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Prognostic factors for graft success in tympanoplasty with mastoidectomy

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Abstract

Objective: The aim of this study was to evaluate the different factors that may affect graft success in tympanoplasty with mastoidectomy.

Methods: Patients who underwent tympanoplasty with mastoidectomy between September 2004 and July 2010 were included in this study. Patient data were collected retrospectively. The effects of the epitympanic patency, duration of the dry period of the ear, presence of preoperative otorrhea, location of the perforation, status of the middle ear mucosa, and status of the tympanic membrane on the rate of postoperative graft success in patients who underwent tympanoplasty with mastoidectom were investigated. The chi-square test and Fisher's ex ere use for statistical analysis.

Results: A total of 130 pati 4 male 56 fe n ave age age of 35.7 (ge: 56) years we cluded e o l su cess rate p per success 75% 3-m r dry period of ear ence preoperative hea, preoperative normal middl a, a of epitympanic patency significantly incre the op ve success rate of graft (p<0.001). The presence of perative otorrhea and granulation tissue in the middle ear mucosa, presence of preoperative myringosclerosis, and lack of epitympanic patency were significantly associated with graft failure after tympanoplasty with mastoidectomy (p<0.001).

Conclusion: Epitympanic patency, middle ear infection, and the morphology of the tympanic membrane and middle ear mucosa should be considered prognostic factors in patients who undergo tympanoplasty with mastoidectomy.

Keywords: Tympanoplasty, mastoidectomy, prognostic factors, epitympanic patency.

Özet: Mastoidektomili timpanoplastide greft başarısını etkileyen prognostik faktörler

Amaç: Çalışmanın amacı mastoidektomili timpanoplastide greft başarısı üzerinde etkisi olabilecek faktörleri araştırmaktır.

Yöntem: Bu retrospektif çalışma, Eylül 2004 ile Temmuz 2010 arasında mastoidektomili timpanoplasti ameliya ların verileri kullanılarak yürütüldü. Epi açık ulağın kalış süresi, preoperatif ot ol asi, perfo nun y orta kulak mukoza m men rum n po eratif greft başa zerindeki et araştır İstatistiks için ki-kare ve Fish xact testleri ku ldı.

Bulg Çalışmada t n 130 hasta (56 kadın, 74 erkek; yaş ortamas ralığı: 11–56) dahil edildi. Greft başarı oranı %75 ak belirlendi. Kulağın 3 aydan daha uzun süre kuru kalması, preoperatif olarak kulak akıntısı olmaması, preoperatif normal orta kulak mukozası ve epitimpanik açıklık oluşu postoperatif greft başarısını anlamlı şekilde artırmıştır (p<0.001). Preoperatif otore ve orta kulakta granülasyon dokusu varlığı, preoperatif miringoskleroz oluşu ve epitimpanik açıklığın olmaması mastoidektomili timpanoplasti sonrası ise mastodiektomili timpanoplasti sonrası greft başarısı anlamlı olarak düşüren faktörler olarak izlendi (p<0.001).

Sonuç: Çalışmamızın sonuçlarına göre epitimpanik açıklık, orta kulak enfeksiyonu ve timpanik membran ve orta kulak mukozasının yapısal özellikleri mastoidektomili timpanoplasti yapılacak hastalarda prognostik açıdan önem taşımaktadır.

Anahtar sözcükler: Timpanoplasti, mastoidektomi, prognostik faktörler, epitimpanik açıklık.

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Chronic suppurative otitis media (COM) is a stage of ear disease in which there is chronic infection of the middle ear cleft, which comprises the Eustachian tube, tympanic cavity, and mastoid cells.[1] The management of COM is mostly surgical, and the surgical procedure is chosen according to the pathology of COM. The mail goals of tympanoplas-

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ty are to remove active disease and repair sequelae.[2] Various factors may affect the success rate of tympanoplasty. Tobacco smoking, pathology in the opposite ear, the size of the tympanic membrane perforation, experience of the surgeon, and duration of the dry period have been reported as prognostic factors for success after tympanoplasty.[3] Other factors suggested to be associated with the surgical outcome of tympanoplasty are age, sex, perforation size and site, ear status at the time of surgery, and surgeon experience; however, the actual roles of these factors remain controversial.[4,5] Graft success is an important occurrence after tympanoplasty. If the tympanic membrane becomes healthy in the postoperative period, then one may hope for improvement in hearing loss and prevention of recurrent middle ear infection.

In the present study, we evaluated the influence of different factors on graft success after tympanoplasty with mastoidectomy.

Materials and Methods

Patients who underwent tympanoplasty with mastoidectomy between September 2004 and July 2010 were retrospectively analyzed. Approval of Institutional Review Board and written informed consent were obtained. All patients were subjected to otoscopic and microscopic examination. Evaluation of the tympanic membrane perforation performed with an otoscope. If there was no active infection in the middle ear, the duration of the dry period of the ear was obtained from the patient's medical history. The location of the tympanic membrane perforation, morphology of the tympanic membrane, morphology of the middle ear mucosa, and presence of otorrhea were recorded during the otologic examination. Hearing measurements were achieved at 500, 1000, 2000, and 3000 Hz both preoperatively, and at postoperative 6-month pure-tone averages were obtained (Interacoustics AD629, Interacoustics A/S, Assens, Denmark).

All patients underwent general anesthesia via a retroauricular approach. The temporal muscle fascia was used for reconstruction of the eardrum. An antrostomy was performed in all patients to evaluate the opening between the antrum and the epitympanum by pouring water into the antrum. If the water passed through the aditus and was seen in the tympanic cavity, then epitympanic patency was present. If the water did not pass through the aditus and was not seen in the tympanic cavity, a simple mastoidectomy was performed for eradication of the pathology (hypertrophic mucosa, granulation, or sclerosis) and opening of the epitympanic region. The patients were examined at postoperative 6-month for graft success. The mean follow-up period was 19.4 months.

Data was analyzed by Statistical Package for Social Sciences Program version 11.0 (SPSS Inc., Chicago, IL, USA). The chi-square test and Fisher's exact test were used for statistical analysis.

Results

This study included 130 patients, 74 male and 56 female, with an average age of 35.7 (range: 10 to 56) years. The follow-up period ranged from 6 to 30 months (mean, 19.4 months). The influences of the prognostic factors on graft success in the postoperative period among the 130 patients who underwent tympanoplasty with mastoidectomy are shown in Table 1.

The success rate of graft success was 85.7% for patients with a >3-month dry period of the ear, whereas it was 56.5% in the group whose dry period was <3 months. The difference between the two groups was statistically significant (p<0.001).

The status of the middle ear mucosa also significantly affected the rate of postoperative graft success. The rate of graft success was 93.5% in patients with normal middle ear mucosa, whereas it was 75% in tympanosclerotic ears and 44.4% in patients with granulation tissue in the middle ear (p<0.001).

The rate of graft success was 88% in tympanic membranes without myringosclerosis, but it decreased to 52% in tympanic membranes with myringosclerosis (p<0.001). The location of the tympanic membrane perforation did not significantly affect the postoperative rate of graft success (p=0.648).

The rate of graft success was 89.4% in patients with epitympanic patency, whereas it was 55.5% in patients without epitympanic patency (p<0.001) (Table 1).

The mean level of hearing improved after tympanoplasty. The mean air bone gap was 32.54±3.75 dB preoperatively and 18.23±2.33 dB postoperatively.

Discussion

The aims of tympanoplasty are restoration of the eardrum, eradication of middle ear infection, and improvement in the hearing level. A healthy mucosa lining the middle ear cleft can be achieved after a successful tympanoplasty.[3] Graft success is an important component after tympanoplasty because it prevents recurrent middle ear infections and may

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improve hearing. Various factors may be associated with the success rate of tympanoplasty.[5–10]

Mastoidectomy is preferred for eradication of middle ear infection. However, its effect on the success of tympanoplasty remains controversial.[11–16] There are three potential reasons for this. Many authors accept that mastoidectomy is useful for both infected and dry ears, while others recommend it only for infected ears.[5–7,11,12] On the other hand, some others suggest that mastoidectomy is not useful for either infected or dry ears.[16,17] Onal et al. reported that dryness of the ear is important in the timing of tympanoplasty.[3] In our study, we found that the rate of graft success was significantly higher after tympanoplasty in patients with a >3-month dry period of the ear (p<0.001).

The influence of the location of the perforation on surgical outcome after tympanoplasty has frequently been an issue of interest. The location of the perforation reportedly had no effect on the surgical results in some studies.[18,19] However, Pinar et al. found that the rate of graft success was higher for central perforations than for posterior and anterior perforations.[20] Onal et al. reported significant differences in the success rates between smaller and larger perforations.[3] Controversy remains regarding the influence of the location of the perforation on operative success.[10,21] The location of the [illegible]rforation [illegible] not significantly affe[illegible]success [illegible]e of [illegible]r ty[illegible] panoplas[illegible]tu[illegible]

Myrin[illegible]cle[illegible]sis [illegible] the tymp[illegible] membrane may cause poor [illegible]of g[illegible]erial. In addition, removal of sclerotic plaques during surgery results in a larger perforation. Onal et al. found no correlation between myringosclerosis and the surgical outcome of tympanoplasty.[3] Pinar et al. reported that the absence of myringosclerosis increased the success rate of tympanoplasty.[20] In the present study, we found that the rate of graft success was significantly higher in tympanic membranes without myringosclerosis (p<0.001).

There are inadequate data indicating that tympanoplasty combined with mastoidectomy has better results than tympanoplasty without mastoidectomy. In on previous study, tympanoplasty combined with intact canal wall mastoidectomy offered no significant improvement in the rate of closure of simple tympanic membrane perforations.[4] In these patients, it is suggested that mastoidectomy is not necessary for successful closure of simple postinfectious tympanic membrane perforations. In a temporal bone study, a significant difference was found in the ability to observe middle ear [illegible]log[illegible]betwe[illegible]the intact canal wall and [illegible]ra[illegible]own tym[illegible]noma[illegible]idectomy, with [illegible]r sh[illegible]ng s[illegible]rity.[illegible]ommended mas[illegible]dectomy fo[illegible]ischa[illegible]s, and Mishiro et al. repo[illegible]d that they [illegible]not r[illegible]utinely perform mastoidectomy fo[illegible]ympanic membrane perforations accompanied by chronic otitis media.[23]

In the present study, the rate of graft success after tympanoplasty was significantly higher in patients with epitympanic patency (p<0.001). In addition, the presence of

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Table 1. Prognostic factors and rate of graft success after tympanoplasty.

Parameters		n	Success rate	p value
Duration of dry period	Less than 3 months	46	26 (56.5%)	<0.001*
	More than 3 months	84	72 (85.7%)	
Peroperative otorrhoea	Dry	116	94 (81%)	<0.001*
	Wet	14	4 (28.5%)	
Location of perforation	Anterior	18	12 (66.6%)	0.648
	Posterior	42	32 (76.2%)	
	Ventral	70	54 (77.1%)	
Status of the middle ear mucosa	Normal	62	58 (93.5%)	<0.001*
	Tympanosclerosis	32	24 (75%)	
	Granulation tissue	36	16 (44.4%)	
Status of the tympanic membrane	Without myringosclerosis	84	74 (88%)	<0.001*
	Myringosclerosis	46	24 (52%)	
Epitympanic patency	Open	76	68 (89.4%)	<0.001*
	Close	54	30 (55.5%)	

*: Statistically significant.

granulation tissue in the middle ear had a negative effect on the success rate of graft success after tympanoplasty ($p<0.001$). As a result, we advocate mastoidectomy with tympanoplasty in patients with active middle ear infection to achieve epitympanic patency and remove the granulation tissue from the middle ear.

In conclusion, middle ear infection and the morphology of the tympanic membrane and middle ear mucosa must be taken into consideration as preoperative predictive factors for full closure of the tympanic membrane after tympanoplasty.

Conflict of Interest: No conflicts declared.

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