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Comparitive analysis of anterior tucking method and circumferential falp method of tympanoplasty in subtotal perforation

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Abstract
Introduction: Myringoplasty is defined as the surgical repair of the tympanic membrane. In most of the cases the damage is likely to be a persisting perforation of the drum but there are also situations where a thin or retracted drum may need to be reinforced.
Material and method: This is a prospective clinical study done on 100 patients of chronic otitis media of safe type with sub Total perforation. This study was done in department of otolaryngology at Patna medical college and hospital, Patna from September 2017 to may 2019 on patients attending ENT opd after prior written consent.
Result: Success rate improves after including anterior tucking method in all the tympanoplasties
Conclusion: Hearing gain and success rate of both the technique is comparable and can be considered as choice for subtotal perforation.

Keywords: tympanoplasty, anterior, tucking, graft, circumferential, flap

Introduction

Myringoplasty is defined as the surgical repair of the tympanic membrane. In the majority of cases the damage is likely to be a persisting perforation of the drum but there are also situations where a thin or retracted drum may need to be reinforced. Perforations may be completely asymptomatic and can be found incidentally. The majority of patients, however, will present to the ENT surgeon as a result of their symptoms, the commonest being discharge and hearing loss. Temporalis fascia is the most commonly used autologous material, with the use of cartilage increasing in popularity for larger perforations. Underlay and overlay techniques are known to have almost similar outcomes. This study was done to compare anterior tucking method and circumferential flap method of tympanoplasty in subtotal perforation with respect to graft uptake and hearing outcome.

Materials and methods

This is a prospective clinical study done on 100 patients of chronic otitis media who were having safe type of disease. Study was done in department of otolaryngology at Patna medical college and hodpital, Patna from September 2017 to may 2019 on patients attending ENT opd after prior written consent.

Inclusion criteria

1. Mucosal type of chronic otitis media
2. Subtotal type of perforation
3. Dry ear
4. Age group between 12 to 48 years
5. Those giving consent to study upon them

Exclusion crireria

1. Co morbid condition
2. Cholesteatoma ears
3. Squamosal disease
4. Sensorineural or mixed type of hearing loss
5. Previous otologic procedures

All the patients were clinically examined properly. History was taken in detail followed by otoscopic examination of the ear. Suction cleaning was done under microscope for those requiring it. Clinical finding of all the patients on whom study was to be done was noted. X ray schuller's view was taken to know mastoid condition. Pre-operative pure tone audiometry finding was recorded in all the patient.
Patients were prepared for surgery only after having 3 months of dry ear.

- Patients were randomly allocated to two groups of 100cases each.
- Group A 50 -Tympanoplasty by anterior tucking method
- Group B 50-Tympanoplasty by circumferential flap method

Surgical technique

- Both these methods involved creation of a vascular strip and grafting with temporalis fascia medial to the handle of malleus.
- Circumferential Flap Method: The fibrous annulus was elevated with the tympanomeatal flap, exposing bony sulcus all around, and the graft was placed over the bony sulcus and supported by repositioning the vascular strip.
- Anterior tucking method-The tympanomeatal flap was elevated with the posterior tympanic annulus, an incision was made on anterior canal wall about 5 mm lateral to the anterior annulus and a tunnel was made connecting to anterior mesotympanum. The graft was placed medial to the handle of malleus and tucked medial to the fibrous annulus anteriorly by pulling it through the tunnel.

Patients were followed up at the 1, 3, 6 month postoperatively. Postoperative improvement in hearing was

assessed by PTA. The success of surgery was defined as complete closure of tympanic membrane perforation and postoperative improvement in hearing.

Results

Out of 100 patient 45 was male and 55 was female. Patient was distributed according to their age and gender. fig 1.All the patient had subtotal perofation.

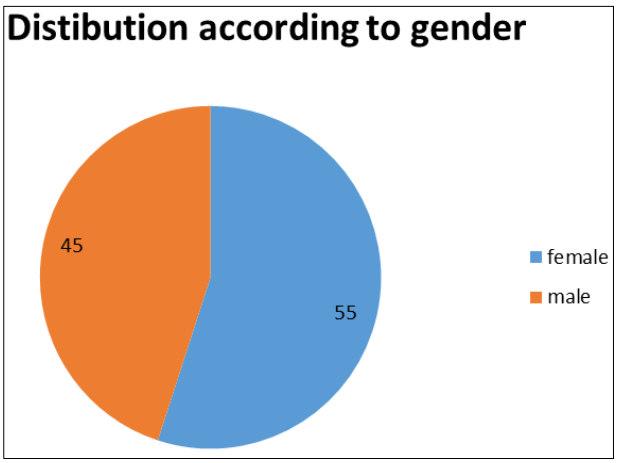

Fig 1: distribution according to sex

Hearing loss on average pre operatively anterior tucking group was 36dB and in circumferential flap method was 34dB. After 6 month of follow up,in anterior tucking method, the raft uptake rate was 98%(p value=.012)One patient had suffered reperforation at 6th month due to infection while es the patient showed adequate graft uptake. In circumferential flap method, there was a success rate of 96% (p value =.234).Two patient had reperforation post surgey. One of it had graft necrosis at 3rd month of follow up and other had reperforation dur to infection. Two patient showed lateralization of graft after surgery. (p value =.003)FIG 2

When hearing outcome was assessed at 6th month of follow up,in anterior tucking group there was an average gain of 18dB and in circumferential flap method there was an average gain of 16dB(p vaue =.001)TABLE 1

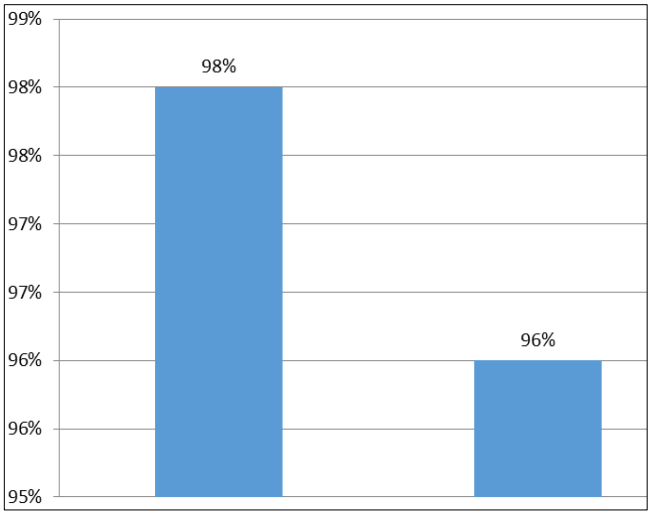

Fig 2: Graft Uptake Rate in Anterior Tucking Method and Circumferential Flap Method

Table 1: Average Hearing Gain at 6th Month of Folloe Up

Method	Average hearing loss pre operatively	Average hearing loss post operatively	P Value
Anterior Tucking	36	18	.001*
Circumferential Flap	34	16	.000*

P Value <.005 is Significant

Discussion

Myringoplasty can be defined as the surgical repair of the tympanic membrane [1]. The two goals of tympanoplasty are to achieve a dry ear by eradicating middle-car disease and hearing improvement by closure of any tympanic 1nembrane perforation by grafting and/or ossicular reconstruction. The results of tympanoplasty are measured in terms of success or failure of graft-take and hearing improvement.

Individuals with benign perforations and simple ossicular chain deficits have a very good probability of obtaining a dry ear and hearing within the normal range. Such a patients expect a 93 to 97% chance for a graft "take" and an 85 to 90% chance for a hearing gain to within 20 dB of bone level [2, 3].

The three principal indications for myringoplasty are recurrent otorrhoea, hearing loss due to a chronic perforation, and the desire to swim without having to waterproof the ear [4]. Various tympanoplasty prognostic scoring systems have been proposed, including SPITE (surgical, prosthetic, infection, tissues and Eustachian tube) and MERI (Middle Ear Risk Index), to try to stratify possibilities of success [5]. Other factors to think about prior to surgical intervention include patient age, presence of infection, status of the other ear, reperforation rates, the influence of the mastoid and smoking.

Two major techniques have been described for placement of graft materials, namely overlay and underlay.

Overlay, the graft being placed lateral to the fibrous layer of the drumhead and hence over the fibrous annulus, the epithelial layer having been elevated alone and then replaced onto the graft. The underlay method involves placement of the graft medial to the entire tympanic membrane, with elevation of a flap of ear canal skin together with the drumhead being most commonly used for access, stabilizing the graft under the fibrous annulus.

A prospective randomized controlled study of both techniques did not show any difference in temporalis fascia graft uptake rates between the two techniques [6]. The authors concluded the underlay technique to be superior due to its technical ease, shorter post-operative healing time, fewer complications and better hearing gain. There is debate as to correct placement of an underlay graft, particularly with a medialized handle of malleus.

Usually the graft should pass under the malleus though, with a subtotal or central perforation with an exposed umbo, some advice a small hole in the centre of the graft through which the umbo can pass to try to prevent the 1.4% risk of graft lateralization [7].

Retraction of the drumhead following grafting can occur in up to 10%, with some suggesting the use of cartilage to try to prevent this [8, 9].

Elevation of the anteroinferior aspect of the tympanic membrane runs the risk of anterior blunting, a risk with both overlay and underlay techniques. Various techniques or packing methods have been proposed to try to prevent this as it can impact on hearing outcomes. The incidence of iatrogenic cholesteatoma, particularly with the overlay technique which runs a higher risk of leaving some squamous epithelium medial to the graft, can be as high as 4.4% [10, 11].

Silverstein described a method where in, tympanomeatal flap was elevated along with fibrous annulus anterosuperiorly over the Eustachian tube. Here a tunnel was made (2-4 mm) through which the graft was pulled out and between the anterior meatal skin and the bone canal.

Schraff *et al* in his study did a modification by elevating the fibrous annulus from bony sulcus first and later the canal skin over the anterosuperior quadrant in a retrograde fashion. This was followed by an underlay grafting where he graft was situated between the raw bone and the anterior meatal skin. This study showed 94.5% success rate.

In study by Hosmani *et al*, it was seen that overall incidence of successful graft uptake was 96.96 per cent in group one who underwent additional anterior tagging of graft and 81.5 per cent in group two who did not undergo any modification.

Conclusion

Around 70-80% of acute perforations heal spontaneously within 30 days. Three indications for myringoplasty are recurrent infections, hearing loss and social impact such as pain on swimming. Success rates for myringoplasty are 60–99% in adults and 35–94% in children. Post-operative retraction of the drumhead can occur in up to 10%. The risk of iatrogenic cholesteatoma is 4.4%.Anterior tucking of graft increases chance of graft uptake and improves hearing result.In our study, anterior tucking and circumferential flap techniques of tympanoplasty are good regarding ease of graft placement, graft uptake rate, and audio logical outcome. Both techniques are good for CSOM with subtotal perforation, especially with little or no anterior remnant of pars tensa.

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