Original Article

A study on graft uptake in myringoplasty with and without gelfoam in the middle ear

C R K Balaji[1], P K Purushothaman[2], M Punitha[3*]

[1]Assistant Professor, [2]Professor, [3]PG. Student, Department of ENT, SRM Medical College Hospital, Kattankulathur, Tamil Nadu, INDIA.
Email: entpurush@gmail.com, crk_balaji@yahoo.co.in, punithamurugan@gmail.com

Abstract

Aims and objective: To study the graft uptake in myringoplasty in chronic otitis media - inactive mucosal type with and without gelfoam in the middle ear. **Study Design:** Retrospective study, **Study Period:** July 2013 to December 2014 **Setting:** SRM Medical College Hospital, Kattankulathur **Study size:** 100 patients, 50 with gelfoam and 50 without gelfoam in middle ear. **Patients:** 1) Age: 15-65 years of age both sexes. 2) Patient with small, medium, large and subtotal perforation. 3) Patients with only mild to moderate conductive hearing loss. 4) No evidence of active infection in nose, throat and paranasal sinuses. **Result:** of the total of 100 patients taken into the study 92 patients had successful outcome. Of them 47 belonged to no gelfoam in middle ear and 45 belonged to the with gelfoam group. Among the unsuccessful outcome 3 patients belonged to the no gelfoam group (NGG) and 5 belonged to with gelfoam group (WGG). The overall success rate was 92 %. **Conclusion:** There was no statistical significance in the outcome when comparing both groups. Although it has been noted that the use of gelfoam incites trauma to the middle ear structures and provokes new inflammatory tissue reaction, the newer technique of avoiding gelfoam in the middle ear holds its place better than the former.

Keywords: Gelfoam, Middle ear, Myringoplasty.

[*]**Address for Correspondence:**
Dr M Punitha, Department of ENT, SRM Medical College Hospital, Kattankulathur-603 203, Tamil Nadu, INDIA.
Email: punithamurugan@gmail.com

Received Date: 18/11/2015 Revised Date: 22/12/2015 Accepted Date: 20/01/2016

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 22 January 2016

INTRODUCTION

Myringoplasty is done under local or general anaesthesia where raising a tympanomeatal flap, with visualization using endoscope. The rim of the perforation is excised and the under surface of the drum remnant denuded of squamous epithelium[1,2]. The middle ear is then packed with gelfoam, and the graft is placed medial to the perforation. Gelfoam holds the graft against the under surface while epithelialisation is taking place. The new drum is usually formed in about a period of 1 to 3 weeks.[3] Gelfoam is a sterile compressed sponge, water-insoluble, non-elastic, porous, pliable product prepared from purified porcine skin and gelatin granules intended for application to bleeding surfaces for hemostasis. Light and Prentice *et al*[4] (1945) noted that Gelfoam caused a mild cellular reaction dominated by an invasion of polymorphonuclear cells. Within 3-5 weeks, the gelatin sponge had disappeared, however, leaving no reactions. Blaine *et al*[5] (1951) tried Gelfoam not only as a hemostaticum but also as a substitute for destroyed tissue, e.g. muscle. In the late 1950s Gelfoam was introduced as a complement in otosurgery, also as a hemostaticum. Very soon this material found its place as an absorbable "scaffold" or supporting substance. Lindsay (1961) described the histopathological changes that followed closure of the oval window using Gelfoam. Gelfoam is not only good fibrin foam, but is superior in certain ways, specifically in its greater tensile strength and ease with which it can be used. Gelfoam has amino acids containing aromatic radicals, an important cause of toxicity and antigenicity. Those parts of the tympanic membrane that came in contact with the gelfoam material became opaque and that part of the lamina propria was thickened. These changes in the tympanic membrane resembled tympanosclerosis. Dense adhesions that form between the malleus and the promontory, causes retractions of the

How to site this article: C R K Balaji, P K Purushothaman, M Punitha. A study on graft uptake in myringoplasty with and without gelfoam in the middle ear. *International Journal of Recent Trends in Science and Technology.* January 2016; 17(3): 313-316. http://www.statperson.com (accessed 24 January 2016).

tympanic membrane and the tensor tympani muscle becomes flaccid and relaxed[6]. It is hypothesized that use of gelfoam in middle ear has lead to increased incidence of postoperative discharge and intratympanic adhesions that can significantly hinder the outcome of the hearing of the patient [6]. The aim of the study is to avoid using gelfoam in the middle ear and allow normal transmucosal gas exchange to be restored so that tympanic cavity can be aerated earlier.

MATERIALS AND METHODS

This is a retrospective study from July 2013 to December 2014 consisting of 100 patients in a tertiary care hospital. All patients between 15-65 years of age, both sexes were included in this study. On examination of the tympanic membrane small, medium, large and subtotal perforations were observed. Perforations involving only a single quadrant were termed as a small perforation. Medium sized perforations are those that had perforation involving either 2 or 3 quadrants of the tympanic membrane or 50% of surface area of pars tensa. Perforations involving the 4 quadrants with remnant pars tensa were named as large perforation and perforations involving pars tensa with only annulus present is termed as subtotal perforation. Pure tone audiometry was done in all patients and patients with only mild to moderate conductive hearing loss were included in this study. Patients had no evidence of active infection in nose, throat and paranasal sinuses. Investigations included Pure tone audiogram (pre op and post op), X-ray both mastoids, laboratory investigations (Complete blood counts, renal function tests) and examination under microscope. Out of 100 patients enrolled in the study, 50 patients in odd numbers were operated with gelfoam technique and 50 patients in even numbers were operated without gelfoam. The outcome of the study was termed as success if there was healed, intact and a mobile tympanic membrane at the end of 6 weeks.

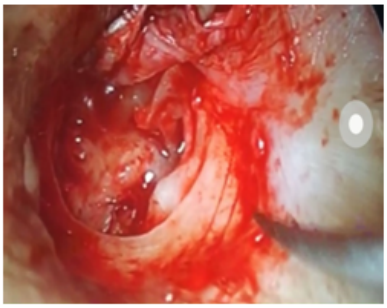

Figure 1: Showing the middle ear cavity before the placement of temporalis fascia graft.

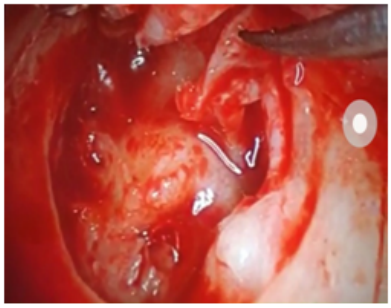

Figure 2: Showing a pick touching the handle of malleus.

RESULTS

The mean age of the study population was 32 years. In both WGG and NGG the mean age was 32 years. There was no significant difference between the two groups. The sex distribution in the study population consisted of 65 female (65%) and 35 male (35%) patients. In each of the groups the male female ratio was almost matched. In NGG 31 were female (62 %) and 19 were male (38%). In WGG 34 were female (68%) and 16 were male (32%). The important symptoms with which patient presented were hard of hearing and previous history of ear discharge. The mean duration of ear discharge in NGG was 73 months and in WGG was 60 months. The other important detail is the duration of dryness of the ear (inactive). In NGG the duration was 4.26 months and in WGG it was 4.29 months. The mean duration of hard of hearing in NGG was 23 months and in WGG was 33 months. The distribution of the size of the perforation between the two groups is discussed. Among the 100 patients 12 patients had small perforations, 58 patients had medium sized perforation, 16 patients had large perforation and 14 patients had subtotal perforation. By comparing the size of the perforation in relation to the outcome of the study population, all small sized perforation were successful. Medium sized perforation had maximum successful outcome 55 out of the 92 successes and subtotal perforation had maximum unsuccessful outcomes 5 out of the total unsuccessful outcomes. It was noted that the patients with medium sized perforation the graft take up or the healing was better when compared to the subtotal perforations. In the 7 patients who had subtotal perforation in NGG, 2 of them had a residual or reperforation in the follow up period. With small perforations the technique was successful in 100% of the cases. In WGG, medium sized perforation had the maximum success rate among the patients with successful closure of the perforation. 61.6 % of the successful cases in WGG had a medium sized perforation. In NGG the mean pre operative PTA was 38dB and air bone gap 26dB. The mean post operative

PTA was 27dB and air bone gap was 14 dB. In WGG the mean pre operative audiogram was 39dB and air bone gap 29dB. The mean post operative audiogram was 29dB and air bone gap was 17dB. The pneumatisation of the mastoid in the study population revealed that 68 patients had pneumatised mastoid and 32 had sclerosed mastoid. In WGG 31 patients had pneumatised mastoid and 19 patients had sclerosed mastoid. In NGG population 36 patients had pneumatised mastoid and 14 patients had sclerosed mastoid. Of the total of 100 patients taken into the study, 92 patients had successful outcome. Of them 47 belonged to NGG and 45 belonged to WGG. Among the unsuccessful outcome 3 patients belonged to NGG and 5 belonged to WGG. The overall success rate was 92 %.

Table 1: Showing the outcome of surgery in patients with and without Gelfoam in middle ear

		GELFOAM		TOTAL
		USED	NOT USED	
OUTCOME OF SURGERY	SUCCESS	45	47	92
	FAILURE	05	03	08
TOTAL		50	50	100

Chi- Square test was done to compare the statistical significance of the two groups with p<0.0 5 taken as the significant statistical parameter. On comparing, p-value was more than 0.05, hence it found to be statistically insignificant.

DISCUSSION

The study was conducted to find the outcome of myringoplasty without using the gelfoam comparing it with the use of gelfoam as graft bed in the middle ear. The 100 patients were distributed in NGG (50) and WGG (50). The age group included in the study were from 15-65 years. The reason was to exclude the confounding factor of upper airway infection and Eustachian tube dysfunction that happens in younger children. This factor was considered taking into account the study of Vrabec *et al*[7] who found better success with advancing age. The mean age was 32 years in both NGG and WGG which was similar to the study conducted by Mani Lal Aich *et al*[8] where the mean age was 27 years. The sex distribution in NGG and WGG population showed maximum number were from female population. 67.5% of the population in NGG and 62.5% in WGG population were female and the rest were male. The ratio was 1:1.85. J. Sade et.al[9] shows in a study that 52.7% of the patients were male and 47.3% were female. Patients history of discharge, their duration and period of inactivity was analysed separately and their influence was studied. In NGG 40 patients had mucopurulent discharge and 40 patients in WGG had mucopurulent discharge. The duration of discharge and duration of dry middle ear was found to be 73 and 60 months in NGG and WGG respectively. The duration of dry ear was 4.26 and 4.29 months in NGG and WGG. The duration of hard of hearing was 23 months and 33 months in NGG and WGG respectively. Medium sized perforation was the most common in our study (58/100) which was similar to the study by Sudhangshu Shekar Biswas *et al*[10]. The distribution of perforations in both groups was closely matching each other. The success rate with small size perforation was high which was comparable to Mani Lal Aich *et al*[8] where the success rate was 100% with small sized perforations. The success rate with subtotal perforation was 12 patients out of 14 patients (82.85%) in our study population which was almost similar compared to the study of Mani Lal Aich *et al*[8] where it was 75% and Sudhangshu Shekar Biswas *et al*[10] showed a success rate of 77.7%. Tympanosclerotic patches were found in 4 patients and 3 patients had successful outcome. The audiological evaluation of the patients was analysed. The average preoperative pure tone average was 38dB and 39dB in NGG and WGG. The average air bone gap was 26dB and 29dB in the NGG and WGG. The improvement in hearing was 11 dB and 10 dB in the NGG and WGG. The average post operative pure tone average was 27dB and 29dB in NGG and WGG. The average closure of air bone gap was 14.39 and 17.47 in NGG and WGG. The closure of air bone gap was 11 dB both in NGG and WGG. The closure of the air bone gap was comparable to the study by Sudhangshu Shekar Biswas *et al*[10] in which the closure was 11dB. The improvement in hearing was statistically significant ($p < 0.05$) in both the groups. Lee *et al*[11] and Palva and Ramsay *et al*[12] stated that mean hearing improvement was 8 dB in their series; this improvement is similar to our study. Sheehy and Anderson *et al*[13] stated that in most case of chronic suppurative otitis media, even though the ossicular chain may appear normal, there is some factor of scar tissue that prevents total restoration of hearing. In our study all the cases were done using transcanal route and the success rate was 82.5% which was comparable to the study by Mani Lal Aich *et al*[8] with a success rate of 87.5%

CONCLUSION

With comparable healing and hearing results without using gelfoam in the middle ear, it allows the normal physiology to be restored in the post operative period much earlier. The results of surgery become evident in the second post operative week when the use of gelfoam in middle ear is avoided. With studies explaining that the use of gelfoam incites trauma to the middle ear structures and provokes new inflammatory tissue reaction, avoiding gelfoam in the middle ear holds its place better than the former. Though this study could not attain statistical

significance, but clinically 2 patients had better surgical outcome without gelfoam. This study would lead the way for more elaborate research in the future which would highlight the surgical techniques that is much more anatomical and most importantly physiological.

REFERENCES

1. Tympanoplasty: Glasscock –Shambaugh: Surgery of the ear. 2010; 6th edition: 465-89
2. Closure of tympanic membrane perforations: Glasscock-Shambaugh: Surgery of the ear. 2003; 5thedition: 400-422
3. Chronic otitis media: Scott and Browns Otorhinolaryngology and head and neck surgery. 2008; 7thedition: Volume 3: 3395-3446
4. Light RU, Prentice H R: Gelatin sponge: Arch Surg 51.1945; 69.
5. Blaine G: Absorbable gelatin sponge in experimental surgery: Lancet ii. 1951; 427
6. Sten Hellstrom: Absorbable gelatine sponge (Gelfoam) in otosurgery. One cause of undesirable postoperative results: Acta Otolaryngol. 1983;96: 269-275
7. Vrabec JT, Deskin RW, Grady JJ: Metaanalysis of paediatric tympanoplasty: Arch Otolaryngol Head Neck Surg.1999;125:530-4
8. Mani Lal Aich: Outcome of myringoplasty: Bangladesh J Otorhinolaryngol. 2009; 15(2): 40-44
9. Sade J: Myringoplasty: J Laryngol and Otol. 1981; 95: 653-665.
10. Sudhangshu Shekhar Biswas: Hearing evaluation after myringoplasty: Bangladesh J Otorhinolaryngol. 2010; 16(1): 23-28
11. Lee P, Kelly G, Mills RP: Myringoplasty- does the size of perforation matter? : Clinical Otolaryngology and Allied Sciences. 2002; 27: 331-4
12. Palva T, Ramsay H: Myringoplasty and tympanoplasty-results related to training and experience: Clinical Otolaryngology and Allied Sciences. 1995; 20: 329-35.
13. Sheehy JJ, Anderson RG: Myringoplasty- A review of 472 Cases: Ann Otol Rhinol Laryngol.1990; 89: 331-334

Source of Support: None Declared
Conflict of Interest: None Declared