



EVALUATION OF MIDDLE EAR RISK INDEX IN PATIENTS UNDERGOING MIDDLE EAR SURGERY

Otolaryngology

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ABSTRACT

OBJECTIVE: The aim of this study was to examine the role of the prognostic factors and middle ear risk index on the success of tympanoplasty.

STUDY DESIGN: Case series.

SUBJECTS AND METHODS: The charts of 100 patients who underwent tympanoplasty operations between 2019 and 2020 were reviewed. Prognostic factors such as age, sex, presence of systemic diseases, location and size of perforation, duration of dry period, presence of myringosclerosis, presence of septal and conchal pathology, operation type, and status of the opposite ear and middle ear risk index were investigated.

RESULTS: The overall success rate was 74.4%. Multivariate analysis was carried out on significant prognostic factors to obtain independent variables and yielded the following results (95% CI): size of the perforation (<50%) (OR:8.11), healthy opposite ear (OR:5.64), more than 3 months dry period (OR:2.21), absence of myringosclerosis (OR:4.01) and low middle ear risk index (OR:87.1).

CONCLUSION: Size of the perforation (<50%), healthy opposite ear, absence of myringosclerosis, more than 3 months dry period, and low middle ear risk index were found to be significant independent prognostic factors.

KEYWORDS

MERI, tympanoplasty, ear surgery

INTRODUCTION

Tympanoplasty is a standard surgical procedure for the eradication of middle ear disease and reconstruction of hearing mechanism including tympanic membrane and ossicles. For chronic otitis media (COM), tympanoplasty is performed with or without mastoidectomy [1, 2]. Surgical procedures include atticotomy, simple mastoidectomy, operation with intact canal wall (ICW) or canal wall down (CWD), radical mastoidectomy, modified radical mastoidectomy, and Bondy's procedure [1]. Primary objective of the surgery is to eradicate the disease and treat the complications and finally to reconstruct the middle ear and make it work [1]. In ICW (intact canal wall) type of mastoidectomy, mastoid antrum is opened, and air cells are removed but posterior meatal wall is left intact. In CWD (canal wall down) procedures include radical mastoidectomy, modified radical mastoidectomy and Bondy's procedure. Ossiculoplasty involves the correction of ossicular chain abnormalities with the aim of improving hearing.

The Middle Ear Risk Index (MERI) by Kartush generates a numeric value which corresponds to severity of disease and the likelihood of a successful outcome following surgery. Using an index such as MERI (Table 1) can be effective guide for case selection, determining the type of operation and counselling of patients pre-operatively. [3,4]. The MERI by Kartush is an amalgamation of the Austin-Kartush classification of ossicular defects, the Belluci classification of otorrhea and takes into consideration the presence of tympanic membrane perforation, middle ear granulation and cholesteatoma. The MERI score varies from 0 to 16 and is categorized as follows: normal (0), mild (1-3), moderate (4-7), and severe (8-16). Aim of this study is to examine the role of the prognostic factors and middle ear risk index on the success of middle ear surgeries.

METHODOLOGY

A total of 100 patients, who underwent middle ear surgeries from February 2019 to November 2020, were evaluated at the department of ENT at Geetanjali Medical College and Hospital, Udaipur after taking

informed written consent and after obtaining approval from Institutional research Ethical board. The patients were evaluated in 3-month and 6-month follow-up visits. An intact graft in the right place, well aerated middle ear, and restored middle ear function at the end of the third month of follow-up indicated the success of the tympanoplasty. MERI 2001 score was used for this study [7]. Statistical analysis -After collecting the data, they were sorted by SPSS software version 16 and analyzed by using descriptive-inferential method. Chi square and Fisher tests were used to investigate the relationship between the variables and success of surgery in the 3-month and 6-month follow-ups. In this study, variables such as age, sex, systemic diseases (diabetes mellitus, hypertension), location and size of TMP, the health status of the opposite ear, the dryness duration of the ear, presence or absence of myringosclerosis during surgery, a deviated septum and hypertrophy of the inferior turbinate, mastoidectomy)

INCLUSION CRITERIA- Males and females between age 7-75 years, pt. with persistent TMP and COM with pathologies, pt. with systemic illness (DM, HTN).

EXCLUSION CRITERIA- Pt. with severe nasal septal deviation, Pt. with severe hypertrophy of inferior turbinate.

RESULTS

In this study, 100 patients were classified in the medium and low-risk group (n = 50, MERI: 1-7) and high-risk group (n = 50, MERI: 8-15). There was no zero or normal score. Mean age $\pm$ SD of 37.8 ± 14.3 years from which 44(44%) were men and 56 (56%) were women. Of all, 87 (87%) had no systemic disease and 9 patients (9%) had hypertension (HTN), 3 (3%) had diabetes mellitus (DM) and 1 (1%) had both DM and HTN. In the 3-month follow-up, 92 (92%) patients had a good tympanoplasty condition, and graft was also satisfactory, 8 (8%) patients had unsatisfactory graft and the result was not good, while it was 88 (88%) and 12 (12%) respectively in 6-month follow-up. The MERI score was mild for 40 (40%) patients, moderate for 10 (10%)

patients, and was severe for 50 (50%) patients. No patient had normal state or zero score. The results showed that there was no significant relationship between the variables and success of surgery in the 3-month and 6-month follow-up visits. However, the results indicated that, the chance of success of tympanoplasty after 6 months follow-up for women was 3.6 times more than that of men. The comparison of the mean MERI scores between three types of operation of intact canal wall (ICW), canal wall down (CWD) and non-mastoidectomy procedures showed that the lower the MERI score, the patient did not need mastoidectomy and vice versa. The worse the condition of the opposite ear, the higher MERI score was, and the longer the duration of dryness, the lower MERI score was and vice versa. There was a direct correlation between MERI and type of surgery, so that the highest MERI score was for those who underwent CWD surgery and the lowest MERI score was for those who underwent simple tympanoplasty without mastoidectomy. The comparison of the mean MERI scores between two CWD and ICW procedures showed that there was no significant difference between the mean MERI scores between these two types of surgery (Table 3). There was a significant difference between MERI scores of the two types of surgery with and without mastoidectomy (Table 4). Likewise, there was a significant difference between the MERI scores in these three types of surgery (Table 5), so that the lower the MERI score, the patient did not need to perform mastoidectomy and vice versa.

Table 3: Comparison of the mean MERI scores between the two CWD AND ICW procedures

SURGERY TYPE	N	MERI SCORE (mean $\pm$ SD)	P value
ICW	43	7.37 $\pm$ 3.25	0.09
CWD	18	8.28 $\pm$ 2.46	

Table 4: Comparison of mean MERI scores between the two types of surgery with and without mastoidectomy

SURGERY TYPE	N	MERI scores (mean $\pm$ SD)	P value
ICW	43	7.37 $\pm$ 3.25	0.0005
CWD	18	8.28 $\pm$ 2.46	
No Mastoidectomy	39	2.63 $\pm$ 2.32	

Table 5: Comparison of the mean MERI scores between the three types of surgery

SURGERY TYPE	N	MERI scores (mean $\pm$ SD)	P value
Mastoidectomy	61	7.64 $\pm$ 3.06	0.0001
No Mastoidectomy	39	2.63 $\pm$ 2.32	

DISCUSSION

Age is one of the prognostic factors for the success of tympanoplasty. The rate of success in pediatric patients undergoing tympanoplasty was less than that of adults due to the dysfunction of the eustachian tube.[8,9] Anterior perforation is more difficult to be used for tympanoplasty graft placement than other techniques. In the present study, the success rate of graft placement in the anterior perforation was 79.2% that was less than other perforations, however, there was no significant relationship for the anterior perforation. Pinar et al. [5] concluded that the success rate of tympanoplasty in the central TMP was higher than anterior and posterior perforations. Analysis of perforation size showed no statistically significant relationship. Pinar et al. [5] showed that there was a significant relationship between the size of the perforation and the success of tympanoplasty. When the size of perforation was less than 50%, tympanoplasty was more successful. Kumar et al.[6] indicated that there was a significant relationship between the size and success of tympanoplasty. In the present study, those who had dry ear for more than 3 months had higher success rate with higher frequency in grafting than those who had dry ear less than 3 months, but no significant relationship was found. Those who had healthy opposite ear had higher successful grafting than those with an unhealthy opposite ear, but this was not significant, which was also found in the study by Singh et al. [10]. There was no significant relationship between the success of tympanoplasty and myringosclerosis. The mean MERI score in the CWD group was the highest, indicating that individuals who have higher MERI scores, have higher risk factors and require CWD surgery. In the group that had undergone a simple tympanoplasty without mastoidectomy, MERI score was low, suggesting that individuals with lower MERI scores undergo simple tympanoplasty with a high success rate. Analysis of the correlation between age, TMP, perforation size, opposite ear status, dryness period, myringosclerosis, septum deviation, hypertrophy of inferior turbinate, and type of surgery with MERI score showed that the correlation between apposite ear health status, dryness duration,

and type of operation with MERI score was significant, which indicates that these three variables are effective in the success of tympanoplasty. This study showed that patients with a MERI lower than 3 or mild group had higher success rates. The mean MERI score was significantly higher in patients underwent CWD than ICW. The reason for this is that in moderate and severe MERI, cholesteatoma, ossicular chain instability and middle ear pathology are likely to occur. The results of this study were consistent with those of Pinar who showed that the mean MERI score in patients underwent CWD was higher than those underwent ICW.

CONCLUSION:

This study showed that patients with high MERI are more likely to require CWD, but those with low and moderate MERI are less likely to undergo CWD surgery. Accurate MERI, especially high, helps surgeons to some extent to explain to patients about the possibility of failure of tympanoplasty prior to surgery. Also, it helps surgeons to plan the surgery more precisely before operation.

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