

*Research Article***Single Layer Graft Technique in Tympanoplasty for Subtotal Tympanic Membrane Perforation**

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Abstract

Objective. To assess hearing improvement & TM healing in Cases of Subtotal TM perforation who had tympanoplasty using single layer graft Technique. **Method:** 18 cases of Subtotal TM perforation had Microscopic postauricular Tympanoplasty using single layer perichondrium / cartilage island graft (composite graft) in underlay manner between 2020 and 2021 and Audiogram was done 1 week & 3 months pre & postoperative respectively. **Results:** 6 of 18 cases had small residual TM perforation postoperative and preoperative mean ABG was 22.65 ± 8.46 dB and became 20.30 ± 9.83 dB postoperatively. **Conclusion:** Postauricular Tympanoplasty using single layer graft in is still valuable technique for cases with subtotal TM perforation. Furthermore, the cartilage is more resistant cases with ET dysfunction and can withstand the (-ve) pressure in middle ear.

Keywords: Postauricular, Tympanoplasty, perforation

Introduction

Chronic otitis suppurative (CSOM) media have a significant effect on a person's social life as Deafness. The ear discharge is troubling and causes the patient considerable discomfort.⁽¹⁾ Tympanoplasty is the cornerstone in treatment of mucosal type of CSOM.

Many types of grafts are used in tympanoplasty and Certain criteria such as minimal rejection rates, enough quantity, perfect tensile strength, Similar to TM in conduction properties and more accessible, make the graft ideal for TM closure.⁽²⁾

Temporalis fascia has mucopolysaccharides & collagen which give it more tensile strength and decrease its metabolic rate. So, infection does not cause autolysis for it. Because the Cartilage is brady trophic tissue, it enables stable and functionally reliable Tympanoplasty⁽³⁾.

Materials and methods

El Minya university's Ethical Committee gave approval to carry out this current research. We prospectively assess clinical outcome in terms of Healing & audiological outcome in 18 cases with subtotal TM perforation using single-layer perichondrium with cartilage island graft

(composite graft) . All cases attended to E.N.T. outpatient clinic, El Minia university hospitals & subjected to: History taking, ENT examination with special care to the diseased ears and Audiological examination: Tuning fork tests (Rinne and Weber's tests) & PTA. CT petrous bone was done.

Routine laboratory investigations.

For achievement of long term success of tympanoplasty, eradication & management of predisposing factors should be done such as nasal allergy, Significant deviated septum, nasal polyposis, or acute sinusitis should be managed before tympanoplasty.

Surgical technique:

All operation done Under General anesthesia by using Microscope after fulfillment of Lab investigation, ECG & Internal medicine fitness.

- Tragal cartilage with perichondrium is harvested: injection of tragus with 2% lidocaine with 1:100000 adrenaline solution. On medial surface of tragus near its tip a small incision done 2 mm below the tip of tragus. For dissection of Subcutaneous tissue from perichondrium a scissor is used for this step. After a substantial proportion of the cartilage has been exposed according the perforation

- size, the cartilage is resected Scissors along with perichondrium.
- Refreshment of TM perforation edge: It is important to remove a 1-mm rim of the perforation circumferentially.
 - Postauricular Incision: .5 – 1 Cm behind the origin of the auricle using scalpel. incision continued toward the external auditory canal through the subcutaneous fat& tissues and continued deep to incise the periosteum. Weitlaner retractor is used for exposure of this area.
 - Continue elevation of the periosteum until reaching EAC then by free elevator, the ear canal skin is elevated off the posterior canal wall. The posterior limb of the canal incision is carried out at a few millimeters deeper than the entrance of the bony external canal (C shape incision) from 6 to 12 clock by scalpel then elevate TMF and the fibrous annulus should be elevated carefully from the sulcus of the bony annulus.
 - The composite graft is held and introduced into the meatus by cup forceps, and then it is spread out in underlay manner to be lateral to middle ear mucosa as well as under & medial to the handle of malleus & tympanic membrane remnant with the perichondrium towards the ECA.
 - Replacement of the TMP flap and gelfoam put in EAC. Then closure of periosteum, SC tissue and finally the skin of post auricular incision.

Results

- The age of patients ranged from 18 – 44Ys old with 50% females & 50% males. (table 1)
- **table 1:**

	Single layer tympanoplasty group (n=18) N (%)
Age (years)	
Mean ± SD	30.5 ± 8.2
Range	18 - 44
Sex	
Male	9 (50 %)
Female	9 (50%)

Demographic data of the study

- Before the operation Audiometry was obtained for each case, then after 3 months postoperative, audiogram done again. when we compare Air Bone gap (ABG) Preoperative & Postoperative, it was found that there is no significant difference in improvement of hearing . preoperative mean ABG was $20.65 \pm 8.50 \text{ dB}$ and became $18.30 \pm 9.85 \text{ dB}$ with p value = 0.07. Table 2

Table 2: comparison between preoperative & postoperative mean ABG

Pre-operative Mean \pm SD	Post-operative Mean \pm SD	P value
20.65 \pm 8.50	18.30 \pm 9.85	0.07

3 months postoperative, TM healing assessed and it was found that 66.66% of cases had completely healed TM while 33.33% had small residual TM perforation.

Discussion

Tympanoplasty is a common otological procedure which mean surgical reconstruction of TM. Repeated middle ear infection and discharge , improvement of hearing and social activities such aquatic sports are most accepted indications for this procedure.⁽⁴⁾

There are some issues in closure of subtotal perforation as maintenance of its anterior part after reconstruction because the anterior portion does not have enough vascular supply, causes graft necrosis in this area, lack of anatomical structures to maintain the graft after position properly, and because of the angle between the tympanic wall and the anterior wall.⁽⁵⁾

Alejo Linares Casas⁽⁶⁾ operate on 37 ear with subtotal TM perforation using Composite graft (cartilage & perichondrium) with classic underlay technique who report that 78.3% of cases had complete TM closure.

Francisco Larrosa⁽⁷⁾ compared Palisade cartilage to single piece composite cartilage-perichondrium grafts for subtotal TM perforations which doesn't show significance in TM closure With complete closure in (85%) in the palisade group and (86.3%)in the one-piece group. Postoperative ABG closure was statistically significant both in the palisade and one-piece groups (11.6 $p = 0.007$ and 8.8, $p = 0.01$, respectively) but there is no significant difference between 2 groups. This differ with current study.

Conclusion

Successful repair of the tympanic membrane depends on various factors such as size of the perforation, function of the eustachian tube, disease clearance from the middle ear cleft, and

experience of the surgeon. Success rate is inversely proportional to the size of the perforation.⁽⁸⁾ single layer graft in form of tragal perichondrium with cartilage island graft (composite graft) showed that it can be dependable considering TM healing but the cartilage still not suitable enough to acoustic transferring system as it is more thick and rigid than the nature of human tympanic membrane.

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