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Original Research Article

A RETROSPECTIVE ANALYSIS OF ENDOSCOPIC TYMPANOPLASTY TECHNIQUES - UNDERLAY VERSUS INTERLAY: OUR EXPERIENCE

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ABSTRACT

The objective of this study was to compare uptake and hearing improvement in patients operated by Underlay or Interlay technique of Endoscopic Tympanoplasty. This is a retrospective study conducted at Northern Railway Central Hospital, New Delhi in patients operated in a 5 years duration. A total of 134 patients with Chronic Otitis Media who were operated by either Underlay or Interlay Endoscopic Tyrnpanoplasty were retrospectively analyzed. Graft Uptake and Hearing Improvement was recorded 6 months after surgery and the two groups were compared. Tragal Perichondrium was harvested by Transcanal approach, was used as the graft material in all cases. The graft Uptake rate was 90.7% in the Underlay group and 98.5% in the Interlay group, in our study. The difference in the graft uptake rate in the two groups was statistically significant. The hearing improvement in terms of ABG closure was seen in both the groups, the difference in improvement in the two groups was not statistically significant.

Keywords: Endoscopic Tympanoplasty, Chronic Otitis Media, Tragal Perichondrium, Underlay technique, Interlay technique.

INTRODUCTION

Chronic Otitis Media (COM) is a common, disease that can have serious complications related to incorrect and inadequate treatment. Tympanoplasty is the surgical procedure performed to eradicate infection and improve hearing in patients with COM. The main purpose of Tympanoplasty is to repair the perforated Tympanic Membrane and rehabilitate the patient's hearing. ln this Retrospective study, we analyse the various techniques of Tympanoplasty employed with respect to graft success rate and hearing improvement.

MATERIALS AND METHODS

This retrospective study was conducted at Northern Railway Central Hospital, New Delhi on 134 patients who were operated by either Endoscopic underlay tympanoplasty or Endoscopic Interlay Tympanoplasty over a period of 5 years. Patients aged between 11 to 65 years operated for COM with mucosal disease were included in the study. The patients were followed up and Pure Tone Audiometry was done 6 months post-surgery. Six patients had both their ears operated. All patients underwent Endoscopic Tympanoplasty by one of the following techniques: Endoscopic Underlay or Endoscopic Interlay. So, the patients were studied under two groups, Group 1, who underwent Underlay tympanoplasty and Group 2 who underwent Interlay tympanoplasty. The patient's demographic data, preoperative and postoperative audiometric test result, grafting technique and Graft take up was analyzed. Follow-up with ear examination, Audiometry was done 6 months post operatively. Hearing threshold was measured at 0.5,1 and 2 khz and average hearing values were calculated. Patients in whom cholesteatoma was identified during surgery were not included in the study.

Surgical Technique: All the patients were operated under Local Anesthesia. Tragal Perichondrial graft was harvested via a Trans cartilaginous incision. After freshening of the margins of the perforation edges, the tympanomeatal flap was elevated. The integrity of the ossicular chain was ensured. For patients undergoing tympanoplasty by Underlay

Technique, the graft was placed under the manubrium mallei and tympanomeatal flap reposited all over it.

For patients undergoing lnterlay Technique tympanoplasty, the graft was placed in between the squamous and fibrous layer laterally and mucosal layer medially.

The Ear canal was packed with gelfoam soaked in antibiotic ear drops. Light gauze dressing over the ear was done.

RESULTS

The age of the patients ranged from 8- 65 years of age. Underlay tymapanoplasty included patients age ranging from 8 - 58 years and interlay tympanoplasty from 13 — 65 years.

Table 1 shows the age distribution in the two groups. The mean age of patients who underwent Endoscopic underlay tympanoplasty was 34 years and Mean age of patients undergoing lnterlay tympanoplasty was 37.7 years of age. Maximum number of patients in both the groups were in the 21-40 years of age. Youngest patient operated was 8 years of age, operated by Underlay technique and oldest was 65 years of age, operated by Interlay technique.47.69% of patients, in our study in the Underlay group were females and 52.3% were males. ln the Overlay group, 52.17 % were females and 47.82% were males. No difference in the female to male ratio was seen in both the groups, 2.7 % patients included in our study had bilateral perforations. Of the 134 patients, in 54.5% patients, left ear surgery was performed and 45.4 % Right ear surgery was performed No statistical difference in the side operated was seen in both the groups.8 out of 134 ears included, reported postoperative residual perforation. Out of the 7 patients,6 patients had been operated by underlay technique and 1 by Interlay Technique. Of these 7 patients, 3 patients underwent revision surgery at our centre and had successful graft uptake. The rest of the 4 patients, refused revision surgery. Out of the 134 ears operated, 2 patients were being operated a third time, the first two surgeries were done elsewhere. [Table 1]

Table 2 shows that maximum number of patients in both the groups had a preop ABG -21-30db. [Table 2]

Table 3 shows that maximum number of patients in the both the groups had a postop ABG ranging between 11-20 db. [Table 3]

Table 4 shows the closure of ABG, comparing the mean preop ABG and Mean postop ABG.

Preoperative AB Gap of the patients in the Underlay group ranged between 15 -33 dB, mean being 22.6 db. This reduced to postop AB Gap 10-20 dB, mean being 14.6 db. Pre op AB Gap in the Interlay group ranged between 17 — 30 dB, mean being 20.6 db. Post op AB Gap in the interlay group ranged between 10-15 dB, mean being 11.8 db. [Table 4]

Table 5 shows the graft uptake rate in the two groups. The Endoscopic Underlay group had graft uptake rate of 90.7% with 59 out of 65 patients having closure of the tympanic membrane perforation. The Interlay group had a graft uptake rate of 98.5%, with only one ear having residual perforation out of 69 patients. [Table 5]

Table 1: Age distribution of study groups

Age Groups	Group 1 (endoscopic Underlay)		Group 2 (endoscopic Interlay)	
	Number	Percentage	Number	Percentage
<20 yrs	17	26.1	9	13.0
21-40 yrs	33	50.7	36	46.3
41-60yrs	14	23.07	23	30.4
>60 yrs	01	0	1	1.4
Total	65	100	69	100

Table 2: PREOP AB GAP in the two groups

Preop ABG	Group 1 (endoscopic underlay)	Group 2 (endoscopic Interlay)
<10	0	0
11-20	17	25
21-30	35	40
31-40	13	04
>40	0	0
Total	65	69

Table 3: POSTOP AB GAP in the two groups

Post op ABG	Group 1 (endoscopic underlay)	Group 2 (endoscopicInterlay)
<10	17	32
11-20	38	33
21-30	10	4
31-40	0	0
>40	0	0
Total	65	69

Table 4: Reduction in ABG at 6 Months post op period

	Preop		Postop		Change
	Mean	S.D	Mean	S.D	
Group 1(endoscopicunderlay)	22.6	6.346	14.6	4.881	-8.0
Group 2(endoscopicInterlay)	20.6	2.503	11.8	2.098	-8.8

Table 5: Outcome of Graft Uptake at 12 Weeks

	Group 1 (endoscopic underlay)		Group 2 (endoscopic Interlay)	
	Number	Percentage	Number	Percentage
Rejected	6	9.2	1	1.4
Accepted	59	90.7	68	98.5

DISCUSSION

In the present study, the demographic variables like age, sex and side operated show no significant difference in the two groups. The patients were divided into two groups, based on the technique of graft placement; Underlay or Interlay technique. Graft Uptake rates in various studies range between 80 -95 % by various authors. Osama Get al (2015),[1] performed Endoscopic Tympanoplasty using Tragal Perichondrium as graft material and observed a graft uptake of 85- 90%. Similarly, Victor Valdivia et al (2013),[2] conducted a study on Endoscopic Tympanoplasty using Tragal Perichondrium graft by under- over Technique and reported a graft uptake rate of 93.5%. Chen et al (2018),[3] reported a graft uptake rate of 96.9% in a study conducted on 129 patients, using Tragal perichondrium by Endoscopic Tympanoplasty. These studies are in accordance to our study, where we observed a graft uptake rate of 90.7% by Endoscopic Underlay technique and 98.5 % by Endoscopic Interlay technique, using Tragal perichondrium as graft material.

The post-operative hearing gain is an important indicator of treatment success and the ABG closure is an important indicator of improvement in hearing. The ABG closure improved from 22.6 dB preop to 14.6 dB postop in the Underlay group. In the Interlay group, the ABG improved from 20.6 dB to 22.8 dB in the post op period. There is no significant difference in the improvement seen in the two groups. Similarly, in a study, Yilmaz et al,[6] reported improvement in ABG from 30.6 dB to 17.8 dB in 45 pediatric patients who underwent Cartilage Tympanoplasty. Riza et al,[5] reported improvement in ABG from 20.4 to 8.12 dB in the Endoscopic group. These results are similar to that in our study. Victor Valdivia et al,[2] reported a significant improvement in ABG closure in patients after tympanoplasty using Tragal Perichondrium.

Using an Endoscope for performing tympanoplasty has several advantages. The main advantage is a decrease in operative time. The Endoscopic approach gives comparable or even better results than the conventional Microscope.

CONCLUSION

Endoscopic Tympanoplasty is a safe and effective technique to repair the defect in Tympanic membrane as a result avoiding the pain, recurrent infection and discharge, if not treated. Best results are obtained in Central perforation with normal middle ear mucosa, good Eustachian tube function, patent ventilation pathways, intact ossicular chain and a good cochlear reserve.

Retrospective analysis done showed that endoscopic interlay technique had a better graft take up and hearing improvement than endoscopic underlay technique these results indicate that although both techniques give > 90% graft uptake endoscopic interlay offers significantly better graft uptake rate. ln our analysis, there was no significant difference in the hearing improvement by either of the techniques.

Compliance with Ethical Standards.

Conflict of interest: The authors declare that they have no conflict of interest.

Human and Animal Rights statement: All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional Research committee and with the 1964 Helsinki declaration and its later amendments or comparable standards.

Informed Consent: Informed consent was obtained from all individual participants included in the study.

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