Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i3.7247

EFFICACY OF UNDERLAY VERSUS OVERLAY MYRINGOPLASTY IN TERMS OF HEARING IMPROVEMENT

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ABSTRACT

Background: One technique that involves repairing the membrane that covers the tympanic cavity is myringoplasty. The postaural, endaural, or endomeatal routes might be used for this treatment. There are several grafts employed, including perichondrium, vein graft, and temporalis fascia. Based on where the material for the graft is placed, the procedure can be classified as underlay, overlay, interlay, or a mix of these.

Objective: To evaluate the efficacy of underly technique for myringoplasty in terms of hearing improvement.

Methodology: The present descriptive study was conducted in Hayatabad Medical Complex, eshawar, in the time duration of six months from 27/4/2019 to 27/10/2019. Patients of both the gender in age range 18-65 years presenting with dry perforated tympanic membrane with duration more than 6 weeks and with air bone gap of > 20db were included in the study. All the included participants were taken to OT and all operations were performed under general anesthesia. The endaural approach was used to perform the underlay technique. Together with the annulus, a sizable tympanomeatal flap based on the superior vascular pedicle was elevated. Little bits of spongeston were jam-packed into the middle ear. The graft was positioned medial to the annulus, over the malleolus handle. To support the graft, tiny spongeston pieces were layered over it. For one week, a gauze pack saturated in antibiotic ointment was kept inside the meatus. Five consecutive days of prophylaxis antibiotic therapy were administered. All the surgeries were performed under the supervision of CPSP fellow ENT surgeon having at least 5 years experienced in surgery.

Results: According to our analysis, of the 215 patients, 41% were between the ages of 18 and 30, 29% were between the ages of 31 and 40, 16% were between the ages of 41 and 50, and 14% were between the ages of 51 and 65. Of the patients, 44% were female and 56% were male. Furthermore, 88% of patients found the underlay technique to be helpful, whereas 12% did not see any benefit.

Conclusion: Our study concludes that the underly technique was 88% effective in the treatment of myringoplasty in terms of hearing improvement.

Keywords: Chronic otitis media, Myringoplasty, Underlay, myringoplasty technique.

INTRODUCTION

One technique that involves repairing the membrane that covers the tympanic cavity is myringoplasty.1 The postaural, endaural, or endomeatal routes might be used for this treatment. There are several grafts employed, including perichondrium, vein graft, and temporalis fascia.2 Based on where the material for the graft is placed, the procedure can be classified as underlay, overlay, interlay, or a mix of these.3 The investigation found that, aside from some drawbacks, the integrated technique had the highest overall success rate; nonetheless, when both approaches were statistically equivalent, the difference between them was not statistically significant.4

The most common causes of tympanic membrane perforation are physical trauma, burns, scalds, chronic suppurative otitis media, and head trauma.5 In addition to their hearing impairment, people who have permanent perforation syndrome also have recurrent otorrhea.5 The tympanic membrane has a strong propensity to repair.6 Tiny perforation mend on their own, but when stratified squamous epithelium covers the perforation's margins, the healing process becomes persistent.7 In cases where conservative therapy or spontaneous healing fails, surgical repair becomes necessary.8 In addition to protecting the middle ear from allergy and extrinsic infections, the healed perforation enhances hearing. The maintenance of the intact membrane (graft uptake) and the enhancement of hearing (airbone gap repair within 10 db7) are the metrics used to assess the success of the surgery.

After myringoplasty, the overall percentage of effective graft acceptance was 88.3%, with 86.7% of the grafts taken in by wet ears and 90% by dry ears. There was no statistically significant difference (p value of 0.688>0.05) between both of the groups. In terms of post-operative hearing improvement, both groups showed significant improvements over prior to surgery hearing, with mean hearing gains (dB) ranging from 3.43± 2.81 in wet ear cases to 3.85± 3.05 in dry ear cases. However, there was no statistically significant disparity among the two groups (p value of 0.582>0.05).9

In another investigation, Group B (underlay group) performed slightly more effectively in terms of graft uptake and postoperative AB gap improvements with a mean after surgery AB gap of 11.11 dB and an uptake rate of 91.43% compared to Group A (overlay group) with an uptake rate of 89.18% and a mean after surgery AB gap of 11.72 dB.10 In a different investigation, the underlay approach resulted in hearing improvement in 75.7% of patients and effective healing in 94.7% of instances.11

This investigation will give us the most recent and accurate data about the effectiveness of the underpinning method for myringoplasty in terms of improving hearing because a comparable investigation has been carried out in our community in the past five years. Furthermore, given that the individuals in our sample have varying socioeconomic backgrounds, levels of schooling, and standards of life, our research might vary from other investigations in these areas. If the underlay technique proves to be more successful in our investigation, we will routinely advocate using it for myringoplasty. Furthermore, the results of the investigation will be used in future research projects and disseminated to other medical specialists.

MATERIALS AND METHODS

The study was conducted in E.N.T Department, Hayatabad Medical Complex, Peshawar. It was a descriptive study and was conducted in the time duration of six months 27/4/2019 to 27/10/2019. In this study a total **s**ample size was 215 which were calculated by taking 94.7% proportion9 of hearing improvement in underlay technique for myringoplasty. The WHO formula for calculating sample size yields a 95% confidence range and a 03% margin of error. Consecutive non-probability sampling was used as the sample method.

The inclusion criteria included all patients of both the gender in age range 18-65 years presenting with dry perforated tympanic membrane with duration more than 6 weeks and with air bone gap of > 20db, ASA grade I and II. Exclusion criteria included infection in middle ear and mastoids (on the basis of clinical examination and culture of discharge). History of previous ear surgery. Deviated nasal septum, enlarged inferior turbinates and polyps in the nose (on the basis of clinical examination.) Eustachian tube malfunction (on the basis of tympanogram). Chronic infection in nose, sinuses, nasopharynx and oropharynx (on the basis of clinical examination and history).

After receiving approval from the hospital's ethics council, the research was conducted at the Hayatabad Medical Complex in Peshawar. Via the OPD and E N T departments every individual who met the inclusion criteria—that is, those who presented with a dry perforated tympanic membrane—were recruited in the research project. Each participant was given written permission after being told of the goals and advantages of the trial.

Detailed history, routine investigations and thorough ear, nose and throat examination were done for the confirmation of dry perforated tympanic membrane and pre operative assessment was carried by tuning fork tests and pure tone audiometry.

Every patient who was part of the study underwent OT, and all procedures were carried out while the patient was sedated. The endaural method was used to perform the underlay technique. Together with the annulus, a sizable tympanomeatal flap based on the superior vascular pedicle was raised. Little bits of spongeston were jam-packed into the middle ear. The transplanted tissue was positioned medial to the annulus, over the malleolus handle. To support the graft, tiny spongeston pieces were layered over it. For one week, a gauze pack saturated in an antibiotic cream was kept inside the meatus. Five consecutive days of prophylaxis antibiotic treatment were administered. Every procedure was carried out under the guidance of a colleague ENT surgeon from CPSP who had at least five years of surgical expertise.

All patients were followed after one month for the assessment of efficacy of the procedure and the procedure was considered effective if the air bone gap is at least ≥10 db after I month of follow up. Telephone contact was kept up to date for any legal compliance and any individual who failed to show up for monitoring was dropped from the research. On a preliminary design form, all of the collected information including age, gender, length of illness, hole size, and perforation site was documented. Exclusion standards were closely adhered to in order to prevent bias in the results of the investigation. All the above-mentioned information was recorded and was analysed in computer software SPSS. Mean and standard deviation was calculated for continuous variables i.e. age, duration of disease. Frequency and percentage were calculated categorical variable i.e. gender, ASA grades, site of perforation, size of perforation and efficacy. Efficacy was stratified with age, gender, ASA grades, duration of disease, size of perforation, site of perforation to see the effect modifications and post stratification chi square test was applied in which P value ≤0.05 was considered as significant value.

RESULTS

In all, 215 individuals were monitored during this investigation; of these, 89 (41%) fell within the 18–30 age range, 62 (29%) fell within the 31–40 age range, 34 (16%) fell within the 41–50 age range, and 30 (14%) fell within the 51–65 age range. Table 1 shows that 95 patients (44%) were female and the remaining 120 (56%) were male. According to Table 2, 142 patients (66%) had ASA Grade II and 73 patients (34%) had ASA Grade I. In Table 2, 125 patients (58%) had a disease duration of more than 12 weeks, while 90 patients (42%) had a disease duration of less than 12 weeks. The sickness lasted an average of 12 weeks, with a standard deviation of ± 8.09. (Table 4) A tiny perforation affected 123 individuals (57%), a medium perforation affected 71 patients (33%), and a big perforation affected 21 patients (10%). (Tabel 5). A total of 77 patients (36%) had postero-inferior perforation, 86 patients (40%) had antero-inferior perforation, 15 patients (7%), and 37 patients (17%) had inferior perforation. Table 6 shows that the more over underlay strategy worked for 189 patients (88%), while 26 patients (12%), did not see any improvement. Table 7 Table Nos. 8–10 describes the stratification of the underpinning technique's efficacy according to age, gender, ASA grades, length of illness, hole size, and perforation site.

Table 1: Age Distribution

Age	Frequency	Percentage
18-30 years	89	41%
31-40 years	62	29%
41-50 years	34	16%
51-65 years	30	14%

Total	215	100%
Mean age = 33 years SD = ± 12.37		

Table 2: Gender Distribution

Gender	Frequency	Percentage
Male	120	56%
Female	95	44%
Total	**215**	**100%**

Table 3: ASA Grades

ASA Grades	Frequency	Percentage
Grade I	73	34%
Grade II	142	66%
Total	**215**	**100%**

Table 4: Duration of Disease

Duration	Frequency	Percentage
≤ 12 weeks	90	42%
> 12 weeks	125	58%
Total	**215**	**100%**
Mean duration of disease was 12 weeks with standard deviation ± 8.09.		

Table 5: Size of Perforation

Size	Frequency	Percentage
Small perforation	123	57%
Medium perforation	71	33%
Large perforation	21	10%
Total	215	100%

Table 6: Site of Perforation

Site	Frequency	Percentage
Inferior	37	17%
Superior	15	7%
Postero-inferior	77	36%
Antero-inferior	86	40%
Total	**215**	**100%**

Table 7: Efficacy

Efficacy	Frequency	Percentage
Effective	189	88%
Not effective	26	12%
Total	**215**	**100%**

Table 8: Stratification of Efficacy with Respect to Age

Efficacy	18-30 years	31-40 years	41-50 years	51-65 years	Total
Effective	78	55	30	26	189
Not effective	11	7	4	4	26
Total	**89**	**62**	**34**	**30**	**215**
P value = 0.9929					

Table 9: Stratification of Efficacy with Respect to Gender Distribution

Efficacy	Male	Female	Total
Effective	105	84	189
Not effective	15	11	26
Total	**120**	**95**	**215**
P value = 0.8370			

Table 10: Stratification of Efficacy with Respect to ASA Grades

Efficacy	Grades I	Grades II	Total
Effective	64	125	189
Not effective	9	17	26
Total	**73**	**142**	**215**
P value = 0.9394			

DISCUSSION

One technique that deals with repairing the tympanic membrane is myringoplasty. The postaural, endaural, or endomeatal routes might be used for this treatment.1. There are several grafts employed, including perichondrium, vein graft, and temporalis fascia. Based on where the transplanted tissue is placed, the procedure can be classified as underlay, overlay, interlay, or a mix of these. The present research compared the underlay, overlay, and combined techniques with respect to overall success rates, surgical complications, and membrane defect repair.2 The present investigation found that, aside from some drawbacks, the integrated approach had the highest overall success rate; nonetheless, when both approaches were statistically equivalent, the difference was not statistically important.3

According to our analysis, of the 215 patients, 41% were between the ages of 18 and 30, 29% were between the ages of 31 and 40, 16% were between the ages of 41 and 50, and 14% were between the ages of 51 and 65. Of the patients, 44% were female and 56% were male. 34% patients had ASA Grade I and 66% patients had ASA grade II. 42% patients had duration of disease <12 weeks while 58% patients had duration of disease >12 weeks. 57% patients had small perforation, 33% patients had medium perforation, 10% patients had large perforation. 17% patients had inferior perforation, 7% patients had superior perforation, 36% patients had postero-inferior perforation, 40% patients had antero-inferior perforation. Furthermore, 88% of patients found the underlay technique to be useful, whereas 12% did not see any benefit.

Chandrashekar Y et al12 reported similar outcomes, with an overall effective transplant uptake of 88.3% after myringoplasty, 86.7% for wet ears and 90% for dry ears, and no statistically significant difference (p value of 0.688>0.05) between the two groups. In terms of after surgery sense of hearing enhancement, both of the groups showed substantial enhancement over prior to surgery hearing, with mean hearing gains (dB) ranging from 3.43±2.81 in wet ear cases to 3.85±3.05 in dry ear cases. However, there was no statistically significant difference between the two groups (p value of 0.582>0.05).

In another study carried out by Saraf A et al13 had reported that Group A consisted of 37 patients who received myringoplasty overlay for tympanic membrane restoration, while Group B includes 35 individuals who received underlay myringoplasty. The transplantation success rate—that is, the complete absorption or refusal to take up, the medialization or lateralization of the grafts within six months after the surgery, and the enhancement in hearing at the conclusion of the six-month follow-up—was utilized for comparing the outcomes of the two procedures. The results showed Group B (underlay group) performed slightly better than Group A (overlay group) in terms of transplant uptake and postoperative AB gap enhancement, with a 91.43% rate of uptake and a mean postoperatively AB gap of 11.11 dB, compared to 89.18% for Group A. 72 dB is the mean postoperative AB gap; nevertheless, there was no statistically significant variation. In Group A, there were three cases of graft lateralization, but only one case of graft medialization occurred in Group B. Both myringoplasty treatments yield satisfactory outcomes; however, the underlay technique performs more effectively

than the overlay technique. Because underlay approach is relatively straightforward, it should be chosen; however, the doctor's choice and the location of the perforations will ultimately determine which method is used.

In an additional study, Dangol K et al.14 stated that 219 participants were enrolled in total. In 182 out of 219 cases, transplant uptake was detected (83.1%). The age spectrum of the patients was 13–62 years old, with a mean age of 26.14 ±10.41 years. There were 120 (54.8%) girls and 99 (45.2%) males in total. 121 people (55.3%) had a left myringoplasty and 88 people (44.7%) had a right myringoplasty. It was discovered that 127 individuals who had myringoplasty had healthy ears on the other side. Eleven2 (88.2%) accepted the graft. In the contralateral ear, tubotympanic chronic otitis media (COM) affected 56 individuals, of whom 42 (75%), underwent grafting. When tubotympanic COM was present in the contralateral ear, graft absorption was noticeably inadequate ($p < 0.05$).

CONCLUSION

Our study concludes that the underly technique was 88% effective in the treatment of myringoplasty in terms of hearing improvement.

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