

Correlation between Middle Ear Risk Index (MERI) and tympanoplasty-A prospective study

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Abstract

Tympanoplasty results depend on the severity of middle ear disease present preoperatively. Various grading systems were developed for this. The present study was carried out to determine the Middle Ear Risk Index (MERI) score and categorise the patients into mild, moderate and severe MERI and study the relation between MERI and outcome of tympanoplasty. The study consisted of 50 patients undergoing tympanoplasty for mucosal or squamous type of CSOM. The MERI score was calculated. The patients were categorised into those with mild, moderate and severe MERI. The graft uptake status was assessed. The relation between MERI score and graft status was assessed by T test. The overall graft uptake was 76%. Patients with a high MERI score had low graft uptake. This study shows that MERI score is a prognostic indicator of tympanoplasty results. It is inversely proportional to graft uptake.

Keywords: Middle Ear Risk Index, Tympanoplasty, Graft uptake, Chronic suppurative otitis media.

Introduction

Tympanoplasty results depend on the severity of middle ear disease present preoperatively. Various grading systems were developed for this such as Belluci grading, Wullstein and Austin five part system, SPITE system of Black,⁽¹⁾ Kartush's factors.⁽²⁾ The Middle ear risk index developed by the above authors were numerical values which were evaluated with the help of the above factors. 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. Smoking was added as a risk factor.⁽³⁾

Aims and Objectives

1. To predict the result of tympanoplasty with the aid of MERI.
2. Based on MERI score the patient can be categorised as Mild, Moderate and Severe.
3. To study the interdependence between MERI score and success of tympanoplasty.

The objective of our study is to segregate the patients based on their MERI scores and assess the results of tympanoplasty.

Each risk parameter was given a numerical value:

MERI

Ear discharge: 0-3, Perforation: 0-2, Cholesteatoma: 0-2, Ossicular chain status: 0-4, Middle ear granulation and history of previous surgery: 0-2.

Now newly, smoking is also included as a risk parameter.

Materials and Method

This clinical study which was conducted in the ENT Department of TMCH, from July 2013 to June

2015. The group under study comprises 50 patients of the age group 20-45 years with Chronic suppurative otitis media (CSOM), both mucosal and squamous type with hearing loss planned for tympanoplasty. Patients with systemic diseases, otomycosis, septic foci such as sinusitis which can influence the outcome of tympanoplasty were excluded from the study.

History of ear discharge, hearing loss, previous ear surgery and use of ototoxic drugs were taken into consideration. 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 CBC, aural culture sensitivity, PTA and CT temporal bone were taken. Otoendoscopy and otomicroscopy were done to confirm the otoscopic findings. The MERI was evaluated. The patients were segregated into those with mild(0-3), moderate(4-6) and severe(≥ 7) MERI.

The type of tympanoplasty and mastoidectomy was decided intraoperatively based on the extent of disease in middle ear and mastoid. Temporalis fascia graft was used for all patients. Graft status was analysed by otoscopy, such as Healed graft/Atelectatic graft/Perforation of the graft.

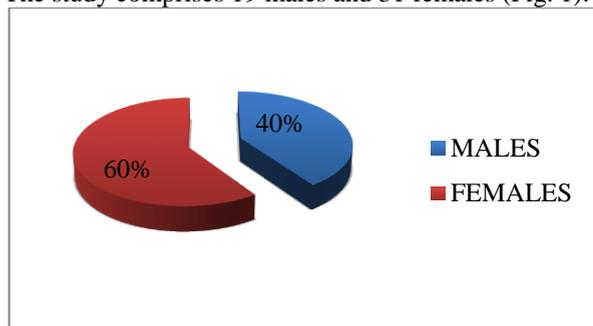
Results

This study was conducted in the department of ENT department, Thanjavur Medical College and Hospital, Thanjavur, Tamil Nadu for a period of two years from July 2013 to June 2015. The group under study consisted of 50 patients CSOM of both mucosal and squamous type (Table 1).

Table 1: Demographic data

Age	No. of Patients	Percentage
20-25 Years	5	18
25-30 Years	18	36
30-45 Years	16	32
35 - 40 Years	9	18

The study comprises 19 males and 31 females (Fig. 1).

**Fig. 1: Sex Distribution**

29 patients belong to mucosal or tubotympanic type of CSOM and 21 patients belong to the squamous type or the atticointral type.

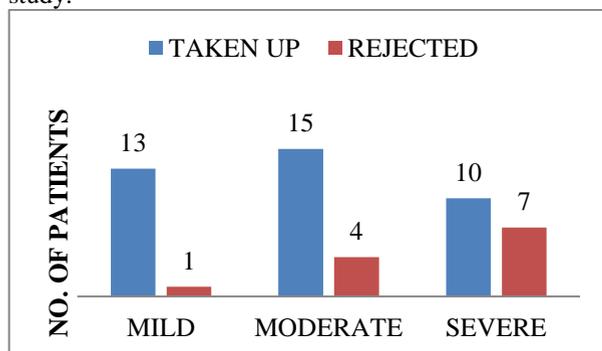
The study group comprises 14 patients with mild (1-3) MERI score, 19 patients with moderate (4-6) MERI score and 17 patients with severe (≥ 7) MERI score (Table 2).

Table 2: Distribution of cases

	Mild	Moderate	Severe
Taken up	13	15	10
Rejected	1	4	7

The data in the table indicates that when the MERI score is mild graft is taken up by 13 patients and rejected for only 1 patient. When the MERI score is moderate the graft is taken up by 15 patients and rejected for only 4 patients when the MERI score is high the chances of graft taken up among patients is low & rejection rate is high.

It may be noted from the above table that the p value of .031 is lower than alpha value at 5% level of significance by doing the T Test. Therefore higher the MERI score, lower the graft uptake in patients under study.

**Fig. 2: Graft Status Vs MERI Score**

The graft is taken up for 38 patients (72%) and rejected for 12 patients (28%). Thus the overall success rate of tympanoplasty is 74%. Among those with mild MERI, graft is taken up for 13 patients and rejected only for 1 patient. Similarly, among those with severe disease, there is higher graft rejection rate (7 patients) (Fig. 2).

Discussion

CSOM is a quite common ENT problem worldwide, especially in developing countries. It is more common in rural areas than urban areas and is associated with poor hygiene, illiteracy and is common among the middle and low income groups. 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. Hence these risk parameters are summarised and assigned a numerical value corresponding to the MERI index, which helps us to identify the extent of disease and thereby predict the outcome of surgery.

In our study, the overall success rate of tympanoplasty is 74% according to graft status. Manpreet Kaur et al did studies on comparison of graft uptake between tympanoplasty alone and tympanoplasty combined with simple mastoidectomy in non- CSOM (mucosal type) in patients with sclerotic bone. They concluded that graft uptake was 76% in patients who underwent tympanoplasty and 88% in tympanoplasty combined with simple mastoidectomy.⁽⁴⁾ Veyssel Yurttafli et al stated that the presence of middle ear with granulation tissue had a negative effect on the hearing improvement after reconstructive surgery. His study concluded that graft uptake rate was about 44% in patients with extensive middle ear granulation tissue.⁽⁵⁾ He suggested mastoidectomy with tympanoplasty for all patients with active middle ear infection to remove granulation tissue from middle ear and mastoid cavity. Success of hearing reconstructive surgery depends on the preoperative ossicular status. An intact ossicular system with only a perforation in the tympanic membrane gives the best results. Smoking is associated with reduced graft uptake. Zoran Becvarovski stated that delayed failure of the graft was more commonly seen in smokers(60%) than non-smokers(20%). The patients without tympanic membrane perforation had better graft uptake in the absence of other significant middle ear pathology. With many studies it was concluded that the rate of graft uptake is lesser with anterior perforations than posterior perforations. This is due to lesser blood supply to anterior part of the drumhead and lesser surgical access to the anterior part. Cholesteatoma is associated with reduced rate of graft uptake and hearing benefit. Generally canal wall down procedure is done for extensive cholesteatoma. The higher rate of recurrence was found to be in cholesteatoma. Recurrent Cholesteatoma is more than

twice common in children than adults according to Stankovic M.⁽⁶⁾ Debora Bunzen, Alexandre Campos, Fabiana Sperandio, Silvio Caldas Neto analysed factors which influence the results of the tympanoplasty. They concluded that presence of ear discharge preoperatively did not change the final surgical result. Smaller perforations yield better results than subtotal and total perforations. In patients with healthy middle ear mucosa there was 80% success rate.⁽⁷⁾ Pinar E et al stated that low MERI scores, smaller perforation, healthy opposite ear, absence of myringosclerosis and more than 3 months dryness were good prognostic factors.⁽⁸⁾

Sevim Aslan Felek studied the prognostic value of MERI in ossiculoplasty and compared the outcome of different ossicular prostheses. He stated that MERI is a valuable tool to make good patient selection.⁽⁹⁾ The role of MERI score on the outcome of tympanoplasty was studied by Rakesh Saboo et al. They concluded that patients with mild MERI had maximum graft uptake while those with severe MERI had greater failure rates.⁽¹⁰⁾ Viktor Chrobok et al stated that cholesteatoma, tympanic membrane perforation, status of the ossicular chain and history of previous surgery were highly significant negative prognostic factors influencing the outcome of tympanoplasty.⁽¹¹⁾ Granulation in middle ear predisposes to ossicular necrosis. Da Costa and Paparella found out that ossicle changes developed in 96% of granulation tissue.⁽¹²⁾

Conclusion

The study group comprised 50 patients, of which 19 were males and 31 were females. Most of them belong to the lower middle class, with malnutrition and poor literacy. Hence MERI score was found to be a useful and mandatory tool to predict the extent of disease as well as outcome of the surgery such as tympanoplasty in our area compared to other studies conducted in developed countries. Higher the MERI lower the graft result. Based on the study, MERI score was found to be a prognostic indicator on the outcome of tympanoplasty. Hence surgical success and hearing benefit can be explained to the patient pre-operatively with consent.

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