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Original Article

Myringoplasty: A Retrospective Study

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Abstract

Background: Myringoplasty is the most commonly done surgery in the field of otology. It is a beneficial procedure done for closing tympanic membrane perforations and improving hearing.

Objective: The aim of this study was to assess hearing results after myringoplasty at 1 month and at 3 months postoperatively and to compare the graft uptake rates in perforations of different sizes and at different sites.

Materials and Methods: The study population consisted of 100 patients who were suffering from chronic suppurative otitis media-tubotympanic pre-operative air-bone (AB) gap which were calculated by taking averages of bone conduction and air conduction at the frequencies of 500, 1000, and 2000 Hz. Myringoplasty was performed with underlay technique under local anesthesia by postaural routes using temporalis fascia as grafting materials. Patients were called for follow-up at 1 and 3 months postoperatively and hearing evaluation was done and compared with pre-operative. The status of the graft was determined at each follow-up otoscopically.

Results: In a total of 30 cases of small perforations, graft was intact in 25 patients with a success rate of 83.33%. In a total of 50 cases of medium-sized perforations, graft was intact in 45 patients with success rate of 90%, whereas in 20 patients of subtotal perforations, the graft uptake was seen only in 12 patients with success rate of 60%. Graft uptake in 30 patients of anterior perforations was seen in 28 patients with a success rate of 93.3%. In 56 patients of posterior perforations, 48 patients showed graft uptake with a success rate of 85.71%, whereas in 14 patients of all quadrant perforation, only 6 showed graft uptake with a success rate of 42.85%. There was overall improvement in hearing in 87 (87%) patients and no improvement in 13% patients.

Conclusion: Using the proportion of patients with a post-operative hearing within 40 dB as the criterion, in this study, 100% of patients achieved their hearing level within 40 dB. Using hearing gain exceeding 15 dB as the criterion, 87% of patients (87) had their hearing gain exceeding 15 dB. Using post-operative AB gap within 20 dB as the criterion, 96% of patients (96) had their AB gap within 20 dB.

Key words: Chronic suppurative otitis media, Myringoplasty, Perforation

INTRODUCTION

Chronic suppurative otitis media (CSOM) is one of the most common ear diseases in developing countries.[1] CSOM is defined as a persistent disease, insidious in onset, often capable of causing severe destruction of middle ear structure and irreversible sequelae, which is clinically manifested with deafness and discharge > 3 months. The disease affects the area of the tympanic membrane.[2]

Myringoplasty is one of the various surgical techniques for the management of CSOM-tubotympanic type disease. It is defined as simple surgical repair of a tympanic membrane perforation without ossicular reconstruction. The presence of a perforation of tympanic membrane with intermittent discharge and hearing loss of conductive nature are the indications of myringoplasty. It is a beneficial procedure done for closing tympanic membrane and improving hearing.

Myringoplasty was introduced by Berthold[3] in 1878, but the modern era began only in the 1950s with the work of Wullstein[4] and Zoellner.[5]

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Many techniques and materials have been used over the years, but the underlay technique as advocated by Austin and Shea[6] is now universally used. Hough[7] modified this underlay technique by utilizing autologous temporalis fascia.

The degree of hearing improvement depends on several factors such as site and size of perforation, ossicular status, surgical technique, type of graft, and function of eustachian tube.[8,9]

The present study was undertaken with the aim to assess the hearing results after myringoplasty and rate of graft uptake in perforations of different sizes and at different sites.

MATERIALS AND METHODS

This study was conducted retrospectively in about 100 patients attending ENT Outpatient Departments of SMGS Hospital, Government Medical College, Jammu, between June 2016 and September 2018 with CSOM mucosal disease presenting with chief complaints of ear discharge and hearing loss.

Inclusion Criteria

Patients with 15–50 years of age of both sexes and patients with small, medium, and subtotal perforations, dry ear for at least 4 weeks preoperatively, tuning fork test-weber lateralized to worst ear and rinnes negative always, pure tone audiometry revealing hearing loss 25–50 dB, good cochlear reserve, patent Eustachian tube, usage of temporalis fascia graft only, only underlay technique myringoplasty with no ossicular reconstruction, and no evidence of active infection in the nose, throat, and paranasal sinuses were included in the study.

Exclusion Criteria

Patients with attic and total perforation, patients with sensorineural hearing loss, and revision cases were excluded from the study.

After the selection of patients, informed written consent was obtained. A detailed clinical examination was done including examination of the nose and throat to rule out any infective focus.

Otoscopic examination of the selected patients was done. According to quadrant occupied, the size of perforation was determined. The site of perforation as anterior is taken with the handle of malleus as a landmark when >74% of the perforation is found anterior to handle of malleus and posterior when it involves posterior to handle of malleus. Degree and type of hearing loss were assessed by tuning fork tests clinically. Pure tone audiometry was done and pre-tone average was calculated at speech frequencies of 500, 1000, and 2000 Hz. Moreover, AB gap was calculated at the same frequencies. All the patients of the study group were examined under microscope within 1 week before surgery.

Myringoplasty was performed with underlay technique under local anesthesia using postaural, transcanal, and endaural routes. Temporalis muscle fascia was used as a grafting material for reconstruction of the tympanic membrane in all the patients. Soframycin soaked pack was removed on the 10th post-operative day. Then, the patients were instructed to instil three drops of antibiotic ear drops 3 times a day for 15 days. The patients were then called for follow-up at 1 month and 3 months postoperatively. During follow-up, both clinical and audiological examinations were done. On otoscopic examination, the status of the graft was noted. Post-operative air-bone (AB) gap was calculated comparing as an average of pre-operative bone conduction threshold and post-operative air conduction threshold at frequencies of 500, 1000, and 2000 Hz. Comparison between pre-operative and post-operative AB gap was done, and AB gap closure was determined.

Statistical Analysis

The information collected was compiled, tabulated, and analyzed. Descriptive statistics was used for the demographic profile of subjects and summarized as mean ± standard deviation. Independent sample *t*-test and paired sample *t*-test were performed for continuous data to find the significance of the difference of means of various measures. A $P < 0.05$ was considered to be statistically significant. Data were analyzed using Statistical Package for the Social Sciences computer software program version 20.

RESULTS AND OBSERVATIONS

A total of 100 myringoplasties preformed were assessed retrospectively.

The following observations and results were obtained.

Age and Sex Distribution

There were 56 male (56%) and 44 female (44%) patients. The age limit among them was minimum of 15 years and maximum of 50 years with a mean of 26.47 ± 7.59 years.

Size and Site of Perforation and its Relation with Graft Uptake

There were 30 cases of small perforation (30%), 50 cases (50%) of medium-sized perforation, and 20 cases (20%) of subtotal perforation [Figure 1].

In a total of 30 cases of small perforations, the graft was intact in 25 patients with a success rate of 83.33%. In a total of 50 cases of medium-sized perforations, the graft was intact in 45 patients with a success rate of 90%, whereas

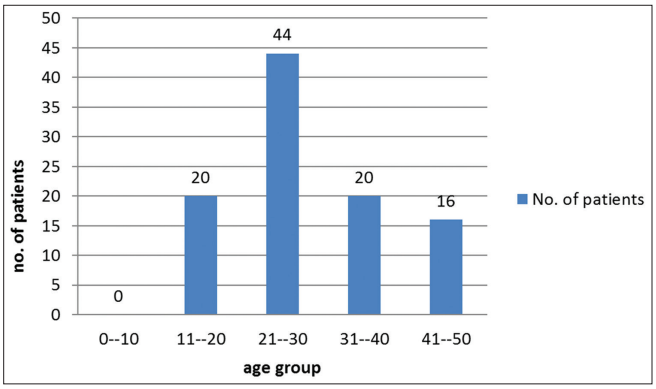

Figure 1: Age-wise distribution of patients

in 20 patients of subtotal perforations, the graft uptake was seen only in 12 patients with success rate of 60%. Hence, there was a significant success rate of graft uptake in small- and medium-sized perforations as compared to subtotal perforations [Figures 2 and 3].

In 100 cases of CSOM, 30 patients (30%) presented with anterior perforations, 56 (56%) with posterior perforations, whereas 14 (14%) presented with perforations occupying all the quadrants. Graft uptake in 30 patients of anterior perforations was seen in 28 patients with a success rate of 93.3%. In 56 patients of posterior perforations, 48 patients showed graft uptake with a success rate of 85.71%, whereas in 14 patients of all quadrant perforation, only 6 showed graft uptake with a success rate of 42.85% [Figures 4 and 5].

This shows that there is a significant success rate in anterior and posterior quadrant perforations as compared to all quadrant perforations.

Pure Tone Audiometry Findings

The mean pure tone average (PTA) in pre-operative period was 35.88 ± 2.50 dB. The mean post-operative PTA in 1st and 3rd months was 26.32 ± 5.79 dB and 24.46 ± 4.79 dB, respectively [Table 1]. There was a significant improvement in post-operative PTA to that of pre-operative PTA in 1st and 3rd months. Table 2 shows mean pre-operative PTA in small, medium, and subtotal perforations and comparison of post-operative PTA with pre-operative.

AB gap closure was between 5 and 10 dB in 59 (59%) patients. Figure 6 shows AB gap closure. Hence, there was overall improvement in hearing in 87 (87%) patients and no improvement in 13% of patients.

DISCUSSION

In this study, we have operated 100 cases considering pre-requisites. In this study, the age of the patient who underwent surgery varied from 15 years to 50 years. The

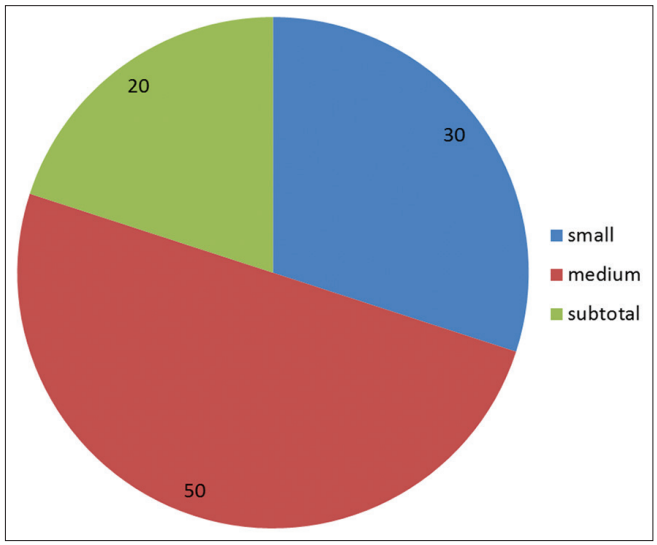

Figure 2: Distribution of patients according to the size of perforation

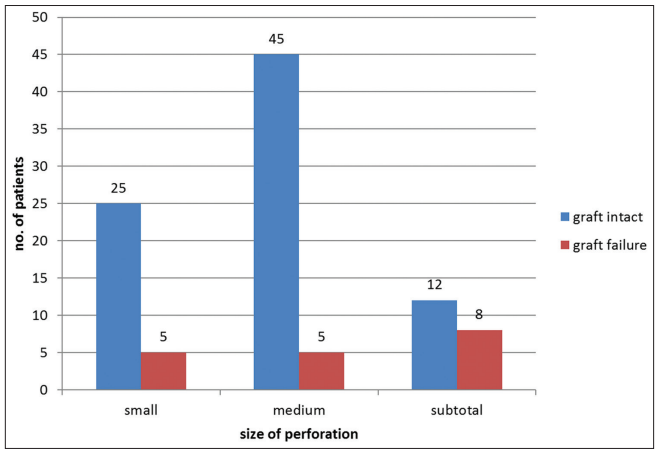

Figure 3: Graft uptake rate according to the size of perforation

average age of the patient at the time of operation was about 26.47 years. In the earlier studies conducted by many authors, as in Benett series,[10] the average age of the patient was 21.5 years. In their series, the youngest was 8 years old and the oldest 67 years, with an average of 33.7 years. This means that, except for very young and very old patients, patients of all age groups were operated. This is because very young children by the time they seek the advice of the specialist, they will have reached this age, and very old people are reluctant to get operated.

In this study, the success rate for small- and medium-sized perforation was 83.33% and 90%, and for subtotal perforations, the success rate was 60%. We found that smaller and moderate perforations have a better chance of closure than larger perforations. This is probably because the larger bed is provided for the graft and the graft has better chance to take in cases of small- and moderate-sized perforations.

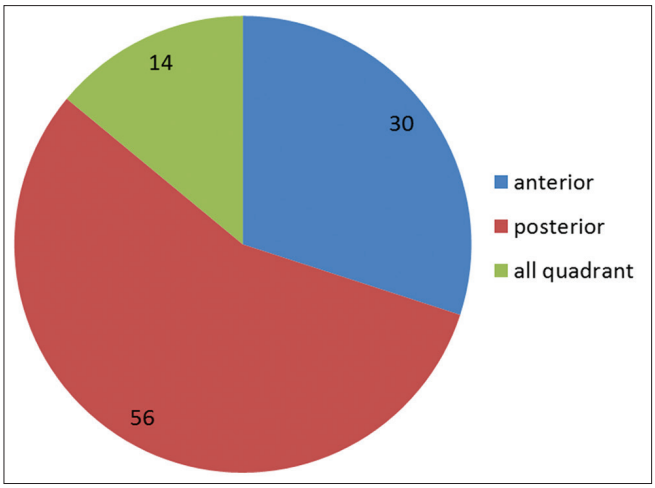

Figure 4: Distribution of patients according to the site of perforation

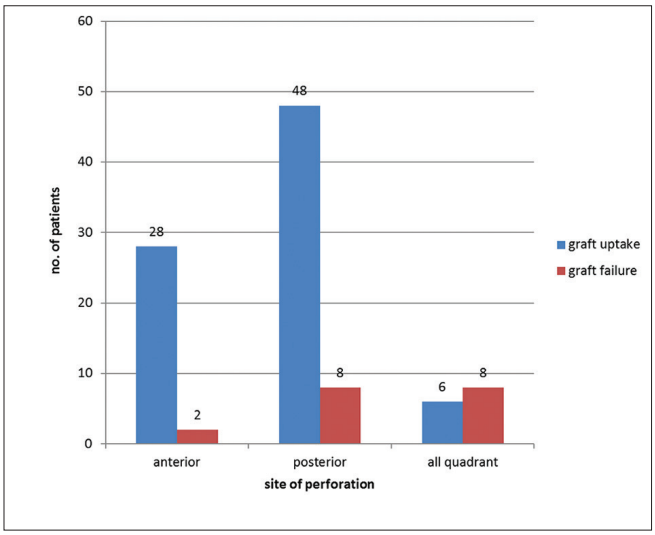

Figure 5: Graft uptake rate according to the site of perforation

Of 100 patients, 30 had anterior perforation, 56 had posterior perforation, and 14 had all quadrant perforation. Yung (1983)[11] obtained similar findings. In our study, we utilized underlay technique using temporalis fascia for all cases. The success rate was 83.3% in cases of small, 90% in cases of medium size perforations, and 60% for subtotal perforations. Although the success rate is less for larger perforations as compared to small- and medium-sized perforation, the overall results were good as stated by Gibb and Kiat;[12] if careful technique is used, the success rate is not affected by the size of perforation. Gibb and Kiat in their study of 365 cases showed that percentage of the graft take rate was 88.8% when the graft was moist/fresh, 91.4% when the graft was partially dried, and 90% when it was completely dried. The overall analysis showed that the graft take rate was not influenced significantly by the state of hydration of the graft material. In our study, the majority

Table 1: Comparison of mean PTA between preoperative and postoperative at 1 month and 3 months, respectively

PTA	Mean (dB)	SD	*P* value
Pre-operative	35.88	2.50	
Post-operative 1 month	26.32	5.79	0.000
Post-operative 3 months	24.46	4.79	0.000

PTA: Pure tone average, SD: Standard deviation

Table 2: Comparison of mean PTA between preoperative and postoperative at 1 month and 3 months, respectively, according to the size of perforation

Site of perforation	PTA	Mean (dB)	SD	*P* value
Small (30)	Pre-operative	30.33	2.56	0.000
	Post-operative 1 month	20.28	4.54	
	Post-operative 3 months	20.28	4.54	
Medium (50)	Pre-operative	32.75	1.48	0.000
	Post-operative 1 month	26.81	2.29	
	Post-operative 3 months	26.81	2.29	
Subtotal (20)	Pre- operative	34.88	3.76	0.000
	Post-operative 1 month	28.76	2.89	
	Post-operative 3 months	28.76	2.89	

PTA: Pure tone average, SD: Standard deviation

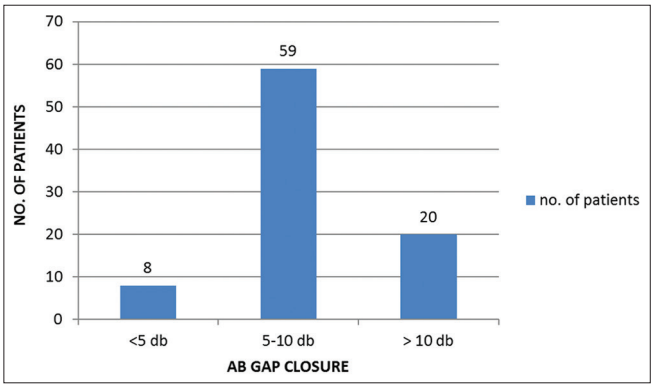

Figure 6: Air-bone gap closure

of cases of the graft was allowed to dry until it resembled parchment and in few cases partially dried. We found that, when the graft material was dried, it was somewhat easier to handle and place the graft. The final result was good in all cases and is consistent with views of Gibb and Kiat. In our study, we used only underlay technique and temporalis fascia as graft with a success rate of 87% and correlate well with other authors. About the assessment of hearing, various criteria have been used by different authors, such as closure of AB gap and improvement in hearing to socially adequate level; most of the authors consider that the improvement in hearing by air conduction to 30 dB or closure of AB gap to within 20 dB or less as successful result. In cases where there is no improvement in hearing or deterioration following surgery, the result is considered

failure. Benett[10] in reviewing the post-operative hearing of his 85 type I tympanoplasties reported that 72 cases (84.3%) achieved socially adequate hearing level postoperatively. There was marginal improvement in 12 cases (14.1%) and one case had post-operative worsening of hearing. Packer and Solar[13] in their study showed that closure of AB gap was better with underlay technique than overlay technique and also stated that underlay dura was better than underlay fascia. There was no statistically significant difference between the man improvement in AB gap with dura or fascia. They also showed that achievement of socially acceptable hearing was better with underlay than overlay.

In our study, 87 cases (87%) achieved socially adequate hearing level postoperatively, and in 13 cases (13%), there was marginal hearing improvement. There was no worsening of hearing in any case postoperatively. Our results are comparable with figures of Benett.[10] In their study, there was a mean improvement in air conduction from 52.3 dB to 28.8 dB with the resultant average improvement amount of closure of AB gap of 23 dB. In our study, the mean PTA was 35.88 dB preoperatively, 26.32 dB at 1 month postoperatively, and 24.32 dB at 3 months postoperatively.

There are different criteria for assessing hearing after chronic ear surgery such as social hearing method, hearing gain method, and mean AB gap for each frequency but none are universally accepted method.

The standard method of comparing the post-operative air conduction to pre-operative bone conduction appears most frequently in literature. Thus, this method had been used for calculating hearing result in this study. Japan Clinical Otology Committee has used the following three criteria for calculation of the hearing.[14] Using the proportion of patients with a post-operative hearing within 40 dB as the criterion, in this study, 100% of patients achieved their hearing level within 40 dB. Using hearing gain exceeding 15 dB as the criterion, 87% of patients (87) had their hearing gain exceeding 15 dB. Using post-operative AB gap within 20 dB as the criterion, 96% of patients (96) had their AB gap within 20 dB.

CONCLUSION

Myringoplasty using the underlay technique with temporalis fascia as graft is an easy technique which gives a high success rate as far as the closure of perforation in tympanic membrane is concerned. Hearing results and graft uptake were better in small- and medium-sized perforations as compared to large ones.

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