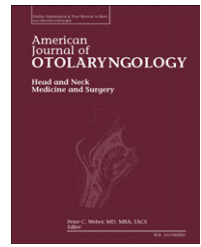


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Pediatric otolaryngology: Principles and practice

Comparison of temporal muscle fascia and cartilage grafts in pediatric tympanoplasties[☆]



Sule Demirci, MD^{a,*}, Arzu Tuzuner, MD^a, Hatice Karadas, MD^a, Cemile Acikgoz, MD^a, Refik Caylan, MD^b, Ethem Erdal Samim, MD^a

^a Department of Otorhinolaryngology-Head and Neck Surgery, Ministry of Health, Ankara Training and Research Hospital, Ankara, Turkey

^b Department of Otorhinolaryngology- Head and Neck Surgery, Konya Medicana Hospital, Konya, Turkey

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ABSTRACT

Objective: To compare anatomic and functional outcomes of the different graft materials used in pediatric tympanoplasty.

Materials and methods: The patients younger than 18 years of age and who had tympanoplasty between 2010 and 2012 were included in the study. Temporal muscle fascia or cartilage was used as the graft material. The age, gender, the side of the operated ear, the operation technique, pre- and postoperative audiological results, and the status of the graft were noted. An intact graft and an air-bone gap (ABG) ≤ 20 were regarded as surgical success in the postoperative period. Audiograms obtained before surgery and 1 year after surgery were used for the comparison.

Results: Sixty pediatric cases were included in the study. Fascia graft was used as the graft material in 35 of them, and cartilage was used in 25 patients. The graft success rate was 82.9% in the fascia group while it was 92% in the cartilage group. In the fascia group preoperative ABG was 28.2 ± 10.1 dB, postoperative ABG was 15.1 ± 10.2 dB, and postoperative gain was 13.1 ± 9.6 dB. In the cartilage group, preoperative ABG was 28.9 ± 10.2 dB, and postoperative ABG was 16.8 ± 10.3 dB with a postoperative gain of 12.1 ± 6.8 dB. The differences between the fascia and the cartilage groups were not statistically significant either for hearing gain or graft success rate.

Conclusion: Cartilage and fascia grafts yield similar results for hearing gain and graft success rate in pediatric tympanoplasty.

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1. Introduction

Tympanic membrane perforation in children usually appears as a sequel of middle ear infection, and may less frequently develop after trauma. Permanent perforations may also be seen after removal of the ventilation tubes [1]. The goal of

tympanoplasty is removal of the pathological tissues in the middle ear and mastoid, obtaining an intact tympanic membrane in order to prevent contamination of the middle ear, and fix the hearing loss.

There is a controversy in the treatment of the tympanic membrane perforations in children. The surgical success rate

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* Corresponding author at: M. Akif Ersoy Mah 266. Cad. No: 7C G3 Blok D:25 Yenimahalle/Ankara, Turkey. Tel.: +90 312 3358754; fax: +90 312 5083166.

E-mail address: suledemirci1@yahoo.com.tr (S. Demirci).

in children has been reported between 35 and 92%, and is lower than the rates reported in the adults [2-6]. Frequent upper respiratory tract infections and middle ear infections, eustachian tube dysfunction, immaturity of immune system, and narrow external ear canal contribute to the tympanoplasty failure in children [2,5].

Skin, vein, cartilage, temporal muscle fascia, fascia lata, perichondrium, autografts such as duramater and some xenografts have been used as graft materials since first description of tympanoplasty. Today, fascia grafts obtained from the temporal muscle fascia are the most frequently used graft materials due to the neighborhood of the donor area to the surgical field. Although the grafts obtained from the temporal muscle fascia were shown to retract and decrease in size during the healing process due to the irregular elastic fibers and fibrous connective tissue they contain [7]. Lately, the cartilage grafts obtained from the tragus or conchal cartilage have been widely used. Cartilage grafts are rigid and more resistant to infections and retractions due to eustachian tube dysfunction when compared to the fascia [8]. A number of authors prefer cartilage in high-risk patients owing to its thickness and firmness, worrying of a conductive hearing loss related to these properties [9]. However, the rigidity of the cartilage grafts was shown to decrease as time goes by [10].

In the literature there are no sufficient studies in children comparing different graft materials. Although there are a number of studies on this subject in adults, the number of the studies in the pediatric population is limited. In this study, we compared the graft success rates and hearing outcomes of the different graft materials used in pediatric tympanoplasty.

2. Materials and methods

Anatomic and functional results of sixty patients ≤ 18 years of age and had tympanoplasty in our clinic between 2010 and 2012 were retrospectively analyzed. The patients with cholesteatoma or atelectasis, the ones with small perforations (smaller than 25%) were excluded. All of the patients had a perforation present at least 1 year prior to surgery. The patients included in the study were divided into two groups considering the graft material used in tympanoplasty. In the first group, there were 35 patients in whom temporal muscle fascia was used as the graft material, and the second group included 25 patients in whom tragal cartilage was used as the graft material. The operations were performed by senior surgeons. All patients had surgery under general anesthesia and with a postauricular approach.

All of the patients had computerized tomography imaging, and audiograms before the operation. The age, gender, the side of the operated ear, the surgical approach, the size of the perforation, the graft material used, pre- and postoperative audiological results, and the status of the graft at the postoperative period were noted in both groups. Each of the ears was scored using middle ear risk index developed by Kartush [11].

In first group the temporal muscle fascia was shaped after it dried, and it was placed over the malleus and under the anterior annulus, with an overlay-underlay technique. The graft was supported by gelfoam both medially and laterally. In second group, the graft obtained from the tragal cartilage was

prepared without thinning the cartilage. The perichondrium was peeled at the convex side of the cartilage. A cartilage strip was removed at the middle portion of the cartilage, to fit the graft to the manubrium of the malleus. The graft was placed as a composite chondroperichondrial island graft, with an overlay-underlay technique. It was supported with gelfoam.

The perforations were classified as small (smaller than 25%), medium (25-50%), large (>50%) or total (100%), according to the classification used by Saliba [12]. As mentioned before, the ones with small perforations were not included in the study.

The patients were examined at postoperative first and second weeks and at postoperative first month. Postoperative audiograms were obtained 1, 3, 6, and 12 months after the operation, at the same time microscopic ear examinations were performed. Later, annual audiograms were obtained. In this study the 12th month audiograms were used for the comparison.

The groups were compared statistically for their clinical and demographic characteristics. The pre- and postoperative air-bone gaps, hearing gains, and postoperative graft success were compared within the groups as well as between the groups. The relation of graft success with the type of the operation, the side of the operated ear, and the perforation size were investigated.

Postoperative surgical success was defined as an intact tympanic membrane without any perforation, retraction or lateralization and an ABG ≤ 20 dB.

2.1. Statistical analysis

The analysis of the data was performed using SPSS for Windows 11.5 package program. Kolmogorov-Smirnov test was used to analyze whether the distribution of discrete numeric variables was normal. Descriptive statistics were presented as mean \pm standard deviation or median (minimum - maximum) for discrete numeric variables, and as number of the cases and "%" for categorical variables. The significance of intergroup differences was analyzed using Student's t test, and the significance of the medians was analyzed with Mann-Whitney U test. Wilcoxon sign test was used to determine the differences between the fascia and the cartilage groups' pre- and postoperative ABGs. Categorical variables were analyzed with Pearson's chi square or Fisher's exact chi square tests. The result was considered as statistically significant when $p < 0.05$.

3. Results

Sixty pediatric tympanoplasty cases were included in the study. The ages of the patients were between 7 and 18 years (mean 15.1 ± 2.9 years). There were 30 females and 30 males. The characteristics of the fascia and the cartilage groups are presented in Table 1. The age, gender, the side of the surgery, type of the surgery, sclerosis, and the size of the perforation, mastoidectomy rates and MERI were similar in two groups ($p > 0.05$) (Table 1).

In the present study the graft success rate was significantly higher in boys (100%) compared to the girls (73.3%) ($p < 0.001$). The age, side of surgery, the operative technique and the perforation size, presence of tympanosclerosis, MERI were not

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