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Role of Eustachian Tube Function and MERI Score as Predictors of Tympanoplasty Results in Tubotympanic CSOM

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Abstract **Original Research Article**

The prospective study was conducted on 82 patients of Tubotympanic type of Chronic Suppurative Otitis Media. All patients undergo through history taken and examinations especially Eustachian tube function, audiological evaluation and MERI score. All patients undergo tympanoplasty and then evaluate results as graft uptake and hearing improvement. In study of 65 patients have normal Eustachian tube function in which graft take up rate 59 (88%)in compare to Eustachian tube dysfunction 15 patients have 8(53%). Hearing improvement is good with low MERI score. Chronic suppurative otitis media (CSOM) is a commonly encountered infection of the middle ear all over the world. The assessment of Eustachian tube function is an important predictor of postoperative results of surgery. MERI score developed by Kartush has been used in present study to divide different groups as per severity of disease and to predict the outcome of tympanoplasty.

Keywords: CSOM. Eustachian tube. MERI score. Tympanoplasty.

INTRODUCTION

Chronic suppurative otitis media (CSOM) is a chronic inflammation of the middle ear and mastoid cavity. The patients with tympanic membrane perforations where discharge is present for periods from 6 weeks [1] to 3 months, despite medical treatment, are recognized as CSOM cases.

Otitis media is a leading cause of healthcare visits worldwide and its complications are important causes of preventable hearing loss, particularly in the developing world [2].This disease is the most common childhood infectious disease worldwide, starting early in life [3].

Continuing mucosal infection of the middle ear by resistant organisms, continuing infection of the nasopharynx with secondary infection of the middle ear cleft and changes in the mucosa of the middle ear secondary to eustachian tube dysfunction may all contribute to the development of chronic otitis media [4]. The functioning of eustachian tube is significant in pathogenesis of CSOM along with microbiological and anatomical factors.

The hearing loss is more in large and malleolar perforations compare to small and non-malleolar perforation. The most common thought regarding hearing loss is that it usually increases with the size of perforation, more so if it is in post inferior quadrant and less in anterior inferior quadrant. A large number of patients undergo tympanoplasty these days, it becomes important to assess ossicular status and treat as per status.

The Mortality and morbidity due to otitis media are primarily related to the complications of CSOM [5]. Surgical repair (tympanoplasty) of the perforated tympanic membrane (TM) is indicated to restore hearing ability as well as to prevent recurrent otorrhea [6]. The severity of disease, willingness of patient, proper counseling and the extent to which ear disease affects routine life of patient is an important measure which is a decisive factor of ear surgery.

The Middle ear risk index was developed with 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.

MERI score can be used as important predictor to assess the severity of disease and to predict the outcome of tympanoplasty thus reduce the burden of suffering patients and provide betterment in day to day life. The present study was done to divide CSOM cases as per severity of disease and assess prognosis of surgery as per their MERI score and to find out role of Eustachian tube in postoperative results.

The varying degree of hearing loss caused by central perforation of tympanic membrane, various theories regarding effect of perforation on hearing loss and importance of normal Eustachian tube function and MERI score in tympanoplasty operations outcome encouraged us to carry out present study to study the clinicoepidemiological picture of CSOM along with relation of MERI score and outcome of surgery.

MERI SCORE

MATERIAL AND METHODS

The study was conducted on 82 cases in NIMS medical college and hospital Jaipur from June 2016 to June 2018. It was a prospective tertiary care hospital based study done on all the patients of CSOM presenting to our department and selected as per our predetermined questionnaire. The relevant history was elicited and thorough general and local ENT examination was done.

Otoscopic examination along with examination under microscope was done to find the presence or absence of perforation, status of middle ear ossicles and mucosa, granulation tissue and cholesteatoma. Examination of nose and paranasal nasal sinuses and throat was done to rule out any local infection in order to ensure good postoperative results. The audiological test were also done as per requirement as pure tone audiometry, Eustachian tube function by instilling ear drop, tympanometry, otoscopic examination, examination under microscope, ear swab for culture and sensitivity. MERI scoring was also done.

Table-1: Middle Ear Risk Index (MERI)

Risk Factor	Risk Value
Otorrhea	Dry – 0
	Occasionally Wet -1
	Persistently wet – 2
	Wet with cleft palate – 3
Perforation	Absent – 0
	Present – 1
Cholesteatoma	Absent – 0
	Present – 2
Ossicular chain	Malleus, incus and stapes present – 0
	Defect of incus – 1
	Defect of incus and stapes – 2
	Defect of incus and malleus – 3
	Defect of malleus, incus and stapes - 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

RESULTS

The present study was conducted on 82 cases. The most common age group was 21-30 years 42 (51.2 %) followed by 11-20 year age group 25 (30.44 %) .The patient included in 31-40 year age group were 7 (8.5 %) and 41-50 year age group were 5 (6.1 %) and >50 year age group were 3 (3.6 %) . The youngest patient was 12 years of age and oldest patient was 55 years in age. Male to female ratio was 1.56:1. Male predominance was seen with 50 and females were 32. Most patients belong to lower socioeconomic status 54 (65.85%) with 20 patients (24.39 %) belonging to middle and 8 (9.75 %) higher socioeconomic status. The most common complaint was discharge from ear in 76 cases. Hearing impairment was seen in 56 (68.2 %) cases, occasional pain in ear in 3 cases.

As per the size of perforation 5 cases presented with small perforation, 61 with medium perforation, 10 with large perforation, 6 with subtotal and total perforation. In pure tone audiometry 68 were having conductive hearing loss, 14 were having mixed hearing loss. None of the patient presented with pure sensorineural hearing loss. Most of the cases involved two quadrants with an average hearing loss of 35 db and large perforation with involvement of all four quadrants as 42 db.

The pathology in ossicular chain was seen in 10 cases. The erosion of handle of malleus was observed in 6 cases and long process of incus in 4 cases. An average hearing loss of 45 db was seen in cases with handle of malleus erosion and 55 db hearing loss in cases with erosion of long process of incus.

The functioning of eustachian tube was tested. Among 82 ears, 67 ears had normal ETF while 15 had eustachian tube dysfunction. We found that among 67 ears with normal Eustachian tube function, 59 (88%) cases there was acceptance of graft and 8 (12%) cases had rejection might be because of poor follow up and developing upper respiratory infections. Among Eustachian tube dysfunction i.e. 15 ears, graft was accepted in 8 cases & rejected in 7 cases.

As per MERI score it was seen that MERI score of 1-3 present in 64 cases, 4-6 in 15 cases and 7-12 in 3 cases. The graft uptake was seen in maximum cases 55 (85.9 %) with low MERI score, 12 (80%) with MERI score of 4-6 and none in severe category.

DISCUSSION

Chronic otitis media is a permanent abnormality on tympanic membrane following a long standing middle ear infection emanating from previous ASOM, OME or negative pressure to the middle ear [7]. It can be found in all age groups and is a major social burden to society.

In present study the age group which is most commonly involved is 21-30 year age group. According to Glasscock, though otitis media is a disease which occurs commonly in paediatric age group, the mean age at which the disease manifests is 20-29 years. Due to this reason, it is more commonly seen in young adults [8]. The male preponderance was present which is supported by studies done in past [9] which might be due to larger no. of male attending hospital

In present study lower socio economic status was more involved. This observation was in accordance with previous studies [10]. Incidence of this disease is higher in developing countries especially among lower socioeconomic society because of malnutrition, overcrowding, poor hygiene, inadequate health care, and recurrent upper respiratory tract infection [11]. The most common complaint was otorrhoea followed by hearing impairment and occasional pain in ear. Maximum case presented with medium size perforation followed by large perforation.

The hearing impairment was found between 26-70 db with 53 % patient presenting with 26-41 db loss and 41 % patients with 41-55 db loss. Conductive hearing loss was most common followed by mixed hearing loss with none of the patient presenting with pure sensorineural hearing loss. The conductive hearing impairment resulting from this condition has been well acknowledged in the literature [12]. The incidence of SNHL has also been documented in recent studies. The toxins might cause damage to the hair cells especially those at the cochlear base; where the hair cells are sensitive to high frequency sounds [13,14].

It was found that malleolar perforation had significantly greater hearing loss than nonmalleolar perforations.This finding might be because when the contact with handle of malleus and membrane is lost, the ability of handle of malleus to move is affected. Thus the tympanic membrane is effective only so far as it communicates its motion though its attachment to the handle of malleus and not otherwise. It follows that a perforation would have a serious effect when it is located in the vicinity of its attachment to the handle of malleus. Hence malleolar perforations will have greater hearing loss than nonmalleolar perforations because of more effective transmission of vibrations to the handle of malleus.

The average hearing loss was more in perforation involving all quadrants as compared to others which involved less than four quadrants. This further confirms the observation that with increase in size of perforation hearing impairment increases. The hearing loss associated with extent and number of involved ossicles also varies. The normal functioning of Eustachian tube was found to be an important factor in

better postoperative results in terms of graft uptake and hearing gain.

MERI score helps in assessing the prognosis of tympanoplasty. Tympanoplasty is the surgical procedure which involves the reconstruction of the middle ear and the sound conducting system. The tympanoplasty is done to remove the disease, improve hearing and establish ventilation of the middle ear. This helps in explaining patient regarding outcome of surgery and to have realistic approach towards success rate of surgery. The cases with low MERI score had graft uptake rate higher as compared with high MERI score. Hearing impairment is one of the most important and preventable complication of CSOM. Thus proper management is necessary to avoid complications. Smoking (both passive and active) affects healing after tympanoplasty [15].

CONCLUSION

It is important to spread awareness among the people for discharging ear for its early diagnosis and management. People should thus be encouraged for maintaining adequate hygiene and proper nutrition for a better outcome. Tympanoplasty is a surgical technique which helps in providing better quality of life to patient as it helps in hearing improvement and prevent recurrent discharge from ear. The results achieved by use of appropriate MERI score and assessing status of eustachian tube functioning were good.

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