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ORIGINAL ARTICLE

Comparison of Graft Uptake by Underlay and Overlay Technique in Myringoplasty

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ABSTRACT

Objective: The objective of this study was to compare the effectiveness of graft uptake by underlay and overlay technique in patients undergoing myringoplasty

Design of the Study: It was a randomized controlled trial

Study Settings: Research was conducted at Department of Otorhinolaryngology and Head and Neck surgery Holy Family Hospital, Rawalpindi from January 2021 to June 2021.

Material and Methods: In this study, 80 patients underwent myringoplasty for tympanic perforation who were randomly divided into two groups. Patients ranged in age from 20 to 40 years old. Those in Group A had an underlay myringoplasty, while those in Group B had an overlay procedure. One of the study's outcome variables was the procedure's effectiveness, which was observed and compared among groups.

Results of the Study: There were 1.2:1 men to women patients, with 44 (55.0%) men and 36 (45.0%) women. Patients who underwent underlay versus overlay myringoplasty had a considerably greater rate of hearing improvement (97.5 percent vs. 77.5 percent ; p=0.007) and a significantly lower rate of complications (5.0 percent vs. 32.5 percent ; p=0.002).

Conclusion: Underlay myringoplasty was found to be much more successful than overlay myringoplasty in 95.0 percent of patients compared to 57.5 percent of patients who received overlay myringoplasty.

Keywords: Underlay Myringoplasty, Overlay Myringoplasty, Tympanic Perforation, Graft,

INTRODUCTION

Physiology and pathogenesis of chronic inflammatory middle ear illnesses rely on the tympanic membrane. For millions of people, tympanic membrane perforation is a life-altering experience.[1] Middle ear infections, trauma, and iatrogenic causes are the most common causes of tympanic membrane perforation. Around 80% of these holes close on their own.[2] The tympanic membrane is repaired during myringoplasty. The postaural, endaural, or endomeatal routes can all be used to do this surgery. Temporalis fascia, vein graft, and perichondrium are some of the grafts employed.[3]

Myringoplasty can be performed in two ways: with an overlay or an underlay. In cases of large or subtotal anterior tympanic membrane perforation, the success rate of overlay surgery is higher, but it is more difficult and requires more skill from the surgeon, and severe complications like graft lateralization, epithelial pearls, delayed healing and anterior angle blunting are possible.[4] For reasons of viability, anterior canal wall protrusion, and medialization of the transplanted TM, and because of this, repairs to perforations in its anterior quadrant are more difficult than repairs in its posterior quadrant. For anterior quadrant holes, the graft is frequently inserted medial to the tympanomeatal flap utilising an underlay approach.[5]

In addition to skin and homologous tympanic membrane, a variety of different materials have been tried, with varying degrees of success. Hearing gain and healing of the perforation are the most common ways to judge the success of a myringoplasty.[6] The surgical method (endaural vs. postaural) and technique (underlay vs. overlay), the location of the perforation, and the type of graft used can all affect the result.[2]

Some studies showed that overlay technique give better anatomical results whereas favorable functional results were obtained by underlay technique.[2] However some authors are of the view that graft uptake rate is same underlay approach was found to be superior to the other due to faster graft healing, greater patient hearing gain (92.8% vs. 57.1%), and fewer minor problems (6.6 vs. 33.3).[7] One study also revealed that overall success rate was best with combined technique.[8] Myringoplasty had an overall success rate of 89.5 percent and an average gain of 9.4 dB, according to a study published in 2015.[9]

Despite the fact that myringoplasty is a well-established operation, researchers are constantly looking for ways to enhance the procedure's outcomes through the investigation of various influencing aspects. Presently no local study is available in last 5 years for guidance. This study may help to achieve desired results by opting correct technique.

MATERIAL AND METHODS

After receiving approval from the hospital's ethical committee the study was carried out Department of Otorhinolaryngology and Head and Neck surgery Holy Family Hospital, Rawalpindi from January 2021 to June 2021.

The study had a total of 80 participants. Two groups of 40 each. According to WHO's sample size calculator, a 90 percent power level and 5 percent significance level were maintained in the collection of a sample, p1 =57.1%7, p2=92.8%.[7] Patients of both gender age between 20 to 40 years with dry ear having central tympanic membrane perforation of various sizes secondary to chronic otitis media diagnosed on otoscopy were included in this study. Patients with wet ear, only hearing ear and bleeding disorder were excluded from the study.

Two groups of patients were randomly divided. Group A received the underlay technique, whereas group B received the overlay technique. Both groups were evaluated in terms of Pure tone audiometry and otoscopic examination at one week, two weeks, one month, and three months intervals in OPD.

Numerical variables; age, size of perforation and duration of problem have been presented by mean ±SD. Categorical variables; gender, complications, hearing improvement and effectiveness have been presented by frequency and percentage. Post stratification chi-square test has been applied taking p≤0.05 as significant

STUDY RESULTS

Ages ranged from 20 to 40 years, with a mean of 29.585.92 years for the patients in the study. There were 1.2:1 men to women patients, with 44 (55.0%) men and 36 (45.0%) women. From one year to 16 years, symptoms lasted an average of 7.263.60 years. Table 9.1 shows that 25-50 percent and >50 percent perforation

occurred in 19 (23.8 percent) and 18 (22.5 percent) patients, respectively, of the 43 patients (53.8 percent) who underwent perforation surgery.

Age (p=0.881) and duration of symptoms (p=0.644) were found to be statistically indistinguishable between the two study groups, as demonstrated by Table 9.2.

Patients undergoing underlay versus overlay myringoplasty had significantly higher rates of hearing improvement (97.5 percent vs. 77.5 percent; p=0.007) and lower rates of complications (5.0 percent vs. 32.5 percent; p=0.002) than those undergoing overlay myringoplasty, as shown in Tables 9.3 and 9.4. Underlay group complications included epithelial pearls and ear discharge, while overlay group complications included ear discharge, blunting of the anterior sulcus, epithelial pearls, and lateralization of the graft.

Compared to overlay myringoplasty, patients who underwent underlay myringoplasty had considerably greater success rates (95.0% vs. 57.5%; p0.001) than those who underwent overlay myringoplasty. Tables 9.6–9.9 reveal that there was a significant difference in perforation size and duration of symptoms across all age, gender, and duration of symptoms groups.

Table 1: Demographics of the study cases

Parameter	Sub-division	Frequency	Percentage
Age	20-30 years	46	57.5%
	31-40 years	34	42.5%
	Mean±SD	29.58±5.92	
Gender	Male	44	55.0%
	Female	36	45.0%
Duration of Symptoms	1-5 years	29	36.3%
	6-10 years	35	43.8%
	11-16 years	16	20.0%
	Mean±SD	7.26±3.60	
Size (% of total)	≤25%	43	53.8%
	25-50%	19	23.8%
	>50%	18	22.5%

Table 2: Characteristics at Baseline of Study Groups

Parameters	Characteristics	Underlay Myringoplasty n=40	Overlay Myringoplasty n=40	P value
Age (years)	Mean±SD	29.48±6.35	29.68±5.54	0.881
	20-30 years	24 (60.0%)	22 (55.0%)	0.651
	31-40 years	16 (40.0%)	18 (45.0%)	
Gender	Male	22 (55.0%)	22 (55.0%)	1.000
	Female	18 (45.0%)	18 (45.0%)	
Duration of Symptoms	Mean±SD	7.45±3.67	7.08±3.56	0.644
	1-5 years	13 (32.5%)	16 (40.0%)	0.745
	6-10 years	18 (45.0%)	17 (42.5%)	
	11-16 years	9 (22.5%)	7 (17.5%)	
Size (% of total)	≤25%	21 (52.5%)	22(55.0%)	0.963
	25-50%	10 (25.0%)	9 (22.5%)	
	>50%	9 (22.5%)	9 (22.5%)	

Table 3: The two study groups were compared in terms of the frequency of hearing improvement n=80

Parameters		Study Group		Total	P value
		Underlay Myringoplasty (n=40)	Overlay Myringoplasty (n=40)		
Hearing Improvement	Yes	39(97.5%)	31(77.5%)	70(87.5%)	0.007*
	No	1(2.5%)	9(22.5%)	10(12.5%)	
Complications	Yes	2(5.0%)	13(32.5%)	15(18.8%)	0.002*
	NO	38(95.0%)	27(67.5%)	65(81.3%)	

Chi-square test, * observed difference was statistically significant.

Table 4: Comparison of frequency of Effectiveness between the two study groups n=80

Effective	Study Group		Total	P value
	Underlay Myringoplasty (n=40)	Overlay Myringoplasty (n=40)		
Yes	38(95.0%)	23(57.5%)	61(76.3%)	<0.001*
No	2(5.0%)	17(42.5%)	19(23.8%)	

Table 5: Study groups were compared for Effectiveness frequency across Age Groups, Gender and Perforation Group Sizes.

Parameters	Sub-Grroups	Effective	Study Group		Total	P value
			Underlay Technique (n=40)	Overlay Technique (n=40)		
Age Groups	20-30 Years (n=46)	Yes	23(95.8%)	13(59.1%)	36(78.3%)	0.003*
		No	1(4.2%)	9(40.9%)	10(21.7%)	
	31-40 Years (n=34)	Yes	15(93.8%)	10(55.6%)	25(73.5%)	0.012*
		No	1(6.3%)	8(44.4%)	9(26.5%)	
Gender	Male	Yes	21(95.5%)	13(59.1%)	34(77.3%)	0.004*
		No	194.5%)	9(40.9%)	10(22.7%)	
	Female	Yes	17(94.4%)	10(55.6%)	27(75.0%)	0.007*
		No	1(5.6%)	8(44.4%)	9(25.0%)	
Duration of Symptoms	1-5 years (n=29)	Yes	13(100.0%)	10(62.5%)	23(79.3%)	0.013*
		No	0(.0%)	6(37.5%)	23(79.3%)	
	6-10 years (n=35)	Yes	17(94.4%)	10(58.8%)	27(77.1%)	0.012*
		No	1(5.6%)	7(58.8%)	27(77.1%)	
	11-16 years (n=16	Yes	8(88.9%)	3(42.9%)	11(68.8%)	0.049*
		No	1(11.1%)	6(37.5%)	6(20.7%)	
Size of Perforation Groups	<25% (n=43)	Yes	21(100.0%)	15(68.2%)	36(83.7%)	0.005*
		No	0(.0%)	7(31.8%)	7(16.3%)	
	25-50% (n=19)	Yes	9(90.0%)	4(44.4%)	13(68.4%)	0.033*

		No	1(10.0%)	5(55.6%)	6(31.6%)	
	>50%	Yes	8(88.9%)	4(44.4%)	12(66.7%)	0.046*
	(n=18)	No	1(11.1%)	5(55.6%)	6(33.3%)	

Chi-square test, * observed difference was statistically significant.

DISCUSSION

To cause tympanic membrane perforation, infections, trauma, or medical errors are the most common reasons.[1] Around 80% of these holes close on their own.[2] Repairing the tympanic membrane is what myringoplasty is all about. Myringoplasty can be performed using either the overlay technique or the underlay technique, both of which are well-established.[4] However, there was a lack of data on underlay and overlay myringoplasty success rates, which necessitated this investigation.

In this study, 80 patients underwent myringoplasty for tympanic perforation who were randomly divided into two groups. Patients ranged in age from 20 to 40 years old. Underlay tympanoplasty was performed on Group A, while overlay tympanoplasty was performed on Group B. One of the study's outcome variables was the procedure's effectiveness, which was observed and compared among groups. Each patient was asked to sign an informed consent form.

The mean age of the patients in this study was 29.58 5.92 years old. Among Turkish patients, Onal et al.10 (2012) found a mean age of 29.511.5 years. Turkish patients were found to be on average 27.311.2 years old in a study done by Yurttas et al.[11], while Indian patients with tympannic membrane perforation were found to be on average 27.80.8 years old by Chouhan et al.[12] Similarly, Shishegar et al.[13] (2012) found that Iranian patients had a mean age of 304.8 years.

Men made up 55 percent of the participants, while women made up 45 percent, resulting in a male to female ratio of 1.2:1. Chouhan et al.[12] found a similar male predominance among Indian patients with tympanic membrane perforation, with a male to female ratio of 1.2:1. In Turkish, Nepalese, and Iranian populations, Vet et al.[14] in 2016 (1.1:1), Khalilullah et al.[15] in 2016 (1.5:1), and Shishegar et al.[13] in 2012 (1.3:1) also found a comparable male prevalence among these patients.

In the current investigation, the median number of years people had been experiencing symptoms was 7.26, with a standard deviation of 3.60. Among Egyptian patients who underwent tympanoplasty, Abdelghany et al.[16] (2013) found a comparable mean duration of symptoms (7.09–4.3 years).

Patients who had underlay myringoplasty as opposed to overlay myringoplasty saw significantly greater rates of hearing improvement (97.5 percent vs. 77.5 percent; p=0.007) and significantly lower rates of complications (5.0 percent vs. 32.5 percent; p=0.002). Similarly, Singh et al.[7] found that the incidence of problems fell from 33.3 percent to 6.6% when using the underlay approach, compared to 33.3 percent when using the overlay technique.

The success rate of underlay myringoplasty was found to be substantially greater in the current study (95.0% vs. 57.5%; p0.001) than the success rate of overlay myringoplasty. Similar to Singh et al.7, we found a significant difference in the frequency of effectiveness (92.8 percent vs. 57.1 percent ; p 0.05) between these two approaches in our investigation. Arumugam et al.17, who found 91.5 percent and 96.0 percent efficacy rates for underlay techniques, concur with our findings, as do Glasscock et al.[18]

It was shown that individuals undergoing underlay (95.0 percent vs. 57.5 percent ; p0.001) myringoplasty had a much greater success rate than those who underwent overlay myringoplasty. It is thus recommended to employ the underlay approach over overlay since it has a lower rate of complications (5.0 percent to 32.5 percent ; p=0.002), according to the findings of the current study.

Because we only followed the patients for three months in this trial, we can't say for sure how effective this technique will be over the long term. Further research involving long-term monitoring is needed and highly recommended in the future.

CONCLUSION

Underlay myringoplasty was found to be much more successful than overlay myringoplasty in 95.0 percent of patients compared to 57.5 percent of patients who received overlay myringoplasty.

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