

Evaluation of Paper Patch Myringoplasty as a Treatment Modality in Patients with Tympanic Membrane Perforations

Charuhas S. Jagtap¹, Mangesh R. Wadekar², Dnyaneshwar Y. Mahajan³¹Associate Professor, Dept. of ENT, ACPM Medical College, Dhule²Associate Professor, Dept. of Anesthesiology, ACPM Medical College, Dhule³Professor, Dept. of Dermatology, ACPM Medical College, Dhule

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Corresponding Author: Charuhas S Jagtap

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Abstract:

Background: Tympanic membrane perforation is seen as partial and/or total rupture of the ear membrane which can occur for many reasons such as trauma, infection, malignant tumors, or iatrogenic interventions. The aims of our study were to evaluate the outcome of office-based paper patch grafting in tympanic membrane (TM)

Methodology: This is a retrospective study of 100 patients that underwent paper patch myringoplasty in Dept of ENT at ACPM Medical College, Dhule, Maharashtra. The clinical factors with potential impact on the healing status of the TM were investigated such as gender, age, laterality, etiology, duration of perforation, tinnitus, hearing loss, otorrhea, size and location of perforation, status of contralateral ear, ipsilateral findings of computed tomography, and duration of complete healing.

Result: TM perforation completely healed in 75.00% cases, and the mean duration of complete healing was 15.11±16.2 weeks.

Conclusion: Paper patch grafting can also be considered before formal surgical myringoplasty in the case of small, dry, chronic TM perforations.

Keywords: TM Perforation, Paper Patching, Myringoplasty.

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Introduction

The tympanic membrane is a membranous structure 0.1mm in thickness and 10-11 mm in length which separates the middle ear cavity from the external ear pathway and transmits sound waves to the middle ear.[1] Tympanic membrane perforation is seen as partial and/or total rupture of the ear membrane which can occur for many reasons such as trauma, infection, malignant tumors or iatrogenic interventions. [2] Chronic suppurative otitis media (CSOM) is an infection of the middle ear cavity, the eustachian tube and mastoid and is the most frequent cause of permanent tympanic membrane perforation, especially in developed countries. [3] Because of perforation, the tympanic membrane is non-intact and there is an intermittent suppurative discharge in the external ear pathway. Conductive hearing loss accompanies the table because of tympanic membrane perforation. Even though a low socio-economic level, crowded living environments, insufficient intake of maternal breast milk, poor nutrition, cigarette smoking, and allergies are held responsible in the etiology, the main etiological factor is frequently recurring and not fully treated middle ear infections [4]

Traumatic tympanic membrane perforations (TTMP) are a result of blunt or penetrating trauma causing increased pressure in the external ear pathway, such as traffic accidents, slap injury, blast injury, terror attacks or self-inflicted injuries. Perforations are generally in the anterior quadrant in the pars tensa and tend to spontaneously recover.[5] The present study was designed to evaluate the outcomes as a result of paper patch myringoplasty conducted as a management modality for TM perforation cases treated in the institution.

Methodology

The present retrospective study was conducted over a period of 6 months from January to June 2025 at ACPM Medical College, Dhule. The study included all cases of patients in whom patch graft myringoplasty was performed to close a TM perforation by an ENT surgeon.

Inclusion Criteria: Patients with TM perforations regardless of the cause or onset

Exclusion Criteria:

- History of previous middle ear surgery;

- Nasopharyngeal or skull base pathology resulting in Eustachian tube dysfunction.
- History of radiation to head and neck region.
- Attic perforation.
- Patient refusing paper patch grafting and choosing alternative treatment options; and
- Patients who were followed up for less than 1 year after paper patch grafting.

This retrospective study enrolled all cases in which patch graft myringoplasty was performed to close a TM perforation by an ENT surgeon and informed consent was waived because of the retrospective nature of the study. The candidates for data analysis were patients with TM perforations regardless of the cause or onset. The middle ear/mastoid pathology

was verified by operating microscope/ otoendoscopy or computed tomography (CT).

Data Analysis: Data was recorded on a Performa. For categoric variables chi-square test was used. For continuous variables independent samples t- test will be used. p-value <0.05 was considered as significant.

Results

The study comprised of 100 cases compiled by the authors. There was a statistically insignificant female dominance in the sample size. Mean age of patients 42.36±10.39 Yrs. 55 patients were female. 46 cases were traumatic injury and 44 cases were infective. (Table 1)

Table 1: Demographic variable

Mean age	42.36±10.39 Yrs
Sex (Male: Female)	45:55
Etiology (Trauma: Infection: Iatrogenic: Unknown)	46: 44: 6: 4
Side (Right:Left)	44:56

Table 2: Clinical profile

Tinnitus present		54(54.00%)
Hearing loss present		60(60.00%)
Time interval between TM perforation and patch grafting	< 3 weeks	64(64.00%)
	3weeks-months	25(25.00%)
	>3 months	11(11.00%)
Size of TM perforation	<1/3	78(78.00%)
	1/3-2/3	18(18.00%)
	>2/3	4(4.00%)
Location of TM perforation	Anterior	67(67.00%)
	Inferior	9(9.00%)
	Posterior	19(19.00%)
	Multiple	5(5.00%)
Duration for complete healing (weeks, mean±SD)		15.11±16.2 weeks
Success rate		75(75.00%)

The data presented in the table 2 describes various clinical and surgical parameters related to tympanic membrane (TM) perforation and its management through patch grafting. Among the patients, 54% reported the presence of tinnitus, while 60% had associated hearing loss. These symptoms reflect the common otological complaints in patients with TM perforation. A majority of the patients (64%) underwent patch grafting within 3 weeks of TM perforation. Another 25% received the procedure between 3 weeks to a few months after the perforation, while the remaining 11% underwent surgery more than 3 months later. This indicates a preference or clinical recommendation for early surgical intervention in most cases. The perforation was less than one-third of the TM in 78% of cases, suggesting that smaller perforations were more frequently encountered or selected for patch grafting. Perforations between one-third and two-thirds of the TM were seen in 18% of cases, and large perforations (>2/3 of TM) were relatively rare (4%).

The anterior quadrant of the TM was the most common site of perforation, observed in 67% of the patients. Posterior perforations were noted in 19% of cases, inferior in 9%, and multiple site perforations in 5%, highlighting anterior perforations as the most frequent surgical indication. The mean time taken for complete healing was 15.11 weeks with a relatively high standard deviation (±16.2 weeks), indicating variability in healing duration across patients. The overall success rate of patch grafting was 75%, suggesting a favorable outcome in the majority of cases.

Discussion

The long-term success rate of paper patch grafting for TM perforation was 75.00% in this study. Our success rate is similar to or slightly higher than those in previous reports [6,7]. However, our general success rate is lower than that reported by Lou et al. [8] In their study, almost 98% of 504 cases with traumatic TM perforations were acute onset (within 1

month after a trauma), and a spontaneous healing rate of 89% cases was reported. Success rate of paper patch grafting for traumatic TM perforations where acute onset is still lower than that of Lou et al. [8] and this difference in success rate suggests that there may be other prognostic factors apart from etiology.

The strength of this study is that we evaluated the predictive clinical factors for successful paper patch myringoplasty for TM perforation. Previous studies reported the size of TM perforations as the predictor for successful paper patching. Golz et al. [6] reported that the closure rate of paper patch myringoplasty depended on the perforation size in the cases of chronic perforations of more than 1 year. Lee et al. [7] also reported that TM perforations of less than 4 mm show the highest closure rate, significantly in cases of chronic otitis media. However, these two studies analyzed only the size of TM perforation as the outcome predictor and did not evaluate any other clinical factors.

The study by Park et al. [9] reported that perforation size was the only outcome predictor of paper patch myringoplasty, although they analyzed predictive factors, including age, sex, affected ear, hearing level, duration of perforation, cause, location and size of perforation, relationship between the perforation border and the malleus, status of TM surface, and number of patch applications. Contrastingly, our study revealed that patient's age, etiology of TM perforation, and history of otorrhea were the important predictive factors for successful paper patch myringoplasty for TM perforation. There were three major differences between the materials and methods of the two studies. The candidates of Park et al. [9] had chronic perforations lasting for more than 3 months; however, our study included all TM perforations regardless of duration.

Conclusion

The predictors of successful outcome were patient's age and etiology of perforation. Clinicians can attempt paper patch myringoplasty first in younger patients, traumatic TM perforation cases, and in patients with no history of otorrhea. Paper patch grafting can also be considered before formal surgical

myringoplasty in the case of small, dry, chronic TM perforations.

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