https://doi.org/10.29309/TPMJ/2026.33.07.10383 www.theprofesional.com

ORIGINAL ARTICLE

To determine the efficacy of underlay technique for myringoplasty in terms of hearing improvement.

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ABSTRACT… Objective: To determine the efficacy of underlay technique for myringoplasty in terms of hearing improvement. **Study Design:** Descriptive Case Series. **Setting:** E.N.T Department, Sir Ganga Ram Hospital, Lahore. **Period:** 11/8/2025 to 10/2/ 2026. **Methods:** Consecutive non probability sampling. A total 132 patients were observed in this study. An extensive ear, nose, and throat examination was performed along with a full history. Pure tone audiometry and tuning fork tests were used for preoperative evaluation. General anesthesia was used for every procedure. The underlay technique was carried out using the endaural approach. A large tympanomeatal flap was elevated based on the superior vascular pedicle together with the annulus. The middle ear was filled with tiny pieces of spongeston. **Results:** Mean age of patients was 30 years with standard deviation ± 12.46. Male patients were 44 percent while 78% patients were female. Additionally, 84% of patients found success with the underlay approach, whereas 21% did not. **Conclusion:** According to our research, the underlay method was 84% successful in improving hearing following myringoplasty.

Key words: Chronic Otitis Media, Myringoplasty, Underlay Myringoplasty.

Article Citation: Javaid W, Waqas SM, Khalid A, Bukhari ST, Amin MUK, Siddique MA. To determine the efficacy of underlay technique for myringoplasty in terms of hearing improvement. Professional Med J 2026; 33(07):1248-1251. https://doi.org/10.29309/TPMJ/2026.33.07.10383

INTRODUCTION

A surgical technique called myringoplasty is used to rebuild the ear drum.[1] The purpose of this surgery is to close the perforation with a dry, stable grafted membrane and raise the patient's hearing level.[2]. Berth Hold developed the notion of myringoplasty by using a full-thickness skin transplant to close a tympanic membrane perforation. Numerous adjustments have been made to both technique and material since then[3]. CSOM typically manifests within the first five years of life and is a follow-up to acute or unresolved otitis media, especially in children from low-income families. An upper respiratory tract infection or contamination from ear canal organisms may cause illness if there is a preexisting perforation or ventilation tube malfunction. Tympanic membrane perforation is usually due to chronic suppurative otitis media, trauma, physical injury, burns, scalds and head injury.[4] Patients with persistent perforation are disabled not only because of hearing loss but also from recurrent ear discharge. Factors prior surgery on that ear, the surgeon's experience, per operative infection, ETD, tympanosclerosis affects final outcome of surgery[5]. The tympanic membrane has a high tendency to heal. Small perforations heal spontaneously but become permanent and do not heal spontaneously when the edges of the perforation are covered by stratified squamous epithelium[6]. Surgical repair is necessary if the perforation does not heal on its own or with the conservative treatment. Hearing improvement and intact membrane (transplant uptake) are used to assess surgical success in terms of air-bone gap closure within 10 db. Over time, a number of surgical methods for myringoplasty have been developed. Use of an endoscope or an auditory microscope are currently the two most used methods. [7]

In another study Group A (overlay group) had a mean postoperative Air Bone gap of 11.72 dB and a graft success rate of 89.18%, whereas Group B (underlay group) had a mean postoperative Air Bone gap of 11.11 dB and an uptake rate of 91.43%.[8] Another investigation found that the underlay technique was effective.

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Article received on:
12/02/2026
Accepted for publication:
22/04/2026

Healing was seen in 92.7% of patients and 75.7% of patients had improved hearing.[9] After myringoplasty, Overall, the graft uptake was successful. 88.3%, with 90% for dry ears and 86.7% for moist ears. There was no discernible statistical difference between the two groupings (0.688>0.05 p value). Following surgery, there was substantial improvement in hearing of both groups with a mean hearing gain in comparison to preoperative hearing for wet ears instances,[10,11]

METHODS

After receiving approval from Combined Institutional Ethical Review Committee of Fatima Jinnah Medical University Lahore No. 118/CIERB Dated 10.02.2026, this study was conducted at the ENT department of Sir Ganga Ram Hospital Lahore from Six months, 11/8/2025 to 10/2/ 2026.

It is a descriptive case series study and sample size was 132 patients using 94.2%[9] proportion of hearing betterment in inlay technique for ear drum repair, 95% confidence interval, 4% margin of error. The patients from 18 to 65 years age group and both sexes were enrlolled in this study. They had a history of chronic suppurative otitis media in active mucosal and Air Bone gap of > 20db.

Patients with chronic rhinusinusitis, nasal septum deflection, inferior turbinates hypertrophy and sinunasal polyposis on clinical examination, Eustachian tube dysfunction on tympanogram, Prior ear surgery on history, Attic tympanic membrane perforation were excluded. All patients fulfilling the inclusion criteria were enrolled through opd, every patient provided written informed consent. A detailed history and thorough ENT examination was done. Pure tone audiometry and tuning fork tests were done for preoperative evaluation. All surgeries were done under general anesthesia.

The endaural approach underlay method was applied. Annulus and tympanomeatal flap was raised. The middle ear was filled with tiny spongestone fragments. The graft was positioned above the handle of malleolus medial to annulus. Antibiotic cover for 7 days was given prophylactically. Every patient was monitored every month to assess the efficacy in terms of improving hearing of at least 10 dB.

Data Analysis

The data was analyzed using SPSS version 26. For numerical variables like age and the illness length, the mean and standard deviation were computed. Categorical variables such as gender, perforation size, perforation place, and efficacy, frequency and % were calculated.

To observe changes in the effect, efficacy was stratifyed by age, gender, length of illness, perforation size, and perforation place.The chi square test was used after stratification, and a P value of less than 0.05 was deemed significant.

RESULTS

65 (49%) of the 132 patients in this study were between the ages of 18 -30, 34 (26%) were between the ages of 31 - 40, 18 (26%) were between the ages of 41- 50, and 15 (11%) were between the ages of 51 - 65. The standard deviation was ± 12.46 and the mean age was 30 years. An analysis of the gender distribution of 132 patients revealed that 78 (59%) were female and 54 (41%) were male.

Analysis of the 132 individuals' illness duration was done as 48(36%) patients had disease duration <1 years while 84(64%) patients had duration of disease >1 years. Mean disease duration was 1 years with standard deviation ± 1.98. Size of perforation among 132 patients was analyzed as 79(60%) patients had perforation size while 37(28%) patients didn't had perforation size. Site perforation among 132 patients was analyzed as 43(33%) patients had perforation at postero-inferior site, 61(46%) patients had perforation at antero-inferior, 20(15%) patients had perforation at inferior site, 8(6%) patients had perforation at superior site. Efficacy of underlay technique was analyzed as underlay technique was successful in 111(84%) patients and ineffective in 21(16%) patients. The effectiveness of the underlying approach was stratified (Table-I-V)

TABLE-I

Stratification of efficacy with respect to age (n=132)

Efficacy	18- 30 Years	31-40 Years	41-50 Years	51- 65 Years	Total	P-Value
Yes	54	29	16	12	111	0.9000
No	11	5	2	3	21	
Total	65	34	18	15	132	

TABLE-II

Stratification of efficacy with respect to gender distribution (n=132)

Efficacy	Male	Female	Total	P-Value
Yes	46	65	111	0.7748
No	8	13	21	
Total	54	78	132	

TABLE-III

Stratification of efficacy with respect to duration of disease (n=132)

Efficacy	≤ 1 Year	> 1 Year	Total	P-Value
Yes	40	71	111	0.8572
No	8	13	21	
Total	48	84	132	

TABLE-IV

Stratification of efficacy with respect to size of perforation (n=132)

Efficacy	Small	Medium	Large	Total	P-Value
Yes	67	31	13	111	0.9372
No	12	6	3	21	
Total	79	37	16	132	

TABLE-V

Stratification of efficacy with respect to site of perforation (n=132)

Efficacy	Postero-inferior	Antero-inferior	Infe-rior	Superior	Total	P-Value
Yes	36	51	17	7	111	0.9922
No	7	10	3	1	21	
Total	43	61	20	8	132	

DISCUSSION

In this study mean age was 30 years with standard deviation ± 12.46. 54% percent patients were male while 78% patients were female. More over underlay technique was effective in 84% patients and was not effective in 21% cases. Comparable findings were observed in another study conducted by Kalsotra P et al.[8] This study comprised 72 patients with in active mucosal disease. Two groups of these patients were created. 37 patients in Group A had their tympanic membranes restored using the overlay technique of myringoplasty.[12,13], 35 individuals in Group B had inlay myringoplasty. Comparison was made in terms of outcomes of both methods within six months of surgery, and improvement in hearing after six months of follow-up.[14,15] Similar outcomes were reported by Sergi B et al.[9], who found that the underlay approach produced a 94.2% (49 instances) success rate. Three patients had postoperative perforations, all of which affected the front portions of the tympanic membrane.

During the healing process, some patients developed granulation tissue, which was treated with boric acid and antibiotics. At the last examination, 63.2% of patients showed an ABGPTA less than 10 dB, and 95.9% less than 20 dB. Surgery did not cause any acoustic trauma in this group and the BCPTA decreased by an average of 1.4 dB.

In another conducted by Dangol K et al[10] had reported that 11 (4.7%) of the 230 individuals that were included in the research did not come for follow-up. Consequently, 219 patients in total. Out of 219, 182 (83.1%) showed signs of graft uptake. The average age of the patients was 26.14 ± 10.41 years, with ages ranging from 13 to 62.

In all, there were 120 (54.8%) females and 99 (45.2%) males. They found that the contralateral ears of 127 patients who received myringoplasty were normal. In another research there were notable improvements in hearing loss and air-bone gap (ABG) both before and after surgery. The average hearing loss was 55.9 ± 13.8 dB prior to surgery and improved to 41.2 ± 14.1 dB following surgery ($p < 0.0001$)[16]. In a similar vein, the average air-bone gap was 20.01 ± 6.03 dB prior to surgery, and it significantly decreased to 14.5 ± 6.4 dB following the procedure ($p < 0.0001$). While 29 patients (19.3%) did not see an improvement in their hearing, 121 individuals (80.7%) did.[17,18] There are three methods used: endaural, transcanal, and postauricular; however, transcanal endoscopic methods have lately gained popularity.[19] Although older individuals showed lower rates of hearing improvement when the inlay approach was utilized, both the underlay and inlay methods dramatically improved hearing abilities.[20]

CONCLUSION

In terms of hearing improvement, our study finds that the underlying method was 84% successful in improving hearing following myringoplasty.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Waqas Javaid:** Data collection, drafting.
2	**Syed Muhammad Waqas:** Critical revision.
3	**Azka Khalid:** Study concept and design.
4	**Syed Tauseef Bukhari:** Literature review.
5	**Muhammad Usman Khalid Amin:** Review of manuscript.
6	**Muhammad Amir Siddique:** Data entry.