

## ENDOSCOPIC INLAY BUTTERFLY CARTILAGE TYMPANOPLASTY

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### INTRODUCTION:

Tympanoplasty was first described by Wullstein and Zöllner in 1952, and it forms the basis of tympanic membrane perforation repair (1,2). Eavey used inlay butterfly tympanoplasty technique in 1998 for repair of small perforations in non-cholesteatomatous chronic otitis media. This technique has been shown to be advantageous compared to other techniques since it may be used under local anesthesia without any need for elevation of a tympanomeatal flap, there is less need for postoperative follow up and care, and it has a low cost (3).

Minimal invasive methods take center places in many surgical fields. Use of endoscopes has been accepted as an efficient and minimal invasive method particularly in chronic otitis media surgery. Use of endoscopes has some advantages such as wide exposure, ability to see particularly anteriorly located marginal perforations, and easier observation of attic, hypotympanum, sinus tympani, and facial recess.

In this study, we presented preoperative and postoperative anatomical and audiological results of our patients who had endoscopic inlay butterfly cartilage tympanoplasty.

### MATERIAL AND METHODS:

A total of 20 patients (10 males and 10 females; mean age: 28 years, range: 8-64 years) who had inlay butterfly cartilage tympanoplasty in Pamukkale University, Faculty of Medicine, Otorhinolaryngology Department between January 2013 and May 2015 were included in the study. The tympanic membranes and the middle ear cavities of all patients were examined using a 0° otoendoscope. The statuses of the outer ear canal and middle ear mucosa, the size and localization of the perforations, and presence of discharge were noted in the preoperatively. The sizes of the perforations ranged between 2-6 mm. Dry, non-discharging ears were followed up for at least 2 months. The patients with marginal perforations were not included in the study. Mean preoperative and postoperative air thresholds were determined by obtaining averages of air conduction thresholds at 500, 1000, 2000 Hz on audiograms. The patients with an air-gap < 30 dB were included in the study. All patients had surgery under general anesthesia. An endaural skin incision was made in 6 patients since their external ear canals were narrow, and a transcanal procedure was challenging. A transcanal route was used in the remaining 14 patients. The edges of the perforation were desepithelized in a circular fashion under the vision of a 0°/4 mm rigid endoscope, and the size of the perforation was measured. The tragal cartilage was removed, and prepared as a graft, leaving the perichondrium intact on its both sides. The size of the graft was adjusted by cutting the upper, lower, and medial sides of the cartilage. The incision over the tragus was sutured. The size of the cartilage was adjusted in a manner that its size was at least 1 mm bigger than the size of the perforation. A no 11 scalpel was used to make grooves, 1-2 mm in depth, on both sides of the cartilage, parallel to the perichondrium (Figure 1). In this way, two cartilage surfaces including perichondrium were obtained, resembling butterfly wings. The upper perichondrium of the cartilage graft was held with a non-serrated forceps, and graft was placed into the perforation like a grommet ventilation tube (Figure 2). A hook was used to ensure that one wing of the graft was medial to the tympanic membrane, and the other one was lateral to it. The surgeon felt certain that the edges of the perforation placed between two wings of the graft all around. In two patients with subtotal perforations and exposed malleus handles, minimal perforations remained in the anterosuperior quadrant was filled with fat grafts obtained from the ear lobules, in the same session. Spongel was put into the external ear canals of those two patients to support the graft. The external ear canals of other patients were not packed.

Figure 1

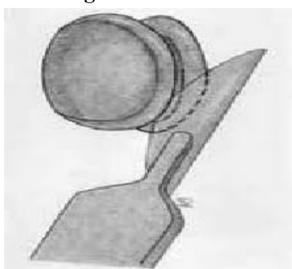


Figure 2



Preoperation

Peroperation

Postoperation



There is the picture of endoscopic cartilage tympanoplasty images preoperative, peroperative and postoperative 12 month later.

### RESULTS:

Patient no	Age	Gender	Preoperative air- bone gap	Postoperative air- bone gap	Follow up (months)	Success
1	8	M	11	5	5	Successful
2	11	M	10	0	3	Successful
3	13	F	26	15	4	Successful
4	16	M	30	15	15	Successful
5	16	F	28	18	6	Unsuccessful
6	18	F	30	10	11	Successful
7	23	F	15	10	2	Successful
8	23	M	15	5	2	Successful
9	26	F	10	0	3	Successful
10	32	F	23	19	6	Successful
11	32	M	17	0	6	Successful
12	36	M	10	5	6	Successful
13	37	F	16	5	6	Successful
14	41	M	15	10	3	Successful
15	43	M	10	0	1	Successful
16	63	F	30	15	12	Successful
17	28	F	17	5	2	Successful
18	20	M	10	0	2	Successful
19	16	M	17	0	1	Successful
20	64	F	27	15	1	Successful

The air- bone gaps of all patients improved in the postoperative period. The mean air- bone gap was 18.5 dB in the preoperatively, and it was found as 7.6 dB postoperatively. In one patient, air- bone gap closed, but the cartilage graft seemed medialized. The patient was re-operated, the cartilage graft was removed, and temporal muscle fascia graft was put with underlay technique. Perforation was closed completely after the second operation. The anatomical closure was complete in two patients in whom cartilage and fat grafts were used simultaneously. Infection or cholesteatoma formation were not seen in the postoperative period in any of our patients.

### DISCUSSION:

Inlay cartilage tympanoplasty is a new technique used in treatment of small, central perforations not causing considerable hearing loss (air- bone gap <30 dB). It's most important advantages are short duration of surgery, and no need for a second incision since transcanal approach is used. Endoscopes provide a wider field of vision, and particularly anteriorly located marginal perforations may be easily seen. Remaining small perforations after placement of the graft may be easily seen and repaired endoscopically. In two patients, we repaired remaining small perforations after placement of the cartilage graft with fat grafts obtained from the ear lobule.

A number of studies investigated anatomical and functional results of endoscopic inlay butterfly cartilage tympanoplasty. In 1998, Eavey described the technique, and reported 100% anatomical closure, and 90.4% improvement in pure tone thresholds in 9 pediatric patients (3). Lubianca-Neto performed Eavey's technique with transcanal approach and under local anesthesia in 20 adults, and reported complete closure of perforation in 90%, and improvement in pure tone thresholds in 94.4% of the patients (4).

Our study included 6 children and 10 adults, and a total of 20 patients. All patients had dry ears for 2 months, the air- bone gaps of all patients were smaller than 30 dB, and none of them had marginal perforations. All patients had endoscopic guided inlay butterfly cartilage tympanoplasty under general anesthesia. Tympanic membrane closure rate was found as 95% in our study. Air- bone gaps improved in all patients. Remaining perforation after placement of the cartilage graft was repaired using fat graft in the same session in two patients, and complete closure of perforation was achieved in follow up. It was seen that fat graft adapted well to cartilage graft. This method has not been used before.

### CONCLUSION:

This technique may be used safely in treatment of tympanic membrane perforations in case of mild hearing loss (air- bone gap <30 db), and a dry middle ear in absence of any suspicion for cholesteatoma or middle ear pathologies

### REFERENCES:

- 1-Wullstein HL. Funktionelle Operationen im Mittelohr mit Hilfe des Freien Spaltlappentransplantates. Arch otorhinolaryngology 1952; 161: 422-435 4.
- 2-Zöllner F. The principles of plastic surgery of the sound conducting apparatus. J Laryngol Otol 1995; 69: 657-659
3. Eavey RD. Inlay tympanoplasty: cartilage butterfly technique. Laryngoscope 1998;108:657-61.
4. LubiancaNeto JF (2000) Inlay butterfly cartilage tympanoplasty (Eavey technique) modified for adults. Otolaryngol Head Neck Surg 123:492-494