

Original Research Article

Evaluation of the role of middle ear risk index as a prognostic tool in cases of tympanoplasty in chronic suppurative otitis media

Poonam K. Saidha¹, Sahil Kapoor¹, Arpita Suri², Ayushi Gupta^{1*}, Vikas Kakkar¹

¹Department of ENT, ²Department of Biochemistry, SGT Medical College and Hospital, Gurugram, Haryana India

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***Correspondence:**

Dr. Ayushi Gupta,

E-mail: gayushi818@gmail.com

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ABSTRACT

Background: In chronic suppurative otitis media (CSOM), the success rate of tympanoplasty, can range from 35% to 92% and is influenced by a number of factors such as age of patient, size and site of perforation, status of ear, ossicular status and surgical technique. The middle ear risk index (MERI) of a CSOM patient is an effective numerical grading system helpful in predicting the outcome of surgery.

Methods: A prospective observational study was conducted in 50 patients over a period of 1 year including all cases of CSOM in age group of 18-55 years with conductive hearing loss that underwent tympanoplasty with or without cortical mastoidectomy and role of MERI was analysed for the outcome of the surgery.

Results: Successful graft uptake was seen in 92% cases while in 8% cases graft was rejected. Of these 46 cases, 32 cases had mild MERI score, 10 had moderate MERI score and 4 had severe MERI score. It was observed that higher the MERI score, lower the graft uptake.

Conclusions: Our study comprised of 50 patients of CSOM which were categorized into mild, moderate and severe on the basis of MERI score preoperatively. All the patients underwent tympanoplasty with or without cortical mastoidectomy and surgical outcome in terms of graft uptake was found to be significant. Higher the MERI score, lower was the graft uptake while lower the MERI score, higher was the graft uptake. Hence, MERI is a useful tool to ascertain the prognosis of tympanoplasty.

Keywords: MERI score, Tympanoplasty outcome, CSOM, Cortical mastoidectomy

INTRODUCTION

Chronic suppurative otitis media (CSOM) is a chronic inflammatory process of the mucoperiosteal lining of the middle ear cleft composed of Eustachian tube, attic, aditus and mastoid air cells and is characterized by recurrent ear discharge through a tympanic membrane perforation.¹ In developing countries like India, the incidence of CSOM is higher because of low socioeconomic condition, lack of nutrition, lack of education on health and can affect people of age and gender.²

The main objective of surgery in CSOM patients was to eradicate the disease from the middle ear and make the

ear safe and dry. Tympanoplasty is done to repair the ruptured tympanic membrane and reconstruction of hearing mechanism. The success of tympanoplasty is dependent on the surgical principle along with the pathological factors associated with disease.³ There are a number of factors which influence the success rate of tympanoplasty such as age of the patient, size and site of the perforation, status of the ear (dry or discharging), ossicular status and the surgical technique, but their real role is still unclear.⁴ Therefore, the success rate of tympanoplasty, as reported, can range from 35% to 92%.^{5,6}

A grading system, the middle ear risk index (MERI), was developed by Becvarovski and Kartush combining the

risk factors into a numerical value to stratify the severity of disease and to assess the prognosis of tympanoplasty. Each patient is assigned a numerical score based on the risk factors. The total score is 12. Based on MERI score, the patients are classified as mild disease (1-3), moderate disease (4-6) and severe disease (7- 12). It was modified in 2001 to include smoking as a risk factor (Table 1).^{3,7} Smoking affects mucociliary clearance by middle ear mucosa.

It causes vasoconstriction and promotes thrombosis and also reduces oxygen carrying capacity of blood leading to impaired blood supply to the graft. It also causes Eustachian tube dysfunction and increases susceptibility to infection.⁷

Table 1: MERI score.

Risk factor	Value-assigned risk
Otorrhea (Bellucci)	
Dry	0
Occasionally wet	1
Persistently wet	2
Wet, cleft palate	3
Perforation	
Absent	0
Present	1
Cholesteatoma	
Absent	0
Present	1
Ossicular status (Austin/Kartush)	
M+I+S+	0
M+S+	1
M+S-	2
M-S+	3
M-S-	4
Ossicular head fixation	2
Stapes fixation	3
Middle ear granulation/ effusion	
No	0
Yes	2
Previous surgery	
None	0
Staged	1
Revision	2
Smoker	
No	0
Yes	2

In this study, we are going to study the role of the middle ear risk index (MERI) as an indicator of the severity of the middle ear disease, to stratify the patient groups according to the severity of the disease and to evaluate the efficiency of MERI score in predicting the outcome of tympanoplasty in cases of safe CSOM.

Aims and objectives

Aim and objectives were 1) to determine the Middle Ear Risk Index in patients of CSOM undergoing tympanoplasty 2) to categorize the patients into mild, moderate and severe disease based on MERI score 3) to assess the prognostic value of MERI on the outcome of tympanoplasty in CSOM.

METHODS

This is a prospective observational study conducted in the Department of Otorhinolaryngology at a tertiary care center comprising of 50 patients over a period of 1 year.

Sampling method

Convenience sampling.

Inclusion criteria

Inclusion criteria were all cases of CSOM, age group 18 - 55 yrs from both sexes patients with conductive type of hearing loss.

Exclusion criteria

Exclusion criteria were age below 18 years and above 55 years; patients with previous history of ear surgery; patients with sensorineural or mixed hearing loss; patients with systemic diseases like diabetes, hypertension, bleeding disorders.

Study design

A detailed preoperative assessment of status of ear before surgery (quiescent/inactive), ET function, type of hearing loss (conductive/mixed/SNHL) were done and recorded for all the patients along with history of smoking and previous ear surgery. Otoscopic examination was done to find the presence or absence of perforation, granulation tissue and cholesteatoma. Examination of nose and paranasal nasal sinuses and throat was done to rule out septic foci. Basic investigations such as complete blood counts, pure tone audiometry and X-ray mastoid were taken. Otoendoscopy and otomicroscopy were done to confirm the otoscopic findings. Risk categories were calculated from the MERI scoring chart given below and the severity of the disease was noted. Patients were classified as normal, mild, moderate or severe MERI group based on the score. Patients who met the inclusion criteria were subjected to medical and general anesthetic fitness.

Patients underwent tympanoplasty. Intraoperatively, drilling was started over MacEwan's triangle and mastoid water patency was checked. In cases where there was no patency, tympanoplasty with cortical mastoidectomy was done. Temporalis fascia graft was used for all patients.

Patients were followed up to 3 months postop and graft status was analyzed by otoscopy.

Statistical analysis

Done using SPSS software. P value of <0.05 was considered significant and <0.01 was highly significant.

RESULTS

This study was carried out in the Department of ENT at SGT hospital from November 2019 to December 2020. The study included 50 patients with CSOM of both mucosal (76%) and squamosal (24%) type. The age range was 24-55 years with mean age ±SD of 41±9.028 years. Of the total participants, 26 (52%) were male while 24 (48%) were female. On the basis of laterality, 43 (86%) unilateral cases and 7 (14%) bilateral cases were taken. Out of 43, 20 (40%) cases were of right side, while 23 (46%) were of left side.

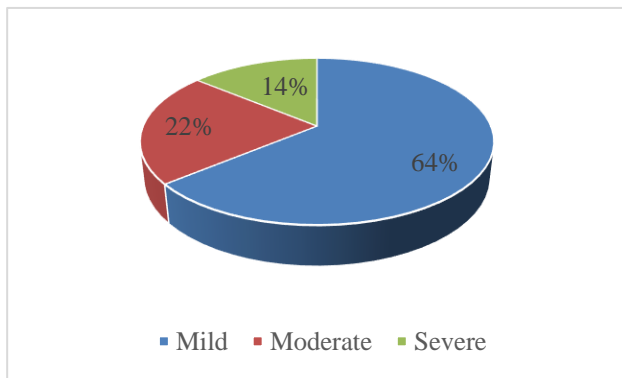


Figure 1: Severity of MERI score in patients.

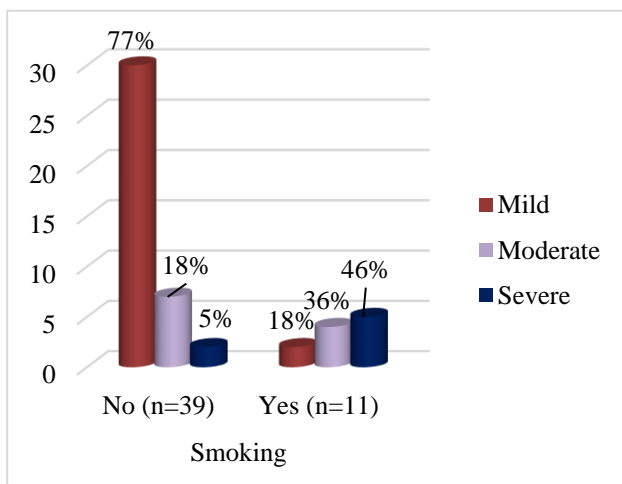


Figure 2: Smoking v/s severity.

In our study, out of 50 patients, 10 patients had small perforation, 17 had medium perforation, 17 had large perforation and 6 had subtotal perforation (p=0.015). The study group comprised of 32 patients with mild (1-3)

MERI score, 11 patients with moderate (4-6) MERI score and 7 patients with severe (7-12) MERI score (Figure 1).

Total 11 (22%) cases had history of smoking while 39 (78%) were non-smokers (p value=0.000). The correlation of severity of MERI score with smoking is demonstrated in Figure 2.

Out of 50 patients, 15 (30%) cases underwent tympanoplasty with mastoid water patency test while 35 (70%) cases underwent tympanoplasty with cortical mastoidectomy. Using pearson chi-square test, the outcome of tympanoplasty was evaluated 3 months post-operatively in terms of graft uptake. Successful graft uptake was seen in 46 (92%) cases while in 4 (8%) cases, graft was rejected. Of these 46 cases, 32 cases had mild MERI score, 10 had moderate MERI score and 4 had severe MERI score. Therefore, it is observed that higher the MERI score, lower is the graft uptake (Figure 3).

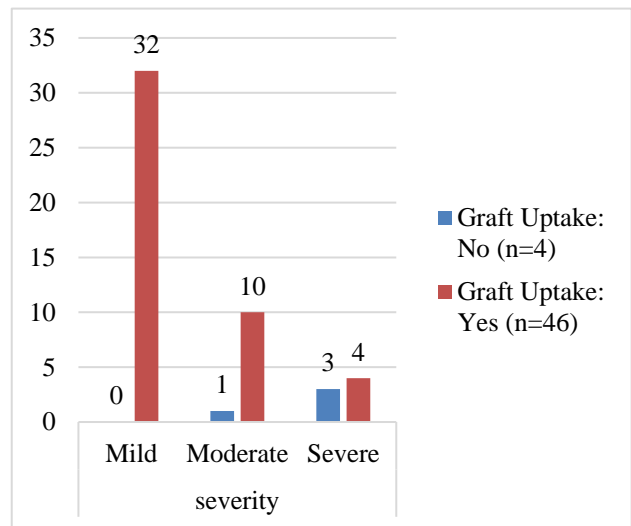


Figure 3: MERI v/s graft uptake.

DISCUSSION

Chronic suppurative otitis media is one of the commonest diseases encountered in ENT practice. The main principle of the management is removal of the disease and making the ear dry and safe along with restoration of hearing to effective levels by tympanoplasty. Some studies have shown that combining tympanoplasty with mastoidectomy has better results in clearing the disease from the mastoid and middle ear and better post-op graft uptake.⁹

The middle ear risk index of a CSOM patient is an effective numerical grading system helpful in predicting the outcome of surgery. MERI score is calculated for each patient preoperatively to stratify the severity of the disease as mild, moderate and severe. In our study (n=50), 64% cases were classified as mild, 22% as moderate and 14% as severe MERI score (Figure 2). In a study conducted by Lakshmi et al, 29 (51%) patients had

mild MERI score, 15 (26%) patients had moderate MERI score and 13 (23%) patients had severe MERI score.⁸ On otoscopic examination, the tympanic membrane findings of all the patients (n=50) were recorded as small (20%), medium (34%), large (34%) and subtotal (12%) perforations. Tympanic membrane perforation size was considered for determining graft uptake. It was observed that patients with moderate perforation (n=17) had 100% graft uptake. In patients with subtotal perforation (n=6), 66.6% had successful graft uptake while 33.34% showed failure. Therefore, larger the size of perforation, lower success rates of graft uptake were observed (p= 0.048). Aftab Ahmed et al also showed lower success rates with larger perforations, but the difference was not statistically significant (p= 0.35).³

In 2001, MERI score was modified to include smoking as a risk factor.^{3,7} According to our study, 11 (22%) cases

were smokers while 39 (78%) were non-smokers with p value of 0.000. Zoran Becvarovski found that delayed graft uptake was more common in smokers (60%) than non-smokers (20%).⁷ On correlating history of smoking with graft uptake, we found that out of 11 smokers in our study, in 82% cases graft uptake was seen while 18% had failure. However, amongst the non-smokers (n=39) in our study, 95% cases showed successful graft uptake while only 5% had failure (p=0.159) (Table 2).

Table 2: Correlation of graft uptake with smoking.

Graft status	Smoking	
	Yes	No
Graft taken	9	37
Graft not taken	2	2
Total	11	39

Table 3: Correlation of MERI with tympanoplasty with and without cortical mastoidectomy.

Procedure	N	Mean rank	Sum of ranks
MERI Score Tympanoplasty with mastoid water patency test	15	18.60	279.00
Tympanoplasty with cortical mastoidectomy	35	28.46	996.00
Total	50		

In our study, the overall surgical success rate was 92% according to graft status. Cases who underwent tympanoplasty with mastoid water patency test (30%) when compared to the ones who underwent tympanoplasty with cortical mastoidectomy (62%) did not show any significant difference (p=0.172). Manpreet Kaur et al compared graft uptake between tympanoplasty alone and tympanoplasty with simple mastoidectomy in mucosal type of CSOM and concluded that graft uptake was 76% in patients who underwent tympanoplasty and 88% in tympanoplasty combined with simple mastoidectomy.⁹ The prognostic value of MERI on outcome of tympanoplasty with mastoid water patency test and tympanoplasty with cortical mastoidectomy was found to be significant (p=0.026) i.e. patients with mild MERI score had maximum graft uptake while those with severe MERI score showed more failure rates (Table 3). Similar observation was reported by Rakesh Saboo et al.¹⁰

CONCLUSION

Our study comprising of 50 patients of CSOM of both mucosal and squamosal type were categorized into mild, moderate and severe on the basis of MERI score preoperatively. All the patients underwent tympanoplasty with mastoid water patency test and tympanoplasty with cortical mastoidectomy and the surgical outcome in terms of graft uptake was found to be significant. Higher the MERI score, lower was the graft uptake while lower the MERI score, higher was the graft uptake. Hence, MERI is a useful tool to ascertain the prognosis of tympanoplasty.

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REFERENCES

- Jahn AF. Chronic otitis media: diagnosis and treatment. *Medic Clin North Am.* 1991;75(6):1227.
- Hayati R, HaRyuna TS. Middle Ear Risk Index Scores as a Predictor for Hearing Threshold after Tympanoplasty in Patients with Chronic Suppurative Otitis Media. *J Clinic Diagnost Res.* 2018;12(4):MC01-4.
- Ahmed A, Sharma SC. Middle Ear Risk Index [MERI] as Prognostic Factor in Tympanomastoidectomy with Tympanoplasty. *Madridge J Otorhinolaryngol.* 2016;1(1):15-22.
- Aggarwal SK, Dev R. Comparative study of tympanoplasty and its outcome in various age groups using the middle ear risk index scale. *Ind J Otol.* 2020;26:4-8.
- Bluestone CD, Cantekin EI, Douglas GS. Eustachian tube function related to the results of tympanoplasty in children. *Laryngoscope.* 1979;89:450-8.
- Yoon TH, Park SK, Kim JY, Pae KH, Ahn JH. Tympanoplasty, with or without mastoidectomy, is highly effective for treatment of chronic otitis media in children. *Acta Otolaryngol Suppl.* 2007;(558):44-8.
- Becvarovski Z, Kartush JM. Smoking and tympanoplasty: implications for prognosis and the

- Middle Ear Risk Index (MERI). *Laryngoscope.* 2001;111:1806-11.
8. Lakshmi N, Sudhakar S, Shobha K. Correlation between middle ear risk index (MERI) and outcome of tympanoplasty- a prospective study. *Int J Scient Res.* 2019;8(12):12-4.
 9. Kaur M, Singh B, Verma B.S, Kaur G, Kataria G, Singh S, et al. Comparative evaluation between tympanoplasty alone & tympanoplasty combined with cortical mastoidectomy in non-cholesteatomatous chronic suppurative otitis media in patients with sclerotic bone. *J Dent Medic Sci* 2014;6(1):40-5.
 10. Saboo R, Modwal A, Gautam P. Tubotympanic CSOM: clinical profile of perforation, eustachian tube function and MERI score as parameter for outcome of tympanoplasty. *Transworld Med J.* 2020;2(2):154159.

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