association between the MERI score and surgical outcomes, thus establishing the prognostic importance of MERI. It can be a useful tool in planning of the surgery.

INTRODUCTION:

Tympanoplasty, with or without mastoidectomy, is a standard surgical procedure for Chronic Otitis Media. The primary goal of this procedure is to eradicate the disease and establish ventilation of the middle ear cleft, while secondary aim is to achieve a dry ear and restore the hearing mechanism(1). Wullstein and Zollner in 1950s reported successful tympanic membrane perforation repair using skin grafts. Their reported success rate was 71%(2). After modifications in graft materials and operative technique, today the observed success rate of tympanoplasty is between 60-99% in adults(3). The most accepted grading system to predict outcome of tympanoplasty is the Middle Ear Risk Index (MERI), given by Kartush in 1994 (4). In 2001, smoking was added as an independent prognostic factor in the MERI scoring system (5). The MERI score ranges from 0 to 15 and risk stratification are as follows: 0 is Normal, 1-3 is Mild, 4-7 is Moderate and 8-15 is Severe.

MERI includes:
Otorrhoea - (0-3)
Perforation- (0-1)
Cholesteatoma -(0-1)
Ossicular chain status – (0-4)
Middle ear granulations- (0-2)
Previous surgery-(0-2)
Smoking-(0-2)

This study aims to identify the importance of MERI in predicting the surgical outcome in patients undergoing tympanoplasty.

MATERIALS AND METHODS:

After obtaining institutional ethical committee approval, this prospective observational study was conducted from September 2020 to November 2021.

A total of 105 patients with Chronic Otitis Media (COM) with history of ear discharge and hearing loss, eligible and consenting for ear surgery were recruited in the study. Patients with traumatic perforation or sensorineural / mixed hearing loss were excluded.

All patients were examined with history and clinical examination including Examination under Microscope, Routine Investigations and Pure Tone Audiometry. These patients were subjected to tympanoplasty with or without mastoidectomy depending on the disease involvement. Their MERI score was calculated and patients were followed up 1 month and 3 months post-operatively for evaluation of graft status and hearing outcome.

Statistical Analysis:

Chi square test, ANOVA test and Student t test were used to evaluate the level of significance and p values <0.05 were considered statistically significant.

OBSERVATION AND RESULTS:

The study included 105 patients between 7 and 67 years of age. Maximum patients were seen in 21-30 years of age group. We observed an overall female predominance (51.43%). Out of 105, 82 (78.09%) procedures were tympanoplasty, 14 (13.33%) were canal wall down mastoidectomy (CWDM), 9 (8.57%) were intact canal wall mastoidectomy (ICWM).

Table 1: Distribution of study subjects based on indicators of MERI:

Variables	Number of Patients	%
Otorrhoea		
Occasionally wet	29	27.62%
Persistently wet	76	72.38%
Perforation		
None	16	15.24%
Present	89	84.76%

Cholesteatoma		
None	92	87.62%
Present	13	12.38%
Ossicular status		
M+I+S+	74	70.48%
M+S+	16	15.24%
M+S-	7	6.67%
M-S+	8	7.62%
Middle ear granulations		
No	85	80.95%
Yes	20	19.05%
Previous surgery		
None	93	88.57%
Revision	12	11.43%
Smoking		
No	84	80%
Yes	21	20%

Based on these variables, MERI score was calculated and patients were categorised into mild, moderate and severe groups. We observed that Mild MERI score was found in 52.38% cases, Moderate score in 40.95% cases and Severe score in 6.67% cases. Mean MERI score was 4.21 with standard deviation 1.84.

At 1st month follow up, graft success rate of 91.42% and failure of 8.57% was observed. After 3 month follow up, graft was taken up in 76.18% cases and remaining 23.80% of patients had graft failure.

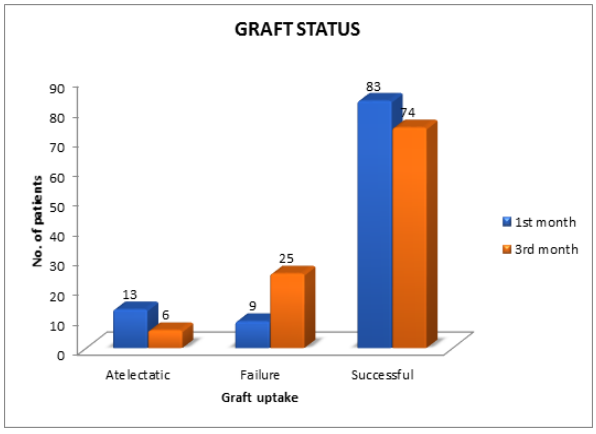

Figure 1: Distribution of study participants according to graft uptake

In our study, graft uptake was successful in 87.27% cases with mild MERI score, 69.76% cases with moderate MERI score and only 28.57% cases with severe MERI score. So, the chances of graft uptake are low and rejection rate is high with high MERI score.

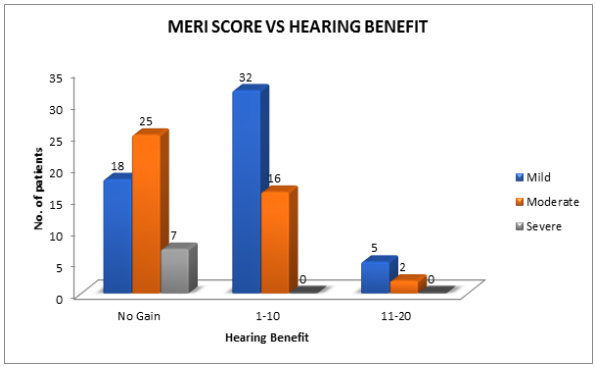

Figure 2: Distribution of study participants according to MERI score and hearing benefit at 3 months follow up.

In our study, hearing benefit was found in 52.38% cases. Majority (45.71%) of those cases, experienced hearing gain of 1-10dB. We observed that 67.27% cases with mild MERI score, 41.86% cases with moderate MERI score experienced hearing benefit post operatively while no hearing benefit was found in patients with severe MERI score.

According to our study, higher the MERI score, lower will be the patient's chances of hearing improvement.

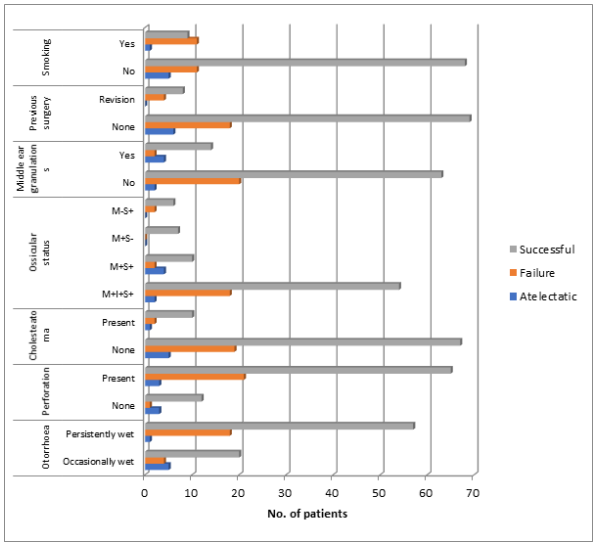

Figure 3: Distribution of study participants according to variables of MERI score v/s graft status

We observed graft uptake to be better in:

- Cases with occasionally wet ear (86.20%) as compared to those with persistently wet ear (76.31%)
- Cases without perforation or with retraction pocket (93.75%) as compared to those with perforation (76.40%)
- Cases with cholesteatoma (84.61%) as compared to the non cholesteatomatous cases (79.12%)
- Cases with middle ear granulation tissue (90%) as compared to those who didn't have granulation tissue (76.47%)
- Cases with no history of previous ear surgery (80.64%) as compared to revision surgery cases (66.67%)
- Cases with no history of smoking (86.9%) as compared to smokers (47.61%)

DISCUSSION:

In spite of the availability of wide range of antibiotics, better surgical techniques and newly developed prosthetic materials, we are still not able to reach 100% successful outcomes in tympanoplasty in terms of graft uptake and hearing benefit. This is due to the extent of pathology in the middle ear and mastoid which affects the outcome. Hence MERI score is summarized and formed a numerical value, that helps to identify the extent of disease and thereby to predict the success rate of surgery and to segregate the patients based on their MERI scores and then assess the results of surgery in terms of hearing assessment and graft status.

We observed persistently discharging ears had a higher failure rate as compared to occasionally wet ears. The more the severity of otorrhea, higher was the MERI score thereby, worsening the surgical outcome. Hence antibiotics should be started to decrease severity of otorrhoea. This was supported by the studies from other authors(6).

Much like our observation, Pinar et al. and Onal et al. suggested a significant relation between the size of perforation and success rate of tympanoplasty(7,8). However, Meranda et al. and Denoyelle et al. dismissed any such association(9,10).

Chrobok et al stated that Cholesteatoma, perforation,

ossicular erosion, and previous surgery were negative prognostic factors(11). And, our work identified with their findings. We found graft failure in 52.38% cases with positive history of smoking compared to those with no history of smoking i.e.13.10%. Zoran Becvarovski and Lin YC et al. reported similar results (5,12). The effects of smoking on the middle ear and eustachian tube can be categorised into local and regional. Local factors include the status and function of the mucociliary system and the vascular supply to the newly grafted drum. The regional effects are those resulting from eustachian tube obstruction.

In our study, patients with Mild MERI score had Maximum graft uptake i.e. 87.27% ,69.76% in cases with Moderate MERI score, while patients with severe MERI score had lowest graft uptake i.e. 28.57%. Viktor Chrobok et al stated that MERI is a significant prognostic factor for predicting the outcome of surgery(11).

We observed, higher the MERI score more are the chances of Mastoidectomy. Pinar et al stated that high MERI has a much higher possibility of CWDM and lower chance of successful tympanoplasty(7). The consideration of the high MERI score allows to assess the patient more accurately before surgery thereby enable the surgeon to design a case specific surgical strategy for each patient. Shishegar M et al found that there is a significant difference between the MERI scores and the three types of operation i.e. ICWM, CWDM and Non mastoidectomy. Highest MERI score is in patients undergoing CWDM and lowest MERI score is in patients undergoing simple tympanoplasty(13).

Our study concluded higher graft rejection rate in patients with severe MERI scores (71.4%) and better hearing gain in patients with Mild MERI score (67.27%). Chrobok et al studied the prognostic factors in surgery of COM and concluded MERI is a significant prognostic factor for predicting the outcome. Patients with a higher MERI score had a more severe impairment of air and bone conduction hearing threshold pre-op and post op compared to patient with a lower MERI score(11).

This study finds a significant association between the MERI score and surgical outcomes and thereby establishes its prognostic importance.

CONCLUSION:

MERI can be used as a tool to plan the type of surgery. Incidence of Mastoidectomy is more in cases with higher MERI score. MERI can be used as a prognostic indicator for graft uptake and hearing benefit after tympanoplasty. The patients with low MERI score have better hearing outcome and long-term graft uptake than those with high MERI score.

Conflict Of Interest: None declared

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