



ORIGINAL RESEARCH PAPER

ENT

A STUDY OF USING FAT PLUG IN MYRINGOPLASTY FOR SMALL TYMPANIC MEMBRANE PERFORATIONS

KEY WORDS:

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ABSTRACT

Tympanic membrane perforation is one of the most common problems in otorhinolaryngology. Many graft materials have been tried over time. In our prospective study, we have analysed the success rates, rate of healing and hearing improvement following a fat plug myringoplasty in management of small tympanic membrane perforations. According to our study, fat plug myringoplasty had higher **success rates & rate of healing & complete closure at the end of 1 & 2 months follow up & a significant improvement in hearing** following the procedure. **No complications** have been encountered in the study & the patient compliance was comparatively better compared to surgery as it is less traumatic & time consuming.

INTRODUCTION:

Tympanic membrane perforation is one of the most common problems in otorhinolaryngology. Many small perforations can heal spontaneously over time. Others may remain persistent due to infection or some other causes. When left untreated, this may lead to hearing loss, middle ear infection, persistent otorrhoea or even an acquired cholesteatoma. Many graft materials like temporalis fascia, perichondrium, vein grafts, cartilage, fat, biomaterials like paper patch, gelfoam and hyaluronic acid derivatives, genetically engineered biomaterials like silk fibroin, calcium alginate, chitosan and collagen have been tried. Yet conventional temporalis fascia graft has been proven to be the most effective graft material used for tympanic membrane perforation closure with high success rate and very less re-perforation rates. This study was designed to find out the efficacy of **fat plug myringoplasty** technique in management of small tympanic membrane perforations. In this prospective study we have analysed the success rates, rate of healing and hearing improvement following a fat plug myringoplasty which can be done as outpatient **procedure**. The study also tries to determine the role of etiology in the success rates and causes for the failure of the procedure.

MATERIALS AND METHODS:

This prospective study was performed on 40 patients of which 21 were males and remaining 19 were females. The patients with infectious cause for TM perforations were **15**, traumatic cause were **20** and post myringoplasty were **5**. History taking and clinical examination was done in all patients. Pure tone audiometry was done for all patients and A-B gap was estimated at 0.5, 1 and 2 kHz. Informed consent was obtained from all patients.

INCLUSION CRITERIA

Age 15 – 50 years, 6 months following the previous ear surgery, perforation in the pars tensa involving only one quadrant, absence of any acute inflammation, absence of ear discharge for atleast 3 months and patent eustachian tube.

EXCLUSION CRITERIA

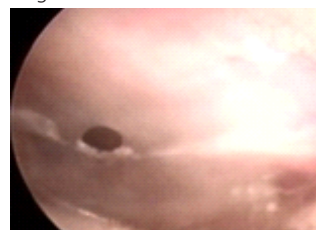
Presence of focal sepsis in nose & tonsils, marginal perforations, large perforations involving more than 1 quadrant, active stage of infections, presence of tympanosclerotic patch, cholesteatoma.

TECHNIQUE OF FAT PLUG MYRINGOPLASTY

4% xylocaine solution soaked cotton ball was placed in the external auditory canal. Patients were placed in supine position with head placed under the head ring and head turned to opposite side. Under strict aseptic precautions, using Hopkins 0 degree endoscope, local anaesthesia given using 2% xylocaine mixed with 1 in 100000 adrenaline in the EAC. The margins of perforation freshened.

2% lignocaine infiltration was given in the ear lobe, a small incision was made on the medial aspect of ear lobule and fat of size

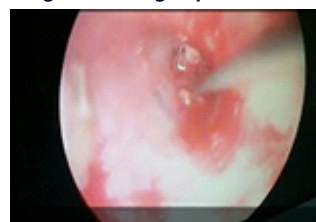
twice as that of the perforation was harvested and put in saline solution. The incision was sutured using 3-0 ethylon. The fat graft was trimmed approximately to the size of twice or lesser to that of the perforation size and using endoscope fat graft was plugged into the perforation like the hourglass using a straight pick. Oversized fat plug may cause a atrophy or necrosis by stretching of the tympanic membrane whereas undersized graft will cause dehiscence. The graft was supported by placing pieces of gelfoam on and around the graft.



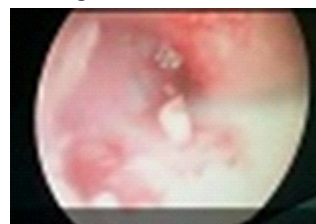
• **Pre op perforation**



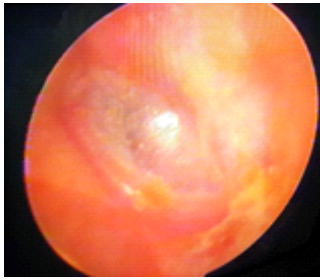
• **Image showing freshening of perforation edges**



• **Plugging in of fat graft**



• **Gel foam placement**



Post op healed CP at 2 months

Medicated ear wick was placed. No ear dressing was used. Patient was kept in observation for about half an hour patient. Antibiotics, analgesics and nasal decongestant drops were given for 1 week. Patients were advised to keep their ear dry, avoid straining or nose blowing for 3 weeks and were asked to follow up in the OPD at the end of 7,30 and 60 days. Ear wick removed at the end of one week. The appearance of dimeric tympanic membrane was monitored in each follow up. Audiometry was done at the end of 1 and 2 months. The failure was determined by the absence of complete closure of tympanic membrane at the end of two months.

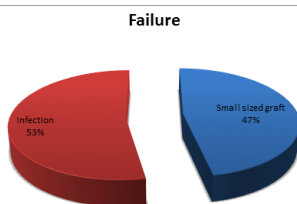
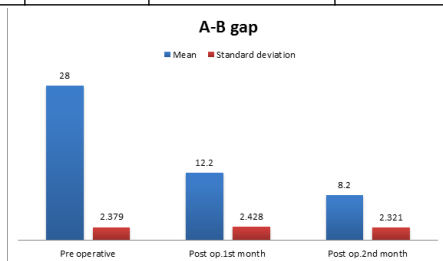
RESULTS:

In our study of 40 patients, infection and trauma were the most common causes and post-myringoplasty cases were rare. Pre-operative A-B gap had mean value of 28 dB in fat group. Post-operative A-B gap mean values at 1 month and 2nd month follow up was 12.2dB and 8.2 dB fat group respectively. Overall success rate was 87.8% of which traumatic cases showed more success rates. Causes of failure in fat plug myringoplasty was either a small sized graft[47%] or infection[53%]. In our study anterior quadrant perforations had higher success rates. Higher rates of complete closure was observed both at the end of first and second month follow up.

CAUSES	FAT
Infection	15(37.5%)
Traumatic	20(50%)
Post Myringoplasty	5(12.5%)

POST OP FOLLOW- UP: AIR- BONE GAP AT 1st MONTH AND 2nd MONTH FOLLOW-UP:

A-B GAP (dB)	Pre operative	1st month post operative follow up	2nd month post operative follow up
Mean	28	12.2	8.2
Standard Deviation	2.379	2.428	2.321



DISCUSSION:

The principal aim of our study is to evaluate the success rate of fat plug myringoplasty for complete closure of the small tympanic membrane perforations. It is a simple, short, cost effective and less pain, absence of skin incisions, fewer complications and also maximum improvement of the air/bone gap after the procedure.

The clinical criteria established by Fiorino and Barbieri[1] was used for the selection of patients eligible for these procedures to have the highest possibility of these procedure's success. The first demonstration of fat plug myringoplasty was reported by Ringenberg in 1962 where he showed success rate of 87%[2]. In the following studies the success rate was 80% to 92% in cases of small perforations. **In our study, the success rate of the entire group of patients underwent fat plug myringoplasty 87.8%**

The advantages of fat graft:

The most common problem with any underlay graft technique is collapse of graft in area near anterior annulus. In fat plug, it is a hourglass plug technique, so it does not need support from middle ear side.

Technical operative points such as "graft size, degree of lateral bulge of the fat plug" are also considered to be important factors of success in the fat grafting procedure[3]. Fat is an active material containing angiogenic and survival factors like prostaglandins, Monobutyryn, cytokines, interleukins 1 and 6 and tumour necrosis factor which stimulate repair of the fibrous layer and promote healing and there by closure of perforations. These factors also provide revascularization which is essential for survival of the free flap[1]. Fat graft promotes growth factors including vascular endothelial growth factor, platelet derived growth factor, transforming growth factor beta, and fibroblast growth factor which promote the process of the tissue repair[6]. Fat contains high population of multipotent cells referred to as adipose-derived stem cells which are similar in activity to those of the bone marrow derived mesenchymal stem cells which has the ability to differentiate into mesenchymal tissues such as endothelial and fibrous types promoting the healing process of the tympanic membrane".[7]

CONCLUSION:

According to our study, fat plug myringoplasty had higher success rates & rate of healing & complete closure at the end of 1 & 2 months follow up & a significant improvement in hearing for small tympanic membrane perforations. The hearing improvement in A-B gap during post operative follow up at 1st and 2nd month were compared with pre-op A-B gap & showed a significant p value (p<0.001). No complications have been encountered in the study & the patient compliance was comparatively better compared to surgery as it is less traumatic & time consuming. The main aim of our study is to bring awareness among medical personnel about the outpatient procedures in closure of small perforations & thus reducing the complications.

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