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Fat Graft Myringopoplasty as a Minimally Invasive Day Care Surgery

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ABSTRACT

Objectives: There are numerous surgical techniques that have been demonstrated and utilized to repair small perforations in the tympanic membrane (TM) with various graft materials such as temporalis fascia,veins, perichondrium, periosteum, and others. In our study, fat was taken as the graft material and the main aim of the study was to evaluate the success rate of graft uptake, assessment of hearing improvement, and complications of the operative procedure. Material and **Methods**: In this study, 40 patients underwent fat myringoplasty, from April 2025 to March 2026 for a period of 1 year. A detailed history, general physical and ear, nose and throat examination were done. Audiometric assessment was done using pure tone audiometry preoperative & postoperative. Patients between the age group of 20 to 50 years were included in the study. **Results**: A total of 40 patients were included in the study who met the inclusion criteria. Our study had successful graft uptake in 37 patients out of 40 patients and this was 92.5%. There were 21 males (95.45%) and 16 females (88.88%) in the successful graft group. In our study we found, the mean preoperative hearing threshold (dB) was 22.1dB and after procedure the mean hearing threshold (dB) was 19.4 and there was a mean gain of 2.78 db which was statistically significant. (P value is 0.009). **Conclusion**: Fat myringoplasty is a methodized, precise, inexpensive, mini-invasive, and cosmetic outpatient procedure for small perforations of TM. It can be done under local anesthesia and has a good success rate if the patient selection is done appropriately.

Keywords: *Fat myringoplasty, Chronic suppurative otitis media,Pure tone audiometry, Tympanoplasty, Chronic suppurative otitis media.*

INTRODUCTION

Myringoplasty is an operative procedure used in the reconstruction of a perforated tympanic membrane. It is one of the most common surgical procedure in otology. The term myringoplasty was named by Berthold in 1878, but the first myringoplasty was performed by Marcus Bancer in 1640.(1) Tympanic membrane perforation is mostly due to infection, trauma or Post Tympanostomy tube insertion. Mostly it heals spontaneously; however recurrent infection may interfere with regenerative process and result in chronic perforation. Myringoplasty is one of the most commonly performed otologic surgical procedures, which involves use of graft material to repair of tympanic membrane perforation. A spectrum of grafts, the most common are auto grafts (from the patient himself like perichondrium, fat, cartilage, etc.), homo grafts (from different patient like cartilage, dura), and xenografts or heterografts (from other species other than humans like pigs, monkeys, tragal perichondrium, bovine pericardium, etc.)(2) Nowadays, Autologous temporalis fascia graft is the most widely used graft material followed by perichondium. Temporalis fascia graft needs external incision and possible visible scar which was used since 1950. The purpose of Fat Graft Myringoplasty is to repair such perforation and tends to improve hearing and eliminate the susceptibility to middle ear infection. The Fat Graft Myringoplasty was 1st introduced by Ringer berg in 1962 as an Office based Procedure.Ear lobule fat was used as graft in this study. Fat graft Myringoplasty is done by transcanal technique using Otoendoscopic guidance. Mostly done under local anesthesia. patient can be discharged on the same day. Fat graft is easily obtained from the ear lobules of the operated ear .(3) Every surgical procedures have its merits and demerits, but the main advantages of fat graft myringoplasty are that it is a minimally invasive, systematized,

relatively safe, cost effective, time saving, and office-based/day care procedure which can be done under local anesthesia. The main aim of the study was to evaluate the success rate of graft uptake, assessment of hearing improvement, and complications of the operative procedure.

MATERIAL AND METHODS:
A retrospective clinical study was carried out in a tertiary care center at Srinagar Garhwal from April 2025 to March 2026 for a period of 1 year. A total of 40 patients were included in the study , patients were informed about the surgical procedure and informed written consent was taken following which a detailed history, general physical, a ear, nose, and throat examination were done.Inclusion criteria: CSOM with central perforation not exceeding 25% area of Pars tensa of TM. Dry perforation for at least 6-8 weeks Perforation, persistent for at least 6 months, Age : 20 – 50 years ,Normal appearance of middle ear mucosa ,PTA showing Conducive hearing loss with Air Bone gap ≤ 30 dB were included in the study. Exclusion criteria :Patient who had active ear discharge, history of previous ear surgery, with associated significant pathology in Middle ear cavity (Cholesteatoma, Ossicular pathology, retraction), Tympanic membrane with Tympanosclerosis, Atrophic area or Pars flaccida retraction, marginal perforation , Sinusitis / History of Allergy or uncontrolled Systemic diseases were excluded from this study. The evaluation of hearing was done(preoperative & postoperative). This study included 40 patients (22males and 18 females) with a small dry central perforation of tympanic membrane . Preoperative evaluation by Otoendoscopic examination of central perforation - site, shape, margin, middle ear mucosal status evaluated. According to site of perforation – Anterior, Posterior, Central accessed. Pure tone audiogram - to rule out SNHL &ossicular pathology .CT scan temporal bone done to rule out any associated middle ear / mastoid bone pathology . Diagnostic Nasal Endoscopic Examination to rule out Rhino sinusitis .

Technique: All the procedures were performed under local anesthesia. Under all aseptic conditions, the patient was draped and local infiltration was given with 2% xylocaine with 1 in 100,000 adrenaline. The ear lobule was infiltrated in the posterior aspect and the ear canal skin was also infiltrated in four quadrants. The edges of the perforation were refreshed by sickle knife. A 1–1.5 cm incision was given in the posteroinferior portion of ear lobule with no. 15 blade, the fat was harvested and the incision was closed with 5–0 absorbable sutures. The fat was shaved and with the help of microcup forceps, it was kept on the TM perforation and was gently negotiated in an hour glass formation using a straight pick. Caution was taken as oversized fat plug can further traumatize the perforation margins leading to atrophy or necrosis later on and undersized fat plug should be avoided to prevent dehiscence in grafting.After proper adjustment of fat graft, small pieces of gelfoam were placed around the graft to support it and the ear canal was filled with gelfoam soaked with antibiotic drops and an antibiotic ointment coated wick was placed in outer external ear canal. Ear dressing was done and the patient was discharged with appropriate medicines. Follow-up was done in the 1st, 3rd post-operative months. Failure cases were counted when the relapsing perforation occurs and persists until the end of the 3rd month postoperatively. Descriptive and inferential statistical analysis has been carried out in the present study, and Microsoft Word and Excel have been used to generate graphs and tables preoperatively and in the 1st , 3rd post-operative month.

RESULTS:
The minimum age in the study was 20 years, and the maximum age was 48 years. The maximum numbers of patients were found in the age group of 25 to 35 years. There were 22 male (55%) and 18 female (45%) patients showing male preponderance with male to female ratio of 1.2: 1.

AGE	MALE	FEMALE	TOTAL
20-30	6	3	9
30-40	11	10	21
40-50	5	5	10
Total	22	18	40

According to site of perforation, 22 patients (55%) had central perforation, 10 cases (25%) had posterior perforation and anterior perforation seen in 8 patients (20%). Inferior or central perforation was the most common cause in our study.

Site of perforation	Group	No.of patient
Anterior perforation	A	8
Posterior perforation	B	10
Central perforation	C	22

AGE	ANTERIOR	POSTERIOR	CENTRAL
20-30	4	2	4
30-40	2	5	10
40-50	2	3	8
Total	8	10	22

Graft Uptake:- Our study had successful graft uptake in 37 patients out of 40 patients and this was 92.5%. There were 21 males (95.45%) and 16females (88.88%) in the successful graft group and there were 1 male and 2 female in the unsuccessful graft group.

Site of perforation	Group	No.of patient	Graft uptake	%
Anterior perforation	A	8	7	87.5
Posterior perforation	B	10	10	100
Central perforation	C	22	20	90.90

The graft uptake with respect to site of perforation was as follow higher in posterior perforation (100%) while central perforation had closure rate of 90.90% and 87.5% in anterior perforation. The different was statistically not significant. P value > 0.05

Out of 40 cases the preoperative PTA showed 15 cases had hearing threshold between 15 – 20 dB, 14 cases had 21 – 25dB and 11 cases had 26 – 30 dB hearing threshold. The mean preoperative PTA average was 22.1 dB. In the age group of 20 to 30 years, the mean preoperative PTA was 25.11dB, the mean postoperative PTA was 21.65dB and the mean gain was 3.46. In 30 to 40 years age group, the mean preoperative PTA was 22.47dB, the mean postoperative PTA was 19.67dB and the mean gain was 2.80. In the age group of 40 to 50 years, the mean preoperative PTA was 22.93dB, the mean postoperative PTA was 20.43dB and the mean gain was 2.5dB. The mean preoperative hearing threshold (dB) was 22.1dB and after procedure the mean hearing threshold (dB) was 19.4 and there was a mean gain of 2.78 db which was statistically significant. (P value is 0.009). Out of 40 cases complications took place in 3 cases (7.5%) with residual perforation. The patients who had residual perforation, didn't come for follow up in the first postoperative month. With regard to site of perforation, two failure case seen in central perforation and one in anterior perforation.

DISCUSSION:

The present study was carried out to evaluate the efficacy of the Fat Graft Myringoplasty with respect to its success rate of small perforation of tympanic membrane in relation to site of perforation and as a day care procedure. In the present study, the age of the patient varied between 20- 50 years. In this age group there is less chance of upper respiratory infections and Presbyacusis. The minimum age in the study was 20 years, and the maximum age was 48 years. The maximum numbers of patients were found in the age group of 25 to 35 years. There were 22 male (55%) and 18 female (45%) patients showing male preponderance with male to female ratio of 1.2: 1. The main aim of the fat graft myringoplasty was to repair perforations in pars tensa of TM which is less than 25% of area .This procedure causes minimal pain and there is no trauma to the healthy ear drum due the absence of skin incisions, dissections of meatal flaps and is associated with fewer complications with maximum improvement of the air/bone gap after the surgery.[4] Fat plug myringoplasty was first introduced by Ringenberg and the success rate was reported as 87% for small perforations.[5] In our study, According to site of perforation, 22 patients (55%) had central perforation, 10 cases (25%) had posterior perforation and anterior perforation seen in 8 patients (20%). Afterward, Deddens et al. found the TM perforation size to be an important factor in predicting the success rate of myringoplasty.[6] According to Kaddour, the size of the perforation should not exceed 30% of the size of the eardrum.[7] Our study had successful graft uptake in 37 patients out of 40 patients and this was 92.5%. There were 21 males (95.45%) and 16 females (88.88%) in the successful graft group .The graft uptake with respect to site of perforation was higher in posterior perforation (100%) while central perforation had closure rate of 90.90% and 87.5% in anterior perforation. Roee Landsberg et al. performed fat graft Myringoplasty on 38 perforations and found successful closure in 81.6%. Chalishazar described closure of TM perforation in 90% cases by fat graft Out of 40 cases.(8) In our study the preoperative PTA showed 15 cases had hearing threshold between 15 – 20 dB, 14 cases had 21 – 25dB and 11 cases had 26 – 30 dB hearing threshold. The mean preoperative PTA average was 22.1 dB. In the age group of 20 to 30 years, the mean preoperative PTA was 25.11dB, the mean postoperative PTA was 21.65dB and the mean gain was 3.46. In 30 to 40 years age group, the mean preoperative PTA was 22.47dB, the mean postoperative PTA was 19.67dB and the mean gain was 2.80. In the age group of 40 to 50 years, the mean preoperative PTA was 22.93dB, the mean postoperative PTA was 20.43dB and the mean gain was 2.5dB. After procedure the mean hearing threshold (dB) was 19.4 and there was a mean gain of 2.78 db which was statistically significant. (P value is 0.009). The previous studies showed Saliba et al., recorded 17 dB as a mean improvement of air/bone gap in his study.(9)Hagemann and Hausler noted closure of perforation in 91% of cases and hearing Gain of 5–10 dB. [10] Out of 40 cases complications took place in 3 cases (7.5%) 1male & 2 female with residual perforation. The patients who had residual perforation, didn't come for follow up in the first postoperative month. With regard to site of perforation, two failure case seen in central perforation and one in anterior perforation. Fiorino et al. attributed the failure causes to: Anterior perforations, inadequate graft support, poor vascular supply, or infection; and delayed failures due to TM atrophy, infections, or Eustachian tube dysfunction with the change of TM structure.(11)

CONCLUSION:

In this study we have achieved a high success rate (92.5 %) for repair of small dry central perforation of tympanic membrane with fat graft. Fat Graft Myringoplasty is a safe and effective technique for closure of small dry central perforation of TM.

The advantages of this technique are simple, no need for GA, need minimal sedation, no need of hair shaving, less operating time, reduced otological trauma from manipulating tympanic cavity, faster recovery with no need of post operative dressing, cost effective,minimum post operative morbidity. It can be performed as an outpatient procedure, and the patient can be discharged on the same day. It causes minimal discomfort and high success rate after proper case selection. Ear lobule fat can be easily harvested in a very short time and there is no visible scar and minimal donor site morbidity.

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