

Efficacy of Adipose Tissue in Fat Graft Tympanoplasty

AHMED SHAKEEL AHSAN, MUHAMMAD RASHID AWAN, AZHAR HAMEED, ABID RASHEED

ABSTRACT

Objectives: The objective of this study was to evaluate the success of using fat graft as a material in tympanoplasty and to discuss its utilities, advantages and disadvantages.

Study design: Retrospective descriptive study

Place and duration of study: This study was conducted in Department of ENT, Fauji Foundation Hospital, Lahore under counseling of Professor Azhar Hameed ENT Unit 1, Mayo Hospital associated with King Edward Medical University, Lahore. It spanned over a period of two years from May 15, 2009 to May 15, 2011.

Material and method: 58 patients with dry central perforation syndrome were evaluated preoperatively by detailed history, clinical examination and relevant investigations like examination under microscope, pure tone audiogram and X-Ray of the temporal bone.

Results: All 58 patients were operated. In all 19 (32.75 %) of 58 male patients 100 % successful closure of perforation was achieved. While in 2 (3.44 %) female patient's grafts were rejected following infection.

Conclusion: Fat graft tympanoplasty has high graft take up rate and it can survive infection with respect to temporalis fascia graft. However the procedure cannot be done in patients with large perforations. Moreover fat takes 6 to 9 months to resolve completely.

Key words: Fat graft, Tympanoplasty.

INTRODUCTION

Tympanic membrane perforation is most commonly a result of infection, trauma or the sequelae of tympanostomy tube insertion or its extrusion. Although 88% of traumatic perforations of any size heal without intervention, the remainders become chronic and require treatment. Without closure, morbidity may include hearing loss, chronic otorrhea and cholesteatoma formation^{1,2,3}.

Tympanoplasty is well known procedure to all ENT surgeons. The first recorded attempt to myringoplasty was by Marcus Banzer in 1640. The first surgical closure using auto graft (full thickness free skin graft) was performed by Berthold in 1878 and he introduced the word myringoplasty. Wulstein and Zoellner popularized the technique in 1951. Various graft materials used since this time are skin, amniotic membrane, mucus membrane, dura matter, cornea, periosteum, perichondrium, adipose tissue and most common the temporalis fascia^{4,5}.

Adipose tissue provides basic requirements for grafting of tympanic membrane, with its own favorable characteristics. Fat graft tympanoplasty is an under-used technique to repair small tympanic membrane perforation. It is a quick and cost effective way with minimal morbidity and can be done as an

outdoor procedure. Fat can be taken from ear lobule, abdomen and buttock, however fat of ear lobule is mostly used because it contains more fibrous tissue^{6,7}.

MATERIAL AND METHOD

58 patients of chronic suppurative otitis media with central perforation were admitted through the outpatient department of ENT, irrespective of age, gender, socioeconomic status and geographical origin. All patients were evaluated preoperatively by history, clinical examination and relevant investigations like examination under microscope, pure tone audiogram and X-Ray of the temporal bone. There was no history of previous ear surgery in any case. Patients with dry central perforation of at least 6 months with less than 30 % area loss and air bone gap of 30 DB or less were selected and operated with permeal approach under general anesthesia. It was ensured that the fat graft should be at least twice the size of perforation. Evidence of active chronic suppurative otitis media, cholesteatoma, ossicular pathology and retraction pocket was excluded by microscopic examination of the ear. It was ensured that ear, nose, throat and paranasal sinuses were free of infection. Informed consent for the surgery was taken after being briefed about the procedure, its merits and demerits. Demographic profile and relevant data was recorded

Department of ENT, Mayo Hospital, Lahore/ Fauji Foundation Hospital, Lahore

Correspondence to Dr. Ahmed Shakeel Ahsan Rizvi, Classified ENT Specialist, Fauji Foundation Hospital,

in a standard proforma. Data was entered in SPSS version 11, a computer based software programme. Mean and standard deviation were computed for qualitative variable like age. Descriptive statistics like frequency and percentage were computed for categorical variable like gender. Statistical test of significance was not applicable in this study.

RESULTS

All 58 (100 %) patients with dry central perforation included in the study were operated. The average age of the patients was 25.58 years (SD 33±19) (table 1). They ranged in age from 14 to 52 years. Male patients were between 14 to 28 years and the females were of 16 to 52 years. There were 19(32.75%) male and 39(67.25%) female patients (table 2). M: F ratio was 1:2.05. Successful repair of the tympanic membrane remained 96.55% in our study. In all 19(32.75%) of 58 male patients 100% successful closure of perforation was achieved. However grafts were rejected in 2(3.45%) female patients following infection. One year follow up of 55 patients were achieved and 3 patients were lost in their follow up. Infection occurred in three other cases but was controlled with oral antibiotic.

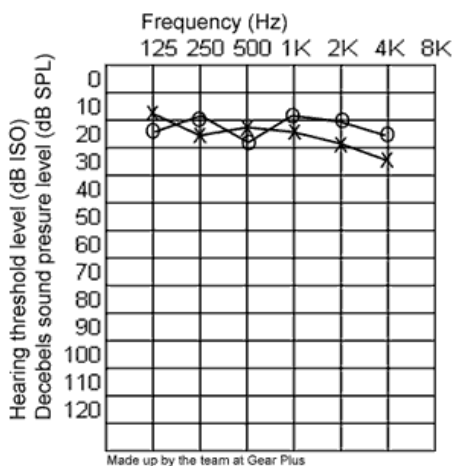
Table 1 Descriptive Statistics of Age(n=58)

| | |
|--------------------|-------|
| Mean | 25.58 |
| Standard Deviation | 33±19 |
| Range | 38 |
| Minimum | 14 |
| Maximum | 52 |

Table 2 Frequency Distribution of Gender (n=58)

| Sex | Frequency | Percent | Cumulative % |
|--------|-----------|---------|--------------|
| Male | 19 | 32.75 | 32.75 |
| Female | 39 | 67.25 | 100 |

PURE TONE AUDIOGRAM



DISCUSSION

In 1962, Ringenberg successfully used adipose tissue (Fat) to repair a small tympanic membrane perforation with a success rate of 87% for small perforations. Since then, studies have shown success rates ranging from 76% to 92% in cases of small perforations. Mitchell et al in 1997 used fat in 342 children to close small perforation achieving 92% success rate. Comparing our results with Ringenberg and Mitchell, global successful closure of perforation was observed in 56 of 58 (96.55%) patients in our study. This may be due to improvement in medical technologies and surgical techniques. However age and no of patients were different than Mitchell in our study^{5, 7}.

We performed all cases using permeal approach. Grafts were harvested from ear lobe fat. A fat blob of ear lobule twice the size of perforation was harvested. Scarring from margins of the perforation was removed. 1 to 2 mm of skin was peeled around the perforation. Middle ear was packed with the gel foam and graft was inserted through the perforation so that the half of it was in middle ear and half in external auditory canal. External auditory canal was packed with gel foam and soframycin soaked tulle gauze (SofraTulle). Packs were removed after two weeks. All cases received antibiotics for 10 to 14 days postoperatively (except those who developed infection).

All cases were followed up on monthly bases for first 3 months and then 3 monthly till 1 year post operatively. The fat graft last 50 % of its bulging at 2nd postoperative month and remaining 40 % at 4th month. We find a small stain of the fat graft in the tympanic membrane thickness at 6th postoperative month in most of the patients. Pure tone audiogram was done preoperatively and at 3rd month, 6th month and at 1 year postoperatively. As fat graft takes longer time to resolve, conductive hearing loss started improving 6 months after surgery. All healed cases had hearing threshold of less than 20 Db in our study.

In 2 (3.45 %) female patients of our study, grafts were rejected following infection. Similar cause was observed in a study by Saliba I et al, in 2008 at Canada and Chalisehar U in India, where grafts were rejected due to postoperative infection. These cases were managed by standard tympanoplasty technique later on. They suggested to soak gelfoam pieces with ofloxacin drops instead of saline and to give 1st generation cephalosporin antibiotics for the 1st postoperative week to decrease the rate of graft rejection^{3, 4}.

Dedden et al considered that size of tympanic membrane perforation is a crucial factor. In his

series, small perforations involving 5–30% of the drum surface had good prognosis. They emphasized that larger perforation are less successful with fat graft alone. We operated all patients without having history of any previous ear surgery. According to Ozgursoy OB et al successful closure of the perforations were obtained in 82.4% of the patients in their final follow up, but it was higher in the group of patients who had not had previous otological surgery than those of revision cases^{8,9}.

CONCLUSION

Fat graft tympanoplasty is a simple and quick procedure for repair of small central perforations. It has excellent long-term durability and can easily be done by permeal approach. The procedure involves high graft take up rate and minimal hospital stay. There is also an extra advantage that fat graft can survive infection with respect to temporalis fascia graft. It should be considered as a procedure of choice for patients with suitable perforation. However the procedure cannot be done in cases of large perforations. Similarly fat takes six to nine months to get resolved completely, so patients need to be counseled and encouraged.

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