

MYRINGOPLASTY, ONLAY VERSUS UNDERLAY TECHNIQUE

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SUMMARY

This is a retrospective study of sixty patients to compare the results of onlay and underlay techniques of myringoplasty for the closure of subtotal tympanic membrane perforation. Thirty three (33) patients underwent myringoplasty by onlay and twenty seven (27) by underlay technique. The graft taken rate for underlay technique was better than that for onlay technique. Similarly, the underlay technique gave better hearing results post operatively. The degree of post operative high frequency sensorineural hearing loss was greater with the onlay technique. Postoperative complications such as retraction of anterior angle, medial prolapse of graft and squamous epithelial pearl formation were not reported with the underlay technique.

INTRODUCTION

Myringoplasty is a reconstructive operation of the tympanic membrane performed to prevent recurrent ear discharge and to improve hearing loss caused by tympanic membrane perforation.¹ The first surgical closure of tympanic membrane perforation, including removal of epithelium and grafting with skin was performed by Berthold in 1878, and he used the term: Myringoplastik: for this operation.² Initially, his method was not widely accepted. Not until 1950, when Zollner reintroduced it, did myringoplasty stir the interest of otologic community. During 1950, with the

improvement in surgical techniques, improved optics and the origin of microsurgery, myringoplasty could be performed with greater safety and increased graft survival.³ Dry ear, good eustachian tube function and no focus of infection in the nose, throat and sinuses are the prerequisites for myringoplasty. Although myringoplasty could be performed in children below the age of eight years, good results have been reported in patients above 12 years of age.⁴ Initially, onlay technique was used by otologist but with the passage of time, complications, such as lateralization of the graft, blunting of anterior angle etc were reported with this technique.⁵ It was Shea who first introduced the underlay

technique of myringoplasty in 1960.⁶ Since then, there is progressive swing towards underlay technique and success rate of over 92% has been reported with this technique.⁷ Over the last few decades, myringoplasty techniques have been modified according to the size and site of perforation. These include through, reverse through and interlay methods. Fat plug and sand-which techniques are used for small perforation.⁸ There are many reports regarding the success rate for onlay and underlay techniques but not any report comparing both techniques in the subtotal perforation. The aim of this study was to compare the success rate for both techniques in subtotal perforations and to evaluate the hearing outcome early and late post operatively.

MATERIAL AND METHODS

Sixty patients (41 male and 19 female) having subtotal tympanic membrane perforation underwent myringoplasty in the ENT department of Hayatabad Medical Complex Peshawar from 1994 to 2001. The age range was from 14 to 40 years. All patients had good eustachian tube function with dry middle ear mucosa. Preoperative assessment was carried out by tuning fork test and pure tone audiometry. Eustachian tube function was assessed by Valsalva and the pressure changes were observed on the impedance meter. Non of the patients had active middle ear disease, ossicular discontinuity or sensorineural hearing loss. The air bone gap ranged from 30 to 40 dB. Thirty three (33) patients underwent myringoplasty by onlay and twenty seven (27) by underlay technique.

Temporalis fascia was used for grafting in all patients. All operations were carried under general anaesthesia. Onlay technique was carried out through endomeatal approach. After freshening the edges of

perforation, squamous epithelium was elevated from the tympanic annulus and the tympanic membrane remnants. The graft was placed lateral to the annulus. Underlay technique was carried out through endaural approach. A large tympanomeatal flap based on superior vascular pedicle was elevated along with the annulus. The graft was placed over the handle of malleus, medial to the annulus. Meatal pack soaked in antibiotic ointment was placed for one week. All patients were followed at weekly interval for complete epithelization. Pure tone audiometry and impedance study was carried out in all successful cases one month, 3 month, 6 month and one year after surgery. The graft take rate, and air bone gape closure were recorded for comparison.

RESULTS

Out of sixty patients, graft was successfully taken in 48 patients. Thus the overall success rate was 80% in our study. The success rate for onlay technique was 75.7% (25 out of 33) and 85.1% for underlay technique (23 out of 27 patients). The time required for complete epithelization ranged from 17-22 days for underlay technique and 25-31 days for onlay technique. The average air bone gap closure after one year follow up was 15 dB for onlay technique and 21.5 dB for underlay technique. Blunting of anterior angle was observed in one patient where as one patient developed squamous epithe-

SUCCESS RATE FOR ONLAY AND UNDERLAY TECHNIQUES

S. No.	Technique	Total No. of cases	No. of patients	% age
01	Onlay	33	25	75.7%
02	Underlay	27	23	85.1%

TABLE - 1

**AIR CONDUCTION IMPROVEMENT FOR
UNDERLAY AND ONLAY TECHNIQUES AT
DIFFERENT FREQUENCIES**

Frequencies.	Air Conduction Improvement	
	Underlay	Onlay
0.25 KHz	21.2 dB	11.0 dB
0.50 KHz	23.2 dB	14.3 dB
1.00 KHz	22.0 dB	15.3 dB
2.00 KHz	21.3 dB	15.3 dB
4.00 KHz	13.0 dB	8.3 dB
8.00 KHz	3.2 dB	0.8 dB

TABLE - 2

lial pearl with onlay technique which required further surgery. Postoperative infection resulting in graft failure was observed in three cases. Table 2 shows late improvement in air conduction at different frequencies. It shows persistence of good hearing outcome for underlay technique except at high frequencies where the improvement was insignificant with slight deterioration in bone conduction. This hearing loss at high frequencies was more for onlay than for underlay technique.

DISCUSSION

Myringoplasty techniques, onlay and underlay have attracted much discussion. There are reported advantages and disadvantages of each. The onlay technique has the credit of being easier and less time consuming. Its disadvantages are the risk of trapping squamous epithelium and consequent cholesteatoma pearl formation, lateralization of the graft and blunting of anterior angle.⁹ The underlay technique has the advantage of inspecting the ossicular chain and division of any intratympanic adhesions. The disadvantage of onlay technique are avoided by this method. Its disadvantage are the risk of medial prolapse of the graft and retraction of anterior angle.¹⁰ We use temporalis fascia for

grafting in our unit as it is easy to take, large surface area is available, has a low metabolic rate and does not require any special preparation.¹¹ The over all success rate in our study, 80% can be favourably compared to 82.2% reported by Kotecha and Fowler.¹² The success rate for underlay technique (85.1%) was better than that for onlay technique (75.7%). Similarly the average air bone gap closure for underlay technique (21.5dB) was better than that for onlay technique (15dB). These results coincides with those reported by Black and Wormald.⁷ The time for complete epithelization was shorter for underlay technique than for onlay technique. A large tympanomeatal flap based on superior vascular pedicle provides better vascularization and helps in rapid healing. On comparing the post operative compliance of both techniques, there was not statistically significant difference. This disproves the claims of some authors that the graft in underlay technique narrows the middle ear space and thus reduces the drum compliance.¹³ The graft in the underlay technique can be placed either medial to the handle of malleus or lateral to it. We recommend putting the graft over the handle of malleus, thus preventing medial prolapse of the graft and narrowing of the middle ear space.

Late hearing evaluation for both techniques one year after surgery showed better improvement in air conduction for underlay technique except at higher frequencies that showed slight deterioration evidenced as non significant improvement (table 2). These changes occurred because of a combined drop of air and bone conduction at higher frequencies. This hearing loss was greater for onlay technique. The sensorineural hearing loss is probably due to excessive mobilization of the ossicular chain during de-epithelization process as reported by Tarabishi.¹⁴

CONCLUSION

In conclusion, it seems that underlay technique gives better hearing results in our centre. The graft take rate is high and time of epithelization is less for underlay technique. Reduction in drum compliance can be prevented by placing the graft over the handle of malleus. We also stress the importance of late hearing evaluation after tympanoplasties with special attention to any late development of sensorineural hearing loss.

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