

Original Research Article

Traumatic tympanic membrane perforation: an overview in a tertiary care centre-Khammam

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ABSTRACT

Background: Aim of the study was to distinguish traumatic tympanic membrane perforation (TTMP) by distribution, etiology and clinical presentation and to assess the prognosis and outcome of treatment and establish masterly inactivity as main treatment modality.

Methods: A prospective observational study was performed on 60 cases of traumatic tympanic membrane perforation in the outpatient department of otorhinolaryngology, Mamatha medical college and general hospital, Khammam from October 2019 to March 2021. All the patients came to ENT OPD with the history of trauma to the ear and hearing loss were examined and after obtaining proper history, all the patients underwent ENT clinical examination, oto-endoscopic and audiological evaluation by pure tone audiometry. All the patients diagnosed with traumatic tympanic membrane perforation after obtaining informed written consent were included in the study. All the patients were followed at regular intervals and observations were recorded.

Results: All patients were evaluated based on oto-endoscopic examination. Age ranges from 20-50 years, mean age of 33.6 years and with a male to female ratio of 1:1.4. Commonest etiology was physical assault (61.66%) followed by self-inflicted injury accounting 20%. Tinnitus (90%) was the common presenting complaint and the perforation spontaneously healing is about 90% patients.

Conclusions: Traumatic perforation of tympanic membrane is under-reported otologic defect which has a good prognosis if treated at right time with a need to educate people on the consequences and about unskilled removal of wax/foreign body, early identification and apt diagnosis and management.

Keywords: Traumatic tympanic membrane perforation, Reduced hearing, Spontaneous healing, Outcome

INTRODUCTION

The tympanic membrane is a thin wall that separates the outer ear from the middle ear.¹ Traumatic tympanic membrane (TM) perforation is an injury of the ear drum, which is frequently faced by otolaryngologists. Trauma to the tympanic membrane and the middle ear can be caused by overpressure, thermal or caustic burns, blunt or penetrating injuries such as instrumentations and barotraumas.^{2,3} Traumatic perforation of the tympanic membrane may be caused by direct impact of fluids and direct pressure from outside.

Traumatic perforation of the tympanic membrane is a common injury that is under reported, hence there is a need to educate on unskilled removal of foreign body, early identification, evaluation and referral of patients so as to reduce the morbidity.

The symptoms of traumatic TM perforation include impaired hearing, aural fullness, tinnitus, otalgia and in severe cases there may be bleeding from ear and vertigo.

A simple traumatic tympanic membrane perforation remains the most common type of trauma-induced otologic dysfunction.⁴ Treatment of traumatic tympanic

membrane perforation range from inactive watchful waiting, active intervention to surgical intervention.⁵ Active interventions include topical application of substances like epidermal growth factor, enoxaparin, and ascorbic acid to stimulate epithelization for quick closure or to prevent formation of sclerotic plaques in the perforated membrane.⁶⁻⁸

An unhealed perforation has got a definite impact on the lifestyle of the patient interfering with his occupational and recreational activities. The risk of failure of spontaneous healing is very real resulting in persistent perforation with its associated problems like infections, hearing loss and late developing cholesteatoma. Surgical intervention is indicated in these cases which include exploration and tympanoplasty, closure of the perforation with stents in the form of simple patches or in the form of silk membrane, or steri-strip patching.⁹⁻¹¹ Closing a perforation has the following advantages like improvement in hearing, that the patient can tolerate getting water in to the ear like swimming, taking shower etc. and that recurrent ear discharges is unlikely to occur during upper respiratory tract infections

Although traumatic tympanic membrane perforations have good prognosis, it is necessary to induce patients with profuse explanations for possible complications to visit out patient-clinic until wound has healed completely.

In our present study, the aim is to analyse the mode of trauma, clinical presentation, characteristics of the perforation and to evaluate the prognosis and outcome of traumatic TM perforations by different means of treatment.

METHODS

This prospective study has been conducted in the department of ENT, Mamatha medical college, Khammam, during a period of 18 months from October 2019 to March 2021.

Inclusion criteria

Subjects of age group 20-50 years of age and both sexes, irrespective of the socio-economic status, patients with history of trauma sustained not earlier than 2 weeks, able to follow the study procedures were included in the study. Informed written consent in Telugu/English.

Exclusion criteria

Subjects less than 20 years and above 50 years, any form of ear surgeries in the past and any active middle ear disease were excluded from the study.

Methodology

After obtaining clearance and approval from the institutional ethical committee, 60 patients fulfilling

Inclusion/exclusion who gave informed consent were included in the study. A detailed clinical and otoscopic examination was performed and associated symptoms such as vertigo and tinnitus were noted. Tuning fork tests, and pure tone audiometry (PTA) was performed on all patients. Follow-up visits were scheduled at 1 week, 2 weeks, 4 weeks, 8 weeks and 10 weeks and further follow up was tailored to the needs of the individual patient. The PTA was repeated on 2nd and 4th visit. The data retrieved included the following parameters: sex, age, and side, cause of injury and symptoms such as earache, hearing loss, tinnitus, and vertigo were recorded. The eardrum appearance was assessed by otoscope/microscope. The following criteria were used to estimate the size of perforations: small perforation, <1 quadrant; middle perforation, >1 quadrant and <2 quadrants; and large perforation, >2 quadrants. A conservative treatment was followed for most of the patients except for those with otorrhea who were prescribed with oral/systemic antibiotics to prevent further infection. The patients were explained about the precautionary measures and each patient was assessed with at least 3 visits. The data retrieved from the patients during their visits were entered into an SPSS computer software and analysed descriptively.

RESULTS

A total of 60 patients with traumatic TM perforation were enrolled in this study. The group consisted of 35 females and 25 males.

In this study group, the age ranges from 20 to 50 years. 56.66% of the patients belong to 20-30 years age group, the youngest being 20 years old and the oldest being 50 years old (Table 1).

Table 1: Distribution of age intervals in the study group (n=60).

Age group (years)	No. of patients (%)
20-30	34 (56.66)
31-40	14 (23.33)
41-50	12 (20)

The right ear was involved in 20 patients and left ear was involved in 37 patients, and bilateral in 3 patients in this study group.

The most common etiology of traumatic tympanic membrane perforation in our study was physical assault accounting for 61.66% cases, followed by self-inflicting (20%), syringing and suctioning accounts for 13.33% cases and the blast injury causing trauma to tympanic membrane contributed to five percentage cases in Table 2.

In our study, tinnitus (90%) was the most commonly presented symptom among the patients (Table 3).

Table 2: Distribution of etiological factors (n=60).

Etiology	No. of patients (%)
Physical assault	37 (61.66)
Self-inflicting	12 (20)
Syringing, suctioning	8 (13.33)
Blast injury	3 (5)

Table 3: Distribution of presenting symptoms in the study group (n=60).

Presenting symptoms	No. of patients (%)
Tinnitus	54 (90)
Reducing hearing	45 (75)
Ear pain	30 (50)
Aural fullness	27 (43.33)
Aural bleeding	15 (25)

In this series, 60% of the patients mostly presented small perforation involving a single quadrant of the tympanic membrane, 33.33% had medium perforation involving 1-2 quadrants of tympanic membrane, 6.66% had large perforation involving more than 2 quadrants.

In our study, majority of patients (66.66%), presented with the conductive hearing loss in the range of 20-35 dB, 25% of the patients with <20 dB hearing loss. While 8.33% of the patients had >35 dB hearing loss in Table 4.

Table 4: Degree of hearing loss in the study group (n=60).

Air bone gap (dB)	No. of patients (%)
<20	15 (25)
20-35	40 (66.66)
>35	5 (8.33)

In our study, 40 (66.66%) patients had spontaneous healing within 2-6 weeks, 16(26.66%) patients within 7-9 weeks and 4 (6.66%) patients within 10-12 weeks. The shortest time taken was 17 days and longest being 68 days.

In study, overall spontaneous healing was achieved in 54 (90%) of patients. Tympanoplasty was done in 3 (5%) patients, trichloroacetic acid cauterization in 2 (3.33%) and residual perforation was found only in 1 (1.66%) patient (Table 5).

Table 5: Overall outcome in the perspective of healing of perforation in the study group (n=60).

Outcome	No. of patients (%)
Spontaneous healing	54 (90)
Tympanoplasty	3 (5)
Trichloro acetic acid cauterization	2 (3.33)
Residual perforation	1 (1.66)

DISCUSSION

The tympanic membrane (TM) is an important component of sound conduction as its vibratory characteristics is necessary for sound transmission in human beings.^{1,2} Trauma to TM and the middle ear can be caused by overpressure, blunting or penetrating injuries and barotraumas.^{2,3}

Traumatic tympanic membrane perforations affect all age groups. In this series we found that the age group (20-30) was found to be the most affected, similar to studies undertaken by Gacek and Berger et al, with a mean age of 33.6 years similar to the study done by Sogebi et al which had a mean age of 33.8 years. Male to female involvement ratio was found to be 1:1.4 with a slightly higher female predominance (58.33%) similar to study reported by Lindeman et al and Lou et al.¹²⁻¹⁶ But, a higher male dominance in results was reported by Gacek and Lilly-Tarah and Somefun.^{3,12}

In this study, almost 95% patients had unilateral ear involvement, with right to left involvement ratio being 1:1.85. This could be associated with the fact that most assailants were right-handed and likely the most of acts of trauma such as slap occurred with the assailant and victim facing each other making the left ear more vulnerable which was similar to the results of Lindeman et al and Berger et al.^{13,15}

Attempts at removal of foreign bodies from external auditory canal, self-ear cleaning with a variety of objects and wax removal in an unskilled manner either by parents, quacks or primary care physician are other important causes of trauma as reported in various other studies.¹⁷ Contradicting to this, in our study it was found that physical assault as the most common cause accounting for 61.66% cases.

Regardless of the mode of injury, tinnitus was found to be most common symptom (90%). The next common symptom being reduced hearing (75%), ear pain (50%), aural fullness (43.33%) and aural bleeding (25%). In the works of Berger et al and da Lilly-Tariah and Somefun hearing loss was a more common symptom than tinnitus followed by ear pain.^{3,13}

Most traumatic perforations heal spontaneously, there was a 90% healing in our study similar to studies.¹⁸ The most effective management is masterly inactivity. Because of the risk of introducing infection, the ear should not be cleaned out. The ear must be kept dry by preventing water from entering the ear canal.¹⁹

The two main predisposing factors for the failure of perforation to heal are loss of tissue and secondary infection. If the perforation fails to close spontaneously by 3-6 months (in the absence of secondary infection), surgical closure is indicated.¹⁹ In our study, residual perforation was observed in only one patient.

CONCLUSION

Traumatic tympanic membrane perforations are still common in our environment and generally the prognosis is excellent. It affects all age groups with females over males and physical assault being the most common of the etiology seen. Left ear is affected more than the right ear and tinnitus is the commonest presenting symptom. The results obtained strongly suggest that prolonged follow up and observation remains an excellent option for the patients presenting with traumatic tympanic membrane perforation.

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