



Graft Uptake in Overlay and Underlay Technique Myringoplasty

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

The aim of this investigation was to compare the graft uptake in overlay and underlay system in myringoplasty. The examination led among 50 patients in Sree Balaji Medical College and Hospital. Among 50 patients 25 patients underwent overlay and 25 patients experienced underlay strategy. This study concludes that underlay technique should be preferred compared to overlay method, but the ultimate decision about the technique to be employed depends on the surgeons preference and the site of perforation.

Keywords: Myringoplasty; chronic suppurative otitis media; underlay myringoplasty; overlay myringoplasty.

1. INTRODUCTION

Chronic suppurative otitis media (CSOM) is characterized as chronic inflammation of the mucoperiosteal lining of the middle ear part or whole. It is the major public health

problem in children and adults. Tympanic membrane perforations can lead to recurrent ear infections and hearing loss, in India there is a general lack of awareness of the disease and also regarding the complications of the disease [1].

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From the seventeenth to nineteenth centuries, several attempts were made to close tympanic membrane perforations using prosthetic materials such as paper patch and cauterizing agents. Banzer (1640) first attempted surgery to repair the tympanic membrane with a pig's bladder. 1. In 1878 Berthold devised the term myringoplasty. In 1952, Wullstein formally announced a technique of closing perforation. That time he used split thickness skin graft 3, 4. After Wullstein and Zollner introduced tympanoplasty in early 1950s, overlay graft was being used in all surgeries. The article "tympanoplasty as an activity to improve hearing in ceaseless otitis media and its outcomes" by Wullstein had arranged the field for the activity to be performed with an objective to improve hearing and shield the center ear from the outside condition [2,3].

There are several factor mentioned in literature that may affect surgical results, including age, perforation size and site, the status of opposite ear, the type of graft and technique used overlay or underlay. Myringoplasty is a surgical procedure to prevent recurrent discharge from the middle ear and to restore hearing mechanism in patients with otitis media, by closing the tympanic membrane perforation using different type of graft. The temporalis fascia or conchal cartilage graft forms a scaffold for the growing epithelium to close the perforation. In this study success of the graft uptake is determined by graft uptake [4,5].

2. MATERIALS AND METHODS

This study was carried out in 50 patients who were introduced in ENT OPD with signs and indications proposing CSOM at Sree Balaji Medical College and Hospital. Among 50 patients 25 patients experiencing overlay strategy as Group A and 25 patients experiencing underlay procedure in myringoplasty as Group B. Cases selected for study were subjected to detailed history and clinical examination. Patients were prepared for surgery under local anesthesia.

Depending on the placement of the graft material, this study compares underlay and overlay techniques of myringoplasty procedure. In overlay technique, the graft material was placed over the fibrous layer of membrane remnant. In underlay technique, the graft material was placed under the membrane remnant including the flap after elevating the tympanomeatal flap beyond the annulus [6].

Unadulterated tone Audiogram is done in all examined population, the frequencies involved were 250, 500, 1000, 2000 Hz in all the patients taken for surgery, which gave an evaluation of the level of hearing trouble and its sort preoperatively. Midpoints of hearing trouble were determined (air conduction edge) among three frequencies (500, 1000 and 2000 Hz). Unadulterated tone audiometry had been utilized for evaluation of hearing level in this investigation. All the patients were followed up for 6 months or more after uneventful postoperative period [7].

The variations were analyzed as percentage of two groups. Comparisons of outcome between these groups were performed by Chi square test and ANOVA one way analysis of variance using SPSS software.

3. RESULTS

The study population was 50 patients were followed for 24 months with detailed history of age, sex, size of perforation, pre op and post op air bone gap and graft uptake were noted.

3.1 Age

Most of the patients selected were between 20 and 50 years of age, the majority of cases were between 20 and 30 years of age, the mean age was 24,142 years. Females were 24 (48 per cent) and males were 26 (52 per cent) in the study population. Of the 50 patients, 19 had left ear disease (38%) and 31 had right ear disease (62%).

Table 1. Age distribution (50 patients)

S. no	Age group	No. of cases	Percentage
I	0-20	0	0
II	20-30	35	70
III	30-40	9	18
IV	40-50	6	12

Table 2. Size of perforation

Size of perforation	Underlay group	%	Overlay group	%
Small	9	36.00	12	48.00
Medium	10	40.00	8	32.00
Large	6	24.00	5	20.00

From this study it is evident most of the perforation are small size with underlay technique of 36% and overlay technique of 48% with mean of 42% among study population. Smaller the perforation more the success rate. Large perforations included perforation size of more than 50% of membrane area.

It is evident that most of the graft type status table that most of the underlay group subjects had temporalis fascia graft (72%) and similarly in overlay group all had temporalis fascia graft (100%) ($p=0.010$).

The graft uptake at 6 months status table that most of the underlay group subjects had graft uptake (88%) and similarly in overlay group majority graft uptake (76%) ($p=0.464$).

4. DISSCUSION

In this study 50 patients admitted in the ENT Department. All these patients suffered from CSOM, TTD. 25 patients underwent overlay myringoplasty, and 25 underlay technique. All the myringoplasties were done using the endoscopic approach [8]. Conchal and temporalis fascia graft were used in this study. General anaesthesia is used for all patients. Most of the patients belonged to middle age group of maximum in between 21-30 age with mean average of 24.142 years. Audiological and endoscopic examinations were done to know the extent of the perforation, size of perforation, and presence or absence of tympanosclerosis [9]. When the perforation is larger hearing loss will be more. Rizer's study evident that same as which found no difference in the 2 techniques for various sizes of perforations [10]. In our study group, 30 patients had pneumatised mastoids (as assessed by pre op X-ray) and 20 patients had sclerotic mastoids. No relationship was found between mastoid pneumatisation and hearing improvement. Pre-operative pure tone audiometry showed majority

of patients (58.3%) had an air-bone gap between 21-30 dB. Singh et al also stated in his study with hearing between 50-60 dB⁵ Post-operative PTA was done at 3 month and 6 months follow-up. Hearing improvement of about 13.695% present in preop and postop hearing assessemnt. By using F-test (multivariate) analysis revealed that these values were statistically insignificant ($p=0.94$), showing that both techniques give equally good hearing improvement. Rizer also reported 84.9% of underlay and 80.4% of overlay having good hearing improvement. However, they found 92.8% of underlay myringoplasty had good hearing improvement, versus only 57.1% receiving the overlay technique. In this study the graft uptake at 6 months status table that most of the underlay group subjects had graft uptake (88%) and similarly in overlay group majority graft uptake (76%) ($p=0.464$). We found that underlay technique was significantly better than overlay technique interns of drum healing (88% vs. 76%). This is in favour to both Doyle's and Glass-cocks results [11].

The after effects of this investigation were superior to Ashfaq et al. who announced a join take-up pace of 73% with underlay method in 105 cases and Khan and Khan "who detailed 77.5% unite achievement rate in 94 cases utilizing a similar procedure". These were additionally superior to Fadl who had 85.4% accomplishment with underlay system arrangement and 66.7% achievement in the overlay procedure [12,13].

The outcomes were practically identical to Gupta [14] who had 86.6% accomplishment in his overlay system arrangement and Wang and Lin [9] who accomplished 82.1% and a 85% take rate with the overlay and the underlay methods, individually. The healing rates in this series are less than those reported by Doyle's and Glass-cock which were approximately 96%. In this study the success rate of overlay technique was

Table 3. Graft uptake

Graft type	Underlay group	%	Overlay group	%
Temporalis Fascia	18	72.00	25	100.00
Conchal Cartilage	7	28.00	0	0.00

Table 4. Graft uptake after 6 months

Graft uptake status - 6 Months	Underlay group	%	Overlay group	%
Graft Uptake	22	88.00	19	76.00
Lateralised	3	12.00	6	24.00
Total	25	100.00	25	100.00
P value	0.464			
Fishers Exact Test				

76% which was significantly less than the study done by Aranklin-M Rizer which was 97% [14].

The complication rate in the present study was quite low, there were 3 cases of graft lateralization in Group A and only 6 case of graft medialization in Group B, but due to small sample size the difference could not be statistically tried. These results were consistent with previous study who reported no case of graft medialization in underlay group while 4 cases of graft lateralization in overlay Group. In contrast to the study by Doyle et al. blunting of the anterior angle in the overlay technique was not seen in the present study, which could be attributed to meticulous surgical technique to expose the anterior remnants [15].

The most significant findings in this study are high success rate with underlay technique and low incidence of complications associated with it. Endoscopic approach was used for adequate exposure. It is an ideal technique to repair perforation that are small and easily visualized in all quadrants, blunting and lateralization of the graft are avoided, the drum heals at the correct level relative to annulus and ossicles. The technique is quicker and easy to perform.

The underlay tympanoplasty heals faster than overlay procedure because of lesser amount of surgical trauma and complication. The underlay technique is also technically less difficult and thus favours the occasional otologic surgeon. Thus, the overall trend has been towards lesser complications for both underlay and overlay with more recent studies. This can be attributed to better antibiotics, improvement in visualization (better magnification) and technical refinements in the surgical techniques.

5. CONCLUSION

This study concludes that underlay technique is more successful than overlay technique. Underlay technique has less surgical

complication and easy to perform. But the success of the surgery depends upon technique used, graft taken and hearing improvement.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Author has declared that no competing interests exist.

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