



OVERLAY VERSUS UNDERLAY MYRINGOPLASTY : A COMPARATIVE STUDY.

Dr. Puneet Maheshwari*

MBBS, MS(ENT), Assistant Professor, Department Of ENT, Hind Institute of Medical Sciences, Barabanki. *Corresponding Author

Dr. Baidya Nath Majhi

MBBS, MS(ENT), Senior Resident, Department Of ENT, Hind Institute of Medical Sciences, Barabanki.

ABSTRACT

Myringoplasty is the procedure of surgically closing a perforation in the eardrum. The objective of the study was to compare the two surgical modalities for Myringoplasty – Overlay and Underlay in cases of CSOM with inactive mucosal disease.

This is a prospective study of 18 months duration, data was collected from 80 patients admitted for Myringoplasty- 40 in each group. Results were calculated in terms of graft accepted or rejected and decrease in air bone gap.

Graft rejection were observed in Overlay 7/40 and in Underlay 5/40. Post operatively after 16 weeks, mean air bone gap was more reduced in Underlay than Overlay Myringoplasty.

Summary: The present study showed that underlay technique had a better graft take and hearing improvement in large central perforation of Chronic Suppurative Otitis Media.

KEYWORDS : Chronic Suppurative Otitis Media, Myringoplasty, Overlay, Underlay.

Introduction

Perforated tympanic membrane and middle ear infection are among common complications treated by tympanoplasty. Up to 80% of these perforations heal spontaneously [1]. For the remaining, Surgical repair, known as Myringoplasty, is usually proposed. Myringoplasty is a surgical technique used to restore the integrity of tympanic membrane and to improve hearing [2]. It was introduced by Berthold [3]. Repair of eardrum by doing myringoplasty may confer considerable benefits to patients by preventing the ossicular pathology and preventing the migration of squamous epithelium around the margins of perforation with possible consequent Cholesteatoma formation [4].

Chronic Otitis Media is an inflammatory process in the middle-ear that results in permanent perforation of tympanic membrane. This is classified as Active, Inactive and Inactive with frequent reactivation [5].

Myringoplasty was introduced long back in 1878 by Berthold [3]. and included the surgical closure of tympanic membrane perforation. In 1950s Zollner [6] and Wullstein [7] reintroduced myringoplasty. This period witnessed an improvement in surgical techniques with improved optics and emergence of microsurgery, thus making the myringoplasty safer and lowered rate of graft rejection. Techniques of myringoplasty include Underlay [8], Overlay [9] and Interlay. Interlay technique is obsolete now a days as being difficult to master. As far as graft materials are concerned different types of grafts such as autogenous, homologous and allografts have been attempted for performing myringoplasty but temporalis fascia graft remains the mainstay of almost all the procedures of myringoplasty. Different advantages for the use of temporalis fascia graft include its physiological similarity with tympanic membrane [10].

Each technique has its advantage as well as disadvantage. Some of the workers are of the view that Overlay technique is more useful in repairing large and anterior perforation while Underlay technique is ideal for posterior perforation [11], Underlay technique is considered technically easier, less time-consuming and has shown to be having higher success rate [12]. The Interlay approach also has shown promising results with success rates higher than 90% [13,14,15,16] but technically difficult to perform.

The present study is an attempt to compare the two commonly used

myringoplasty procedures – Overlay and Underlay.

II. Aim of the Study

To compare the two surgical modalities of Myringoplasty in cases of CSOM with Inactive mucosal disease in large central perforation in terms of graft take up and improvement in hearing.

III. Material and Methods

3.1. Study Design and Setting

This Randomized prospective crossover study was carried in the Department of E.N.T, Hind Institute of Medical Sciences, Barabanki in 80 patients of Chronic Suppurative Otitis Media with conductive hearing loss.

3.2. Study Period

The duration of the study was 18 Months with 4 months follow-up period for every case.

3.3 Procedure

Cases of CSOM with large central perforation and conductive hearing loss were selected. Pre-operatively all patients had a Pure Tone Audiogram with an average of four frequency (0.5/1/2/4 Khz) calculated for both air conduction and bone conduction. Post auricular approach and temporalis fascia was used as a graft material in both techniques of Myringoplasty.

Overlay technique was done in 40 patients having dry ear and temporalis fascia graft was placed lateral to the annulus [17]. **Fig.i**

Underlay technique was done in 40 patients having dry ear and temporalis fascia graft was placed under the membrane remnant including the flap after elevating the tympanomeatal flap elevated along with annulus [18]. **Fig.ii**

Follow up of the patients done weekly in first operative month, Biweekly for next two month followed by final visit after four months. At every follow-up, patients were examined under ear microscopy to check the graft uptake and complication (If any). Post-operatively a Pure Tone Audiogram Using (0.5/1/2/4 Khz) was performed at 16 week (Last) follow-up. Hearing results were assessed by comparing pre-operative and post-operative pure tone averages as well as closure of the air-bone gap.

3.4.1. Inclusion Criteria

- Cases of CSOM with pure conductive hearing loss.
- Both males and females in the age group of 15-50 years.

3.4.2. Exclusion Criteria

- Patient with Sensorineural hearing loss and Mixed hearing loss.
- Squamosal disease with or without complications.
- Patients below 15 years and above 50 years.
- Discharging ear, previous history of ear surgery, Ossicular chain necrosis, Otitis externa.
- Systemic diseases like Hypertension, Diabetes or any chronic infections.

IV. Statistical Tools Employed

The following statistical formulas were used

4.1. Mean

4.2. Standard Deviation

4.3. Chi Square Test

4.4. Analysis Of Variance (ANOVA)

4.5. Paired "T" Test

V. Results

Out of 80 cases enrolled in the study, a total of 40 (50%) each were managed using Overlay and Underlay methods and comprised groups I and II respectively. Age of patients ranged from 15 to 47 years. Majority of patients in both the groups were aged between 21 and 40 years. Mean age of patients in groups I and II was 29.43 ± 7.00 , 28.67 ± 9.72 years respectively.

5.1 Mean hearing gain (Closure in air-bone gap)

Air bone gap ranged from 15 to 35 db in different groups. Preoperative mean air bone gap in groups I and II was 24.50 ± 6.07 and 25.33 ± 4.90 and postoperative mean air bone gap was 16.50 ± 6.04 and 14.67 ± 4.54 respectively shown in (Table I).

Table I : Change in air bone gap in two groups at last follow up (16 Weeks)

Groups	Preoperative		Post-Operative Last Follow Up		Change		Significance Of Change (Paired 'T'-Test)	
	Mean	SD	Mean	SD	Mean	SD	"T"	"P"
Group I	24.50	6.07	16.50	6.04	-8.00	3.85	11.379	<0.001
Group II	25.33	4.90	14.67	4.54	-10.83	7.63	7.661	<0.001
Intergroup Comparison Of Reduction (ANOVA)			F		5.058			
			P		0.008			

Among two groups a significant mean reduction in air bone gap was observed. Mean reduction was more in group II than group I. Statistically, intergroup difference in reduction in air bone gap was significant ($p < 0.001$)

5.2 Graft status (Accepted or Rejected)

Out Of 80 Cases, Graft failure was observed in only 12 cases (12.22%), success rate of 85% was observed in the present study. Success rate was 82.5% and 87.5% in group I and II respectively.

Discussion

Chronic suppurative otitis media is characterized by a persistent discharge from middle ear through a tympanic membrane perforation. According to a WHO report, India is amongst the nations with highest burden of CSOM [19].

Myringoplasty is the procedure to repair perforated tympanic membrane. It is performed when only except for ear drum, the entire ossicular chain is intact [7]. Myringoplasty is beneficial procedure to protect the middle ear and inner ear from future deterioration [20]. There are at least a dozen approaches to perform myringoplasty among these the Underlay and Overlay is quite common and are widely used. The reported differences in immediate success rates are very nominal and hence each of these techniques is claimed to be having an equal if not better efficacy

than the other [21].

In Overlay technique graft rejected in 7 patients. Preoperative mean air bone gap was 24.50 db which comes to be 16.50 db. Postoperative there was change in 8.00 db mean hearing gain after 16 weeks.

In Underlay technique graft rejected in 5 patients. Preoperative mean air bone gap was 25.33 db which comes to be 14.67 db. Postoperative there was change in 10.83 db mean hearing gain after 16 weeks.

No complication noticed in any of the two procedures. Eventually the success rate was 82.5% in Overlay and 87.5% in Underlay.

Thus in present study as far as resolution of air bone gap is concerned, underlay technique showed a statistically significant better outcome as compared to Overlay. The findings in present study showed an almost similar graft take rate in both these techniques.

VII. Conclusion

Myringoplasty is a beneficial procedure to protect the middle ear and inner ear from future deterioration. The optimal results achieved with the underlay technique (better hearing gain, no complications) suggest that this technique should be more widely used, although it is possible that in cases of larger and anterior perforations the overlay technique, ensures a higher degree of uptake.



Fig.i Graft placed by Overlay technique



Fig.ii Graft placed by Underlay technique

REFERENCES

- [1]. Galdstone HB, Jackler RK. Tympanic Membrane Wound Healing. An Overview. Otolaryngol Clin North Am., 28, 1995, 913-932.
- [2]. Aslam MA, Aslam MJ. Comparison Of Over-Underlay And Underlay Techniques Of Myringoplasty. Pak. Armed Forces Med. J, 3, 2009.
- [3]. Berthold E, Ueber Myringoplastik, Wier Med Bull, 1878, 1, 627-627, Cited By: Sismanis A. Tympanoplasty, In Glasscock-Shambaugh Surgery Of The Ear, Vol. 1, 5th Edn, Pp. 463-486, BC Decker Inc., 2003.
- [4]. Bluestone CD, Cantekin EI, Douglas GS, Eustachian Tube Function Related To The Results Of Tympanoplasty In Children. Laryngoscope, 89, 1979, 450-8.
- [5]. Nadol JB, The Chronic Draining Ear. In: Gates GA (Ed.). Current Therapy In Otolaryngology - Head And Neck Surgery, BC Decker Inc., Philadelphia, 1987, 18-22.
- [6]. Zollner F, The Principles Of Plastic Surgery Of The Sound-Conducting Apparatus, J Laryngol Otol, 69, 1955, 637-652.
- [7]. Wullstein H, Theory And Practice Of Myringoplasty. Laryngoscope, 66, 1956, 1076-93.
- [8]. Shea JJ Jr, Vein Graft Closure Of Eardrum Perforation, J Laryngol Otol. 1960; 74: 358-62.
- [9]. House WF, Myringoplasty, Arch Otolaryngol, 71, 1960, 399-404.
- [10]. Sheehy JL, Crabtree JA, Tympanoplasty, Staging The Operation, Laryngoscope, 83, 1973, 1594-1621.
- [11]. Kartush JM, Michaelides EM, Becvarovski Z, Larouere MJ, Over-Under Tympanoplasty, Laryngoscope, 112, 2002, 802-7.

- [12]. Singh M, Rai A, Bandyopadhyay S, Gupta SC, Comparative Study Of Underlay And Overlay Techniques Of Myringoplasty In Large And Subtotal Perforations Of The Tympanic Membrane, *J Laryngol Otol*, 117(6), 2003, 444-8.
- [13]. Komune S, Wakizono S, Hisashi, Interlay Method For Myringoplasty. *Larynx Auris Nasus*, 19(1), 1992, 17-22.
- [14]. Guo M, Huang Y, Wang J, Report Of Myringoplasty With Interlay Method In 53 Ears Perforation Of Tympani., *Lin Chuang Er Bi Yan Hou Ke Za Zhi*, 13(4), 1999 Apr, 147-9.
- [15]. Vishal US. A One-Year Prospective Study To Evaluate The Results Of Superiorly Based Tympanomeatal Flap In Endoscopic Myringoplasty Conducted In District Hospital, Belgaum And KLES And MRC, Belgaum During July 2003 To July 2004, Dissertation, MS (ENT), 2006, RGUHS, Karnataka.
- [16]. Hay A, Blanshard J, The Anterior Interlay Myringoplasty:, Outcome And Hearing Results In Anterior And Subtotal Tympanic Membrane Perforations, *Otol Neurotol*. 35(9), 2014 Oct, 1569-76.
- [17]. Sergi B, Galli J, De Corso E, Parrilla C, Paludetti G, *Acta Otorhinolaryngol Ital*, 31(6), Dec 2011, 366–371.
- [18]. Sengupta A, Basak B, Ghosh D, Basu D, Adhikari D, Maity K, A Study On Outcome Of Underlay, Overlay And Combined Techniques Of Myringoplasty. *Indian J Otolaryngol Head Neck Surg*. 64(1), 2012, 63-6.
- [19]. World Health Organization. Chronic Suppurative Otitis Media, Burden Of Illness And Management Options, WHO Child And Adolescent Health Department, Prevention Of Blindness And Deafness, Geneva, 2004.
- [20]. Hussain A, Yousaf N, Khan AR, Outcome Of Myringoplasty. *J Postgrad Med Inst*. 18, 2004, 693-6.
- [21]. Kartush JM. Ossicular Chain Reconstruction. *Capitulum To Malleus*. *Otolaryngol Clin North Am*, 27, 1994, 89–715.