Research Article

# Fat Graft Myringoplasty- Day Care Procedure: Role in Small Central Perforations

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## Abstract

**Introduction:** Day care surgery is the need of hour in the field of otology. Temporalis fascia is the most common material used for closure of tympanic membrane perforation. But it is a lengthy procedure requiring general anaesthesia (GA) or longer sedation, extensive middle ear manipulation and a longer recovery post operatively. Fat is said to have angiogenetic properties. The aim of this study is to evaluate the usefulness of adipose tissue fat for closure of dry small perforations of tympanic membrane as a day care procedure. **Materials and Methods:** 40 patients with small central dry tympanic membrane perforations were taken up for surgery under sedation using fat graft from ear lobule for closure of perforations. The results were evaluated inta operatively, immediate post operatively and at 1st, 4th , 8th and 12th monthly post operative visit for uptake of graft, hearing improvement and complications of the procedure if any. **Results:** The results showed that the graft uptake success rate`was high as good as traditional myringoplasty using temporalis fascia. The procedure was minimally invasive, requiring little sedation, taking much less time, cost effective where both ears can be operated in the same sitting and the patients can be discharged on the same day with no major complications. There was considerable hearing improvement noted in the patients in the study. **Conclusion:** So it can be concluded that fat graft myringoplasty is an effective method for closure of small central dry tympanic membrane perforations.

**Keywords**: Chronic Otitis Media, Fat Graft Myringoplasty, Myringoplasty, Middle ear perforation

## Introduction

Myringoplasty is the most common surgery performed in otology due to high incidence of tympanic membrane perforation. A variety of graft matierials like fascia, cartilage, perichondrium and fat are documented in literature for closure of perforation [1]. Temporalis fascia is the most common graft material used for this surgery. But temporalis fascia when used requires extensive middle ear manipulation and general anaesthesia or longer sedation, a lengthy procedure which is unacceptable in the era of day care surgery especially for small central dry perforation.

Fat is an active material which is said to have angiogenetic properties [2]. It has been a accepted material for closure of small tympanic membrane perforations in literature [3]. Various studies done by Ringenberg, Liew, Hagemann and Saliba have shown positive results with fat graft myringoplasty. A study by Benson et al has shown the success rate and effectiveness of day care procedure [4]. But this procedure of fat graft myringoplasty has been underused [5]. This study aims to evaluate the usefulness of adipose tissue fat for closure of dry small perforations of tympanic membrane as a day care procedure, to evaluate its advantages and drawbacks and complications if any.

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## Materials and Methods

This study was a prospective study conducted in department of ENT of our medical college and hospital for a period of 18 months from March 2011 to August 2012. The follow up was done for a period of 1 year post operatively. 40 patients with small central tympanic

membrane perforations (unilateral or bilateral), aged between 18 to 60 years were enrolled in the study after obtaining written consent from the patients. The approval of local ethics committee was taken. The criteria for selection of patients are enlisted in Table 1.

**Table 1: Selection criteria for patients**

| S. No | Selection Criteria |
|---|---|
| 1 | Central perforation confined to less than 25% area of pars tensa |
| 2 | Air bone gap less than 45 decibels |
| 3 | Perforation persistent for atleast 6 months |
| 4 | No active ear discharge for atleast 3 months |
| 5 | No history of previous ear surgery |
| 6 | No evidence of cholesteatoma |
| 7 | No Eustachian tube dysfunction |

All the patients were operated by the ENT surgeons performing the study and the sedation was given by the anaesthesist performing the study. The surgical procedure was done under local anesthesia with sedation with dexmedetomidine. Out of 40 patients, 30 patients had unilateral perforation, whereas 10 patients had bilateral perforation. In case of bilateral perforation both ears were operated in the same sitting. In total 50 ears were operated in this study (Table 2).

**Table 2: Total patients and ears operated**

| Perforation | Total patients | Total ears operated |
|---|---|---|
| Unilateral | 30 | 30 |
| Bilateral | 10 | 20 |
| | **40** | **50** |

All the patients had underwent examination under microscope, complete hearing assessment, radiological assessment and Eustachian tube function tests before the surgical procedure.

**Surgical procedure**

"After shifting the patient to the operation theatre, sedation was given using dexmedetomidine. 2% lignocaine with 1: 100,000 adrenaline infiltration was given in the ear canal and on the ear lobule. A 5 mm incision is made in the medial part of ear lobule and fat tissue is harvested double the size of the tympanic membrane perforation. The incision is sutured with silk. The edges of the perforation are freshened using sickle knife. Gel foam is placed in the middle ear. The piece of harvested fat position as a graft over the perforation in a hour glass fashion so that a part of it is above the perforation. Gel foam placed over it and on the sides. No dressing needed. Patient shifted to the post operative ward."

The patients were discharged on the same day after 3 to 4 hours of observation with the instructions to keep the ear dry. The follow up of the patients was done after 1 month when the remaining gel foam was cleared under microscope. The uptake of graft and hearing improvement was assessed after 4 months post operatively. Subsequent follow up was done after 8 and 12 months post operatively.

The patients were assessed for the following points –

- Successful uptake of fat graft
- Hearing improvement in the patients
- Time taken for surgery and recovery
- Complications of the procedure if any
- Patient and surgeon satisfaction

## Results

40 patients with small central tympanic membrane perforation who gave consent were enrolled in this study. All the patients had undergone fat graft myringoplasty under sedation for closure of perforation. Data was collected on all patients. All the patients were in the age group 18 to 60 years. The majority of patients were in the younger and middle age groups (Table 3). There was a slight male predominance among the patients in our study (Table 3).

**Table 3: Age and Sex wise distribution**

| Age Group | Male | Female | Total |
|---|---|---|---|
| 18 – 30 | 11 | 9 | 20 |
| 31 - 50 | 9 | 8 | 17 |
| 51 – 60 | 2 | 1 | 3 |
| **Total** | **22** | **18** | **40** |

Regarding the cause of perforation the majority 24 patients (60%) had history of infection chronic suppurative otitis media whereas remaining 16 patients (40%) had traumatic etiology (Fig 1).

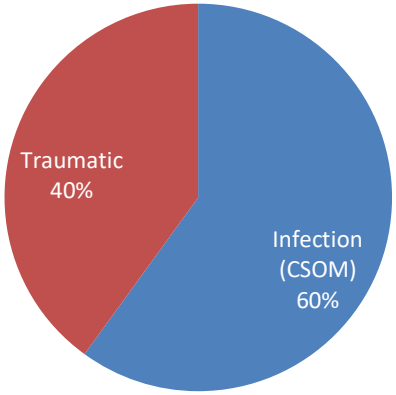


**Fig 1: Etiology of Perforation**

Regarding the intraoperative findings, the procedure was simple, easy to perform, average surgical operating time was 20 minutes, and cost of procedure was very minimal as compared to conventional myringoplasty with no major complications during procedure (Table 4). All the patients were discharged on the same day and there was no need of any dressing for any patient (Table 4).

**Table 4: Operative findings**

| S. No | Finding | Result | Inference |
|---|---|---|---|
| 1 | Total operating time (average) | 31 minutes | Done under sedation. No need for GA |
| 2 | Surgical operating time (average) | 20 minutes | Short and easy procedure |
| 3 | Intra operative complications | 0 patients (0%) | Safe procedure |
| 4 | Total operating cost (average) | Rs 1500 | Cost effective |
| 5 | Post operative dressing | 0 patients (0%) | Minimal invasive. No need for dressing |
| 6 | Discharge of patients | Same day, after 3 to 4 hours post operatively | Faster recovery |

**Note -** Total operating time was the time that the patient stayed in the operation theatre. Surgical operating time was the time from starting of the local infiltration till the end of surgical procedure.

The satisfaction of the patient and surgeon was calculated according to LIKERT scale [6]. Patient satisfaction was enquired 3 to 4 hours after surgery at the time of discharge of patient from hospital. The results showed greater surgeon and patient satisfaction with fat graft myringoplasty (Table 5). 38 patients (95%) were satisfied (most of them extremely satisfied) after the surgery. Only 2 patients were undecided about their satisfaction in the study. Regarding surgeon satisfaction, there was complete (100%) surgeon satisfaction in all the 40 cases operated using fat graft. In most of these cases the surgeon was extremely satisfied (Table 5).

**Table 5: Patient and Surgeon satisfaction results**

| Result | Patient Satisfaction (Total patients – 40) | Surgeon Satisfaction (Total cases – 40) |
|---|---|---|
| Extremely Unsatisfied | 0 patients (0%) | 0 cases (0%) |
| Unsatisfied | 0 patients (0%) | 0 cases (0%) |
| Undecided | 2 patients (5%) | 0 cases (0%) |
| Satisfied | 3 patients (7.5%) | 2 cases (5%) |
| Extremely Satisfied | 35 patients (87.5%) | 38 cases (95%) |

The uptake of graft and hearing improvement was assessed after 4 months post operatively. Regarding uptake of fat graft, it was successful in 45 of 50 operated ears (90%). In 3 ears (6%) there was complete graft failure due to infection and in 2 ears (4%) there was residual perforation (Fig 2).

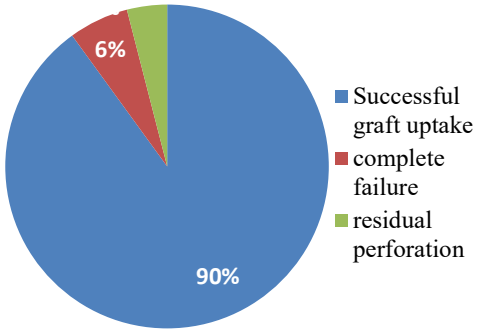


**Fig 2: Fat graft uptake results**

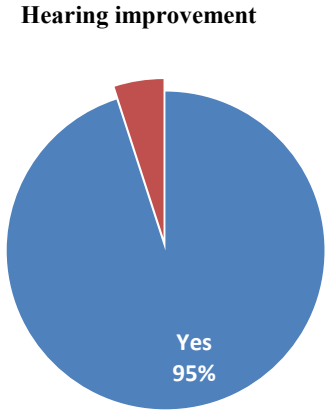


**Fig 3: Hearing evaluation results**

Post operative hearing improvement was evaluated by finding out if there was reduction in mean air bone gap in the patients. The mean air bone gap was calculated as the average of air bone gap at 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz frequencies. Our results showed there was reduction in mean air bone gap in 38 out of 40 patients (95%). One patients with bilateral perforation and one with unilateral perforation who had complete failure of graft uptake due to infection didn't show any hearing improvement (Fig 3).

The same success results both for graft uptake and hearing improvement were seen after 8 months and 12 months post operatively.

## Discussion

The efficacy of fat graft myringoplasty for small central perforations was evaluated in this study. The aim of this study was to evaluate the usefulness of adipose tissue fat for closure of dry small perforations of tympanic membrane as a day care procedure, to evaluate its advantages and drawbacks and complications if any

Tympanic membrane perforations are the most common ear disorders. The most common etiology for the same is trauma, infection or post tympanostomy tube extraction [7]. In our study also we found infection and trauma to be the most common etiology (Fig 1). Variety of graft materials like temporalis fascia, tragal cartilage, fat, perichondrium can be used for closure of these perforation. Ringenberg described fat plug myringoplasty in 1962 with a success rate of 87% [8].

Various studies have shown success rate between 76% to 92% for small central perforations. Our study also had a graft uptake success rate of 90% (Fig 2). These results are comparable with success rate of overlay technique and underlay technique using temporalis fascia.

Fat can be harvested from abdomen, buttock or ear lobule. Ear lobule is the simpler method with same operating area and invisible marginal scar. So it is the ideal area for harvesting of fat graft. Fat tissue provides the basic requirement for grafting of tympanic membrane with its own favourable characterstics [9]. Fat is an active material containing angiogenic and survival factors like monobutyrin, prostaglandins, interleukins, cytokines and tumour necrosis factor which restores and repairs the fibrous layer and promotes revascularization which is essential for success of free flap [10]. According to studies by Liew et al and Hagemann air bone gap improvement was seen in 11 out of 15 patients and 21 out of 44 patients respectively [11, 12]. Similarly in our study reduction in air bone gap was noticed in 38 out of 40 patients (Fig 3).

Fat graft myringoplasty is said to be a short, simple, minimally invasive and cost effective technique [13]. Similar results were obtained in our study with this procedure requiring less operating time, being cost effective with no need for post operative dressing and no major intra operative complications and the patient was discharged on the same day (Table 4). Bilateral myringoplasty can be performed in the same sitting (Table 2). The results are satisfactory for both patient and surgeon (Table 5).

## Conclusion

Fat graft myringoplasty is a safe and effective technique for closure of small central tympanic membrane perforations. The advantages of this technique are

- Simple technique with graft taken from same surgical field.
- No need for general anaesthesia, need minimal sedation.
- Less operating time.
- Day care procedure.
- Minimally invasive with no major intra operative complications.
- Faster recovery with no need for post operative dressing.
- Cost effective.
- Bilateral perforations can be grafted using fat graft in the same sitting.
- Excellent results for both graft uptake and hearing improvement, at par with temporalis fascia graft.

The results of the procedure are highly satisfactory for both patient and surgeon. So we can conclude that adipose tissue fat from ear lobule is an excellent graft material for closure of dry small perforations of tympanic membrane as a day care procedure and can be a preferred method of choice over temporalis fascia. There is scope of further studies along this line of management.

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