

Butterfly cartilage graft myringoplasty results

Butterfly kıkırdak greft miringoplasti sonuçları

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Abstract

Aim: The aim of this study was to study a retrospective analysis of the cartilage graft butterfly myringoplasty performed by the Otolaryngology Head and Neck Surgery department.

Material and Methods: Twenty-two subjects (26 ears) were enrolled in the study. Surgery was performed under general anesthetic in 18 of the 26 ears and under local anesthetic for the remaining eight ears. In four subjects, surgery was performed on both ears as described by Eavey. Before the surgery and during the one postoperative year, an audiologist performed pure-tone audiograms. These audiograms were analysed retrospectively.

Results: Twenty-two subjects (26 perforated ears) who ranged in age from 12 to 44 years were enrolled in this study. All 26 perforations treated by CGBM (cartilage graft butterfly myringoplasty) were successfully closed at the end of the follow-up period. The mean preoperative ABG for all 22 patients was 14,81±4,12 dB and postoperative 6,27±4,50 dB. The ABG of the cases were evaluated as having a statistically significant reduction in the mean postoperative ABG (p<0.05).

Conclusion: Cartilage graft butterfly myringoplasty is a safe, timesaving, easy, and effective technique for the closure of small-to-medium tympanic membrane perforations.

Keywords: Butterfly graft, tympanic membrane perforation, myringoplasty, cartilage graft.

Özet

Amaç: Bu çalışmanın amacı Kulak Burun Boğaz Kliniğine başvuran ve "kıkırdak greft butterfly miringoplasti" ameliyatı yaptığımız kronik otitis medialı hastalarda işitme düzeyini retrospektif olarak analiz etmektir.

Yöntemler: Çalışmaya 22 hasta (26 kulak) dahil edildi. 18 hastada genel anestezi altında 8 hastada lokal anestezi altında, gerçekleştirildi. Cerrahi 22 hastada tek kulakta 4 hastada her iki kulakta ve Eavey tarafından tarif edildiği şekilde gerçekleştirildi. Ameliyat öncesi ve ameliyat sonrası yapılan odyolojik incelemeler retrospektif olarak analiz edildi.

Bulgular: Çalışmaya dahil edilen 22 hasta (26 kulak)'nın yaşları 12-44 arasında idi. Postoperatif takipte kıkırdak greft butterfly tekniği uygulanan 26 kulağın perforasyonunun kapandığı görüldü. Hastaların odyolojik incelemesinde ameliyat öncesi hava kemik aralığı (ABG) ortalama 14,81±4,12 dB iken, ameliyat sonrası ortalama 6,27±4,50 dB olarak ölçüldü. ABG açısından preoperatif döneme göre postoperatif dönemdeki azalmanın istatistiksel olarak anlamlı olduğu görüldü (p<0.05).

Sonuç: Kronik otitis medialı hastalarda kıkırdak greft butterfly miringoplasti tekniğinin güvenli, kolay, kısa sürede yapılabilen, küçük ve orta boyuttaki perforasyonlarda uygulanabilecek bir teknik olduğu görüldü.

Anahtar Kelimeler: Kelebek greft, timpanik zar perforasyonu, miringoplasti, kartilaj grefti.

Introduction

Myringoplasty is a common procedure and numerous graft materials and methods of placement have been described to close perforations in the tympanic membrane (TM). They include either the underlay or onlay approach and temporalis fascia or perichondrium remain the most commonly used materials (1,2). Eavey first described the use of cartilage graft butterfly myringoplasty (CGBM) for selected small tympanic membrane perforations, with good postoperative hearing results (3).

CGBM is a well-established and accepted technique for the repair of small perforations by way of a trans-canal approach (4). In addition, the technique has been extended with a slight modification to patients with large tympanic membrane perforations, demonstrating a take rate of 90 percent, no graft displacement, a low rate of postoperative adverse events (5,6). This study is a retrospective analysis of the CGBM at Otolaryngology Head and Neck Surgery department.

Material and Methods

We retrospectively analyzed the medical records of patients who underwent CGBM at the otolaryngology head and neck surgery department of the Abant Izzet Baysal Faculty of Medicine and Hisar Intercontinental Hospital between September 2008 and January 2011. The study was approved by the Abant Izzet Baysal Faculty of Medicine ethics committee. Twenty-two subjects, who ranged in age from 12 to 44 years (9 men and 13 women), were enrolled in the study.

Patients included in the study demonstrated good pneumatization of the mastoid bone on the temporal bone computed tomography; were dry at the time of surgery; had non-marginal small or medium-sized perforations; had a wide external auditory canal with a clear view of all margins; and had myringosclerosis. Patients with any condition requiring exploration of the middle ear, such as possible cholesteatoma; radical mastoidectomy and mastoid surgery; disproportionate conductive hearing loss caused by the size of the perforation; large (greater

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Table 1: Demographic data, tympanic membrane characteristics, and audiometric results

PATIENT NO	SEX	EAR	AGE (YEARS)	FOLLOW-UP (MONTH)	AUDIOMETRY Preop/Postop (dB)	Air Bone Gap Preop/Postop (dB)	PERFORATION	Diameter of the perforation (mm)
1	M	Left	12	7	30/17	15/4	Anterior-inferior	2
2	F	Right	16	5	28/14	16 /6	Central at umbo,	4
3	F	Left	19	5	34 /17	17/3	Central, inferior	4
4	F	Left	22	6	35/19	20/4	Postero-inferior, myringosclerosis	5
5	F	Left	32	6	20/14	10/4	Postero-inferior, myringosclerosis	5
6	M	Right	44	8	27/8	12/0	Anterior-inferior	4
7	M	Left	23	8	19/12	9/4	Central, inferior	4
8	F	Right	34	8	22/17	12/8	Anterior-inferior,	5
9	M	Left	14	10	38/19	16/7	Central, inferior	5
10	F	Right	14	2	19 /12	10/4	Anterior-inferior	4
11	F	Right	40	11	35/19	22/10	Anterior,	5
12	F	Left	34	10	37/18	25/10	Central at umbo	6
13	F	Right	24	10	19 /14	9/4	Central,	4
14	M	Left	25	6	22 / 12	12/4	Anterior-inferior, myringosclerosis	4
15	M	Left	16	8	28/16	16/4	Central, inferior	4
15	M	Right		8	29 /32	17/17	Postero-inferior	4
16	M	Left	22	2	24 /14	12/3	Central umbo,	5
16	M	Right		9	33 /23	15/5	Anterior-inferior	5
17	F	Left	24	10	32/25	19/8	Central at umbo,	5
17	F	Right		10	37/18	16/3	Central at umbo, myringosclerosis	5
18	M	Right	16	2	39 /22	19/8	Anterior-inferior	4
19	F	Left	18	2	22/ 12	13/3	Central at umbo	6
20	M	Right	26	3	28/26	20/20	Postero-inferior	5
20	M	Left		3	25/12	13/2	Central at umbo,	5
21	F	Right	36	4	25/19	12/7	Anterior-inferior	5
22	F	Left	19	7	34 /14	17/3	Postero-inferior	4



than half of diameter to total replacement of the tympanic membrane) perforations that could not be repaired by way of a transcanal route; extensive myringitis; or active otorrhea, were excluded from the study.

Before the surgery, an audiologist performed pure-tone audiograms (PTA) in all patients. All the operations were performed by a single surgeon (TA). Surgery was performed under general anesthetic in 18 of the 26 ears and under local anesthetic for the remaining eight ears. In four subjects, surgery was performed on both ears.

All surgery was performed transmeatal, using an ear speculum (B Braun Medical Ltd, Sheffield, UK). The patient was anesthetized, prepared, and draped for a sterile procedure. Lidocaine and epinephrine 1:100,000 were used for skin injection into the ear canal and meatal surface of the tragus. If the middle ear mucosa appeared healthy and no unexpected pathology was encountered, the perforation margin was freshened in all cases, using a needle to create multiple circumferential perforations close to the edge with a rim of tympanic membrane removed with a microcups instrument. The squamous epithelium on the manubrium was removed. A tragal incision was made and dissection superficial to the posterior tragal perichondrium was performed. Once sufficient tragal cartilage was exposed, a graft was taken. The graft was prepared by removing any excess soft tissue and harvested with the perichondrium preserved on both surfaces, A number 11 blade scalpel was then used to create the 'butterfly' as previously described (3). No packing was placed in the middle ear.

Table 2: Descriptive statistics of cases

	Male	Female	Total
The Number of Cases	12 (46,2%)	14 (53,8%)	26 (100%)
Age (Year)	21,83±8,51	25,07±8,66	23,58±8,58
Follow-Up (Months)	6,17±2,88	6,71±3,09	6,46±2,95
PTA Preop.	28,50±5,96	27,64±7,08	28,04±6,47
PTA Postop.	17,75±6,94	17,00±3,55	17,35±5,28
ABG Preop.	14,33±3,14	15,21±4,90	14,81±4,12
ABG Postop.	6,50±6,00	6,07±2,89	6,27±4,50
Number of Ears			
Right	5(41,7%)	7(50%)	12(46,2%)
Left	7(58,3%)	7(50%)	14(53,8%)

ABG: Air Bone Gap, PTA: Pure-Tone Audiograms

The dimensions and shape of the perforation were measured previously. The same hook was used to re-estimate the size and shape of the perforation on the harvested cartilage. The groove in the graft was engaged with the anterior rim of the perforation so that the medial flange was medial to the tympanic membrane. The rest of the graft was manipulated into place with a dissector or needle so that the tympanic membrane sat in the groove of the cartilage graft. The procedure is the same as inserting a grommet (7). A piece of self-absorbing gelatin sponge was inserted into the meatus and the patient was discharged the same day. Patients were viewed

routinely every week by an otorhinolaryngologist after the surgery. The gelatine sponge was removed one week after surgery. At each follow-up visit, the patients were examined under a microscopic view to detect inflammation in the external auricular canal or tympanic membrane. Patients with suspected infection were treated with topical antibiotic eardrops. During the one postoperative year, an audiologist performed pure-tone audiograms (PTA).

Table 3: Comparison of Pre- and Post-operative ABG and PTA values

	Pre-operative	Post-operative	p
ABG	14,81±4,12	6,27±4,50	0,001*
PTA	28,04±6,47	17,35±5,28	0,001*

*:Wilcoxon Singed Rank Test, ABG: Air Bone Gap, PTA: Pure-Tone Audiograms

Statistical Analysis

All statistical analyses were performed by using the SPSS (Statistical package for social sciences for Windows, 18.0) program. Data assessing the descriptive statistical methods (mean, standard deviation) as well as quantitative parameters for the data showed normal distribution and homogeneity. The Wilcoxon signed rank test was used for comparisons. Results 95% confidence interval, P < 0.05 was considered statistically significant.

Results

A total of 22 patients (9 men and 13 women) were enrolled in the study. The mean age of the patients was 23,58±8,58 years (range 12–44 years). The perforations were most frequently central or antero-inferior. Demographic data, tympanic membrane characteristics, and audiometric results were gathered for the 22 patients treated by CGBM (Table 1). All 26 perforations treated by CGBM were successfully closed at the end of the follow-up period. During our follow-up time, 20% (n=5) myringitis was noted.

Table4: Summary of Preoperative and Postoperative Air Bone Gap [n,(%)]

dB	Preoperative (n=26)	Postoperative (n=26)
0_10	4 (15,4%)	23 (88,6%)
11-20	20 (76,9%)	3 (11,4%)
21-30	(7,7%)	-

There were no other significant postoperative complications, such as displaced grafts, and no problems with the tragal incision were seen. The graft was displaced into the middle ear only in two ears, but the ABG (Air Bone Gap) wasn't changed. The mean follow-up time was 12,46±2,95 month. The mean preoperative ABG for all 22 patients was 14,81±4,12 dB and postoperative 6,27±4,50 dB. The ABG and PTA of the cases were evaluated and there was a

statistically significant reduction in the mean post-operative ABG ($p < 0.05$) (Table 2–4).

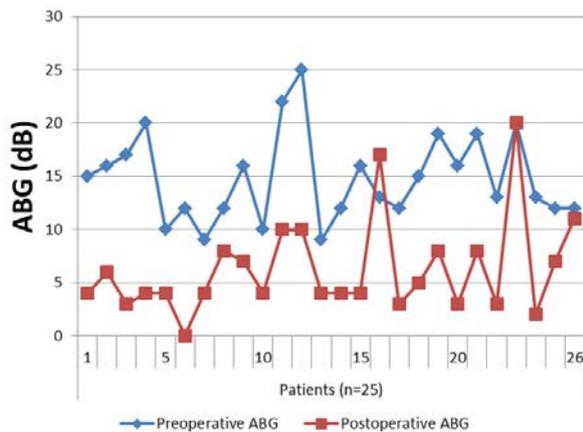


Figure 1. The difference between preoperative and postoperative air–bone gaps in individual patients

Figure 1 shows the differences between preoperative and postoperative air-bone gaps in individual patients and Figure 2 demonstrates the distribution of the perforation sizes in all patients.

Discussion

Many techniques have been described to close tympanic membrane perforations. Cartilage grafts gathered from the tragus or concha are easy to obtain, convenient for shaping according to the size of the perforation, thick, with hard composition, and are resistant to resorption and retraction. Butterfly cartilage inlay grafting is effective for patients with small tympanic membrane perforations. The procedure is more comfortable for the patient postoperatively for several reasons. Since neither a tympanomeatal flap nor a postauricular incision is required because drum preparation does not require the removal of tympanosclerotic plaques or additional exposure, postoperative patient comfort is improved and the patient can hear just after surgery (3,5,8).

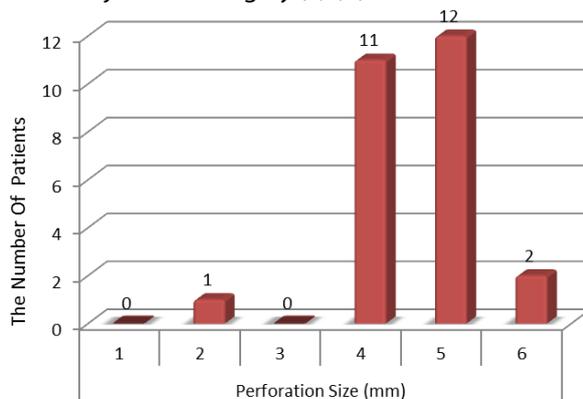


Figure 2: The distribution of perforation size with values representing patient numbers per group.

During the follow-up period, we recorded that no graft had lateralized and no retraction pocket occurred, postoperative patient hearing comfort is improved and no problems were detected with the tragal incision in any patient; however, in two patients, the graft displaced into the middle ear. We thought that it was slightly too small compared to the tympanic membrane perforation. We therefore recommend that the graft should ideally be 2 mm larger than the tympanic membrane perforation to enough success rates for CGBM as experienced in the previous study.

Patients with non-marginal small or medium-sized perforations were included to our study. But according to another study, CGBM is effective in the vast majority of patients with moderate to large perforations. Postoperative adverse events were respectively low, the closure rate exceeded 90% with no graft displacement, and hearing results improved in the majority of patients (4).

Myringitis is the most common occurring early post-operative complication. Eavey (3) describes it in 9% (n=1), Ghanem et al.(4) in 14% (n=14), Rourke et al.[7] in 11% (n=4) and Couloignier et al.(9) in 5% (n=3) of patients. It was treated with 1 week of topical 0.3% ciprofloxacin eye drops and resolved in all four patients by 3 months after surgery (9). During our follow-up time in this retrospective study 20% (n=5) was noted.

The butterfly edge diminishes graft lateralization and displacement caused by patient activities, especially in children, and provides an instant ‘locking’ of the graft (4,9). No packing is required to ‘stabilize’ the graft.

The limitations of the current retrospective study include its relatively small sample size, lack of patients with large and marginal perforations, conditions requiring exploration of the middle ear, and the lack of a control group. Our findings indicate that a larger study with a longer follow-up period is required to better determine the possibility of retraction pocket, perforation recurrence, and iatrogenic cholesteatoma.

Conclusion

Cartilage graft butterfly myringoplasty is a safe, timesaving, easy, and effective technique for the closure of small to medium tympanic membrane perforations that can be performed by way of the transcanal approach.

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