

Tympanoplasty Type 1: A Comparison between Underlay Technique of Myringoplasty with Over under Technique of Myringoplasty

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ABSTRACT

Objective: To compare the underlay myringoplasty with over under myringoplasty with respect to post operative hearing improvement and rate of graft up take.

Setting: Department of ENT; Sir Ganga Ram Hospital Lahore

Duration of study: October 2008 to October 2010

Sample Size: A total of 60 patients divided equally in two groups were underwent myringoplasty and been followed for 3 months.

Sample technique: Non probability purposive sample with random allocation to the two study groups using random number table.

Method: Group I underwent underlay myringoplasty and group II was managed by over under myringoplasty.

Result: In group I, 25(83.3%) patients had a full take of the graft at the 3-month follow-up. In group II, 27(90%) patients had a full take of the graft at the 3-month follow-up. These patients did not develop severe graft lateralization, infection or blunting (p 0.7).

In group I, the hearing improvement or the decrease in air bone gap is by 11 ± 7.2 db while in group II, the improvement of hearing or decrease in air bone gap is by 12.2 ± 7 db (p 0.52).

Conclusion: There were high success rate of graft up take and considerable hearing improvement in both techniques of myringoplasty. No statistically significant difference in both the techniques was proved.

Key words: Myringoplasty, underlay technique, over under technique.

INTRODUCTION

The first surgical closure of tympanic membrane perforation including removal of epithelium and grafting with skin was done in 1878 by Berthold and he used the term: the Myringoplastik. This method was not accepted widely until 1950, when Zoller reintroduced it².

Various techniques of myringoplasty have been described in the literature as, overlay tympanoplasty, underlay tympanoplasty, over under tympanoplasty, Gelfilm sandwich technique tympanoplasty, Swing door tympanoplasty, Triple C tympanoplasty, inlay butterfly tympanoplasty, double breasting technique tympanoplasty and laser assisted spot welding technique etc³.

Different factor could influence the outcome of myringoplasty. These are age of the patient, etiology of the perforation, size and site of the perforation, eustachian tube dysfunction, graft material, and technique of myringoplasty⁵.

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In 1960, Shea introduced the underlay technique of myringoplasty (UTM) with a success rate of over 96% in graft take up⁶ and 92.8% in hearing improvement⁵. It is a simple technique in which graft is placed entirely medial to remaining drum and malleus⁶.

In over under technique (OUTM) of myringoplasty residual drum is elevated from the malleus and graft is placed lateral to the malleus⁶. The success rate of graft uptake is reported as 97% with a hearing improvement rate of 98%³. This study compares UTM and OUTM with reference to the rate of graft up take and hearing threshold improvement.

MATERIAL AND METHODS

The study was conducted in the Department of ENT, Sir Ganga Ram Hospital, Lahore during October 2008 to October 2010. Sixty patients needing myringoplasty were randomly divided into two equal groups. The sampling technique was non-probability purposive. Patients having central perforation and intact ossicular chain with age range from 15-50 years were included in the study. Patients with infection in middle ear and mastoid, infection in nose, para nasal sinuses, nasopharynx and oropharynx,

deviated nasal septum, nasal polyps, enlarge inferior turbinate, eustachian tube malfunction and patients with diabetes and, anemia were excluded.

Group A comprised of patients undergoing UTM and group B contained patients undergoing OUTM. Their demographic data, detail history was noted to determine the cause of perforation and rule out any pathology in nose, throat and ears .General physical and ENT examination were done. Size and site of perforation were drawn on the proforma. Parts of malleus were observed during otological examination Tuning fork test and pure tone audiometry were done to evaluate the hearing (air bone gap) pre operatively and integrity of ossicular chain. Eustachian tube function was evaluated by recording the changes in pressure of middle ear on impedance. Routine investigations such as complete blood count, complete urine examination, blood sugar levels, x-ray chest, mastoid and para nasal sinuses, Anti HCV, HBsAg was carried out pre operatively.

The patients were operated according to their group. Temporalis fascia was used as graft material. The patients were observed for 48 to 72 hours in the ward post operatively and antibiotics were given for 7 days. BIPP (Bismuth idoform paraffin paste) pack was taken out after 7 days when patients is instructed to come after surgery on first pre operative follow up visit, then patients are asked to come back after one month to evaluate the graft up take for consecutive 3 months followed by pure tone audiometry to assess the improvement in air bone gap.

All the data were entered in SPSS version 10 and was analyzed. Chi square tested the graft uptake difference and t test for quantitative changes in decibels was applied. A p-value of less than 0.05 was taken as statistically significant.

RESULTS

The mean age was 25.3±7.9 years with a range of 15-40 years in group I and 28.2±7.7 years with a range 18-45 years in group II (p 0.16). The male to female ratio were 1:0.76 and 1:0.43 in group I and group II, respectively (p 0.28) (Table 1). In group I, 25 (83.3%) patients had a full take of the graft at the 3-month follow-up. In group II, 27(90%) patients had a full take of the graft at the 3-month follow-up. These patients did not develop severe graft lateralization, infection or blunting (p 0.7) (table 2). In group I, the hearing improvement or the decrease in air bone gap is by 11 ± 7.2db while in group II, the improvement of hearing or decrease in air bone gap is by 12.2±7db (p 0.52) (table 3). The hearing improvements were also compared for all the frequencies ranging from 250 – 8000 Hz but the differences were not statistically different between the two groups (table 4).

Table 1: Sex distribution of patients

Gender	Group I (n=30)	Group II (n=30)
Male	17(56.7%)	21(70%)
Female	13(43.3%)	9(30%)
Ratio M:F	1:0.76	1:0.43

P-value is 0.28

Table 2: Comparison and analysis of graft uptake

Graft	Group I (n=30)	Group II (n=30)
1st (7th postop day)		
Rejected	1(3.3%)	-
Intact	29(96.7%)	30(100%)
2 nd visit (1 month post op)		
Rejected	2(6.7%)	2(6.7%)
Intact	28(93.3%)	28(93.3%)
3 rd visit (2 months post op)		
Rejected	4(13.3%)	-
Intact	26(86.7%)	28(93.3%)
4 th visit (3 months postop)		
Rejected	5(16.7%)	3(10%)
Intact	25(83.3%)	27(90%)

P-value is 0.7

Table 3: Comparison of Hearing Improvement between the two groups

Group	±SD	ST	(db)
I (Underlay)	n=30	11.0	±7.2
II (Over-under)	n=30	12.2	±7

p-value = 0.52

Table 5: Comparison by frequency of hearing improvement between the 2 groups

Frequency(Hz)	Unerlay (n=30)	Over-under (n=30)
250 Hz	9.8±6.4 db	10.3±4.5 db
500 Hz	11.2±8.5 db	12.3±9.3 db
1000 Hz	10.7±7.3 db	12.3±6.8 db
2000 Hz	11.8±7.9 db	13.3±7.7 db
4000 Hz	9.9±7.3 db	11.2±6.4 db
8000 Hz	12.8±5.8 db	13.7±6.6 db

P-value is >0.05 for all frequencies.

DISCUSSION

The underlay and the overlay procedures are presently the two most widely used techniques. The former, a relatively simple technique, places the graft under the remaining drum and malleus. In the latter technique, which is considered relatively difficult, the graft is placed lateral to the annulus after the squamous layer has been carefully removed. Each of these techniques has its advantages and disadvantages^{29,34-40}.

In a series of 273 ears, Glasscock³⁵ reported that the success rate was 91% with the overlay technique and 96% with the underlay technique. Sheehy and Anderson³⁴ rate of success in 472 overlay tympanoplasty surgeries was 97%. In a series of 554 overlay grafts, Rizer^{38,42} reported a

success rate of 95.6%. The same author's success rate in 158 underlay grafts was 88.8%.

The OUTM is a combination of the underlay and overlay techniques and has been developed with the aim of minimizing the disadvantages inherent in the other two techniques. This may explain why the OUTM is becoming popular⁶. There are a few studies on this relatively new technique in the literature. Stage and Bak-Pedersen⁴⁰ who supported the over-under procedure when used for perforations anterior to the handle of the malleus, reported a success rate of 91% in 39 ears. A similar success rate (90%) was attained by Kartush et al⁶ in a series of 120 patients who underwent over-under tympanoplasty.

In this study, all patients underwent myringoplasty by using either the UTM or OUTM. The success rate of UTM was 83.3%, whereas with OUTM it was 90%. There were no such complications as graft lateralization, infection or blunting in both groups. Although it is of no statistical significance, the success rate of OUTM is slightly higher than that of UTM.

The most important postoperative complication is lateralization and detachment of the graft from the manubrium mallei and umbo during the healing process. Singh et al. reported this complication in 6.6% patients. Sheehy, Packer and Gibb also reported this complication in their large series in which they used the overlay technique where the graft simply was placed on top of the umbo and manubrium mallei.^{5,36,37,41} As in the overlay technique, in the OUTM a facial graft may become detached from the umbo because of postoperative shrinking and scarring in the healing process theoretically, and this conduction will cause a decrease in the hearing levels. Kartush⁶ did not report any lateralization and detachment of the graft from the manubrium mallei and umbo in their study of 120 cases of OUTM.

In our cases, there were no lateralizations of the graft from the umbo and the other part of the manubrium mallei. Our mean follow-up period was 3 months; we think that this follow-up period is not enough to assess the lateralization of the graft. In the OUTM, the graft is placed on the manubrium mallei, but under the annulus and tympanic membrane remnant. This placement of the graft causes an important difference from the overlay technique. We think that the placement of the graft under the annulus and tympanic membrane remnant prevents lateralization of the graft. In the literature, there is no other data reporting the lateralization of the graft in the OUTM.

She et al²² described hearing improvement of 4.9 db in the UTM group (n=44) and of 9.7 db in the OUTM group (n=30) at 6-month follow-up. In the

study done by Yagit et al³⁰. The hearing improvement was of 16.55 db in the UTM group (n=46) and 16.96 db in the OUTM group (n=58). A study by Mishra et al.³⁹ using only the UTM showed a hearing improvement of 10-30 db. Another study by Ahmed et al.³ using only the OUTM showed a hearing improvement of 12.65 db in six months of follow-up.

The audiometric tests performed at the 4th postoperative visit revealed that the mean air-bone gap decreased by 11±7.2 dB, in patients with UTM. The mean air-bone gap decreased by 12.2±7 in patients with OUTM. The difference between these two groups was not statistically significant.

CONCLUSION

No statistically significant difference could be proved between both techniques regarding graft uptake and hearing improvement. This may be due to limitation of sample size and time of follow up. The results of this study are consistent with other national and international studies.

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