



Necessity of mastoidectomy in patients with chronic otitis media having sclerotic mastoid bone: a retrospective clinical study

Sklerotik mastoid kemiği olan kronik otitis medialı hastalarda mastoidektominin gerekliliği: retrospektif bir klinik çalışma

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ABSTRACT

Objectives: This study aims to investigate the efficiency of mastoidectomy during tympanoplasty procedures in patients having sclerotic mastoid bone with dry or dried up tympanic cavity.

Patients and Methods: The study included 146 patients (66 males, 80 females; mean age 28.6 years; range 16 to 52 years) having sclerotic mastoid bone who underwent tympanoplasty between March 2010 and March 2013. Patients were divided into two groups: group A (34 males, 58 females; mean age 25.8 years; range 17 to 47 years) underwent only tympanoplasty, while tympanoplasty + mastoidectomy were performed on group B (32 males, 22 females; mean age 29.8 years; range 16 to 52 years). All outcomes were evaluated including the actual state of the tympanic membrane graft and level of hearing.

Results: While postoperative perforation and retraction rates were not significantly different between the two groups, results of group A were superior to group B in terms of operation duration and hearing results.

Conclusion: Mastoidectomy is not an efficient procedure in chronic otitis media patients having sclerotic mastoid bone with dry or dried up tympanic cavity.

Keywords: Chronic otitis media; mastoidectomy; tympanoplasty.

ÖZ

Amaç: Bu çalışmada kuru veya kurutulmuş timpanik kavite olan, sklerotik mastoid kemiği olan hastalarda timpanoplasti işlemleri sırasında mastoidektominin etkinliği araştırıldı.

Hastalar ve Yöntemler: Çalışmaya sklerotik mastoid kemiği olup Mart 2010 ve Mart 2013 tarihleri arasında timpanoplasti geçiren 146 hasta (66 erkek, 80 kadın; ort. yaş 28.6 yıl; dağılım 16-52 yıl) dahil edildi. Hastalar iki gruba ayrıldı: grup A (34 erkek, 58 kadın, ort. yaş 25.8 yıl; dağılım 17-47 yıl) sadece timpanoplasti geçiren grup B'ye (32 erkek, 22 kadın; ort. yaş 29.8 yıl; dağılım 16-52 yıl) timpanoplasti + mastoidektomi uygulandı. Timpanik membran greftinin mevcut durumu ve işitme düzeyi dahil tüm sonuçlar değerlendirildi.

Bulgular: İki grup arasında ameliyat sonrası perforasyon ve retraksiyon oranları anlamlı olarak farklı olmasa da ameliyat süresi ve işitme sonuçları açısından grup A'nın sonuçları grup B'den üstündü.

Sonuç: Kuru veya kurutulmuş timpanik kavite olan, sklerotik mastoid kemiği olan hastalarda mastoidektomi etkin bir işlem değildir.

Anahtar Sözcükler: Kronik otitis media; mastoidektomi; timpanoplasti.



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Chronic otitis media (COM) is a frequently seen disease with a worldwide incidence of 2-3% that progresses with inflammation of the middle ear mucosa and/or mastoid cells.^[1-3] Although the incidence of the disease and related complications have decreased owing to widespread antibacterial use, complete cure of the disease has been achieved via surgical means especially in COM patients with cholesteatomas. Often, surgical procedures aim to excise pathological tissues, restore normal middle ear functions and eradicate disease from mastoid cells.^[4] Although mastoidectomy performed concomitantly with tympanoplasty is still frequently used in COM patients with perforated tympanic membrane, in recent years it has become a debatable issue. Studies related to the necessity of mastoidectomy have either recommended mastoidectomy in all dry and suppurative COM^[5,6] or favor performing mastoidectomy only for suppurative COM.^[7-10] Besides, some authors are against mastoidectomy in both dry and suppurative COM without cholesteatoma.^[11,12]

In this study, we retrospectively investigated the patients diagnosed as chronic otitis media without cholesteatomas having sclerotic mastoid bone in radiologic imaging who had undergone tympanoplasty. We tried to compare patients who had or had not undergone mastoidectomy in the light of pre- and postoperative anatomic and functional outcomes to reveal the effectiveness of mastoidectomy (if any) in these patients.

PATIENTS AND METHODS

In this study among 189 patients who had undergone chronic otitis surgery, 146 patients (66 males, 80 females; mean age 28.6 years; range 16-52 years) who had had tympanoplasty between March 2010 and March 2013 were retrospectively analyzed. Patients older than 14 years of age with tympanic membrane perforation, sclerotic mastoid cells as detected on temporal bone computed tomography (CT), without any ossicular abnormalities and aural discharge for at least three months were included in the study. Before initiating surgical intervention, medical therapy was applied for ears with drainage to render them dry for at least three months. Patients with cholesteatomas, ossicular chain abnormalities, adhesive otitis, and those with a history of mastoidectomy were not included in the study. Preoperatively, otomicroscopic examinations

were performed and pure tone audiograms and temporal bone CTs were obtained for all patients.

Patients were divided into two groups based on the surgical treatment they received. Group A consisted of 92 patients (34 males, 58 females; mean age 25.8 years; range 17 to 47 years) who had had only tympanoplasty, while group B comprised of 54 patients (32 males, 22 females; mean age 29.8 years; range 16 to 52 years) who had undergone tympanoplasty plus mastoidectomy. Patients were evaluated 12th months postoperatively with audiograms to ascertain the actual state of the tympanic membrane graft and level of hearing. All cases were operated by a single surgeon under general anesthesia.

In cases included in group A, as a standard procedure, an endaural tympanomeatal flap was elevated to expose the ossicular system and aditus to the mastoid antrum. If no pathological tissue was detected in this region, a boomerang shaped chondoperichondrial graft was used for underlay grafting.

In cases included in group B, as a standard procedure, a postauricular antrotomy opened the aditus to allow for cortical mastoidectomy. The defect was closed with a cartilage graft using an underlay grafting procedure. The patients were followed up for 20.5 months.

Both groups were compared as to pre- and postoperative state of graft success, operative times, graft retraction and air bone gap values. Data were evaluated as standard percentage values using Microsoft Office Excel 2010 (Microsoft Comp. Chicago, IL, USA) and SPSS for Windows version 16.0 software program (SPSS Inc., Chicago, IL, USA). $P < 0.05$ was accepted as a statistically significance level.

RESULTS

At postoperative one year, medical files of the patients were reviewed and in group A, reperforation was detected in nine (9.8%) of 92 patients and closure of the perforations was noted in 83 (90.2%) patients. At postoperative one year, in group B reperforation was detected in four (7.4%) of 54 patients and in 50 (92.6%) grafts were intact.

Mean operative times of the patients in group A and B were calculated as 56.63 ± 8.05

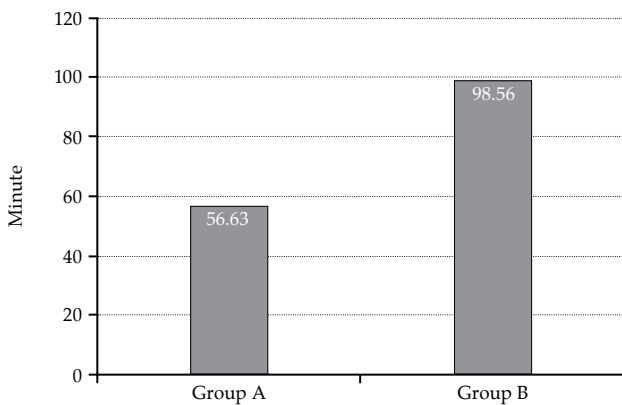


Figure 1. Operative times of groups A and B.

and 98.56 ± 7.25 minutes respectively (Figure 1). *P* value for statistical analyses of operative times was found to be lower than 0.005 ($p=0.0001$) which was deemed to be statistically significant (Table 1).

Hearing test results: Mean air bone gap (ABG) values were estimated and compared. For pre- and postoperative audiograms, ABG values at 500, 1000, 2000 and 4000 Hz frequencies were determined. During the preoperative period mean ABG values in groups A and B were 23.47 ± 4.951 dB and 25.61 ± 6.208 dB, respectively.

During the postoperative period, mean ABG values in groups A and B were 11.58 ± 4.765 dB and 13.54 ± 6.448 dB, respectively (Figure 2). Pre- and postoperative intragroup evaluations of groups A and B revealed that tympanoplasty procedures provided significant improvements in hearing functions. Pre- and postoperative audiogram results of groups A and B were statistically significant ($p < 0.0001$) (Tables 2 and 3). Although

postoperative ABG values were significantly better than preoperative values on intragroup comparison, there were no significant changes between groups as stated in Table 1 (preoperative ABG $p=0.023$, postoperative ABG $p=0.037$).

On comparison for graft retraction, retraction was observed in five of 92 patients (5.4%) in group A after the first year and in two of 54 patients in group B. The retractions were in the central zone in two patients and at posterosuperior zone in three in group A, while two (3.8%) retractions were observed in the central zone in group B. All retractions were grade 1 by Sade classification.^[13]

DISCUSSION

In the surgical treatment of COM especially in noncholesteatomatous cases mastoidectomy is not always a necessary intervention.^[14] Sheehy^[5] recommended simple cortical mastoidectomy in all tympanoplasty operations as a routine procedure. Tos^[8] also recommended mastoidectomy for draining ears, but also indicated that they couldn't always achieve improved outcomes. Despite these expert opinions, many other authors thought that mastoidectomy should be added to tympanoplasty to increase the chance of graft success in chronic cases with suppurative ears who were undergoing revision surgery.^[15] The most important justification for mastoidectomy is that this operation would provide better drainage of middle ear effusion, and open mastoid air cells would increase aeration which would all facilitate regression of the disease.^[16] Toros et al.^[17] evaluated tympanoplasty with or without mastoidectomy performed in patients

Table 1. Some statistical parameters of groups A and B

	n	Mean±SD	Mean±SE	<i>p</i>
Preoperative air-bone gap				
Group A	92	23.4±4.951	0.516	0.023
Group B	54	25.61±6.208	0.845	
Postoperative air-bone gap				
Group A	92	11.58±4.765	0.497	0.037
Group B	54	13.54±6.448	0.877	
Operative time				
Group A	92	56.63±8.095	0.844	0.0001
Group B	54	98.56±7.255	0.987	

SD: Standard deviation; SE: Standard error.

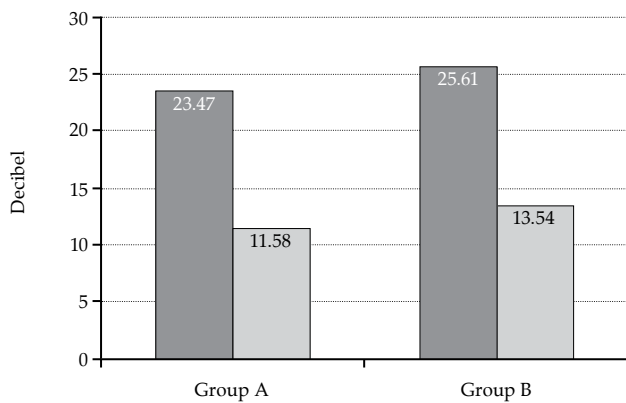


Figure 2. Pre- and postoperative air-bone gap values of groups A and B.

with sclerotic mastoid bone, as for hearing results and graft success and couldn't find any statistically significant difference between both groups. They indicated that simple mastoidectomy is an effective intervention in establishing repneumatization of sclerotic mastoid cells and eradication of infection within mastoid bones. However they also asserted that especially in cases scheduled for myringoplasty only, its added benefits, potential risks and cost-effectiveness should be meticulously evaluated.

In our clinics, we routinely obtain temporal bone CTs for all patients with detected COM for the last 20 months. We perform tympanomastoidectomy through a postauricular approach in cases with available computed tomographic evidence favoring cholesteatoma in the middle ear or mastoid bone. However in cases with sclerosing and/or pneumatized mastoid bone, we perform tympanoplasty via endaural route. In these cases, the posterosuperior wall

is curetted to expose the aditus to the mastoid antrum and ossicular system. In the presence of abnormal tissue (granulation, epithelium and polyp) in the aditus, anterior atticostomy is performed to get rid of these tissues.

Mastoidectomy in patients scheduled especially for type 1 tympanoplasty is a controversial issue. McGrew et al.^[6] could not find any statistically significant difference between patients who had undergone tympanoplasty with or without mastoidectomy as to success rates of grafting and auditory outcomes. Balyan et al.^[11] reported that in cases with noncholesteatomatous COM, mastoidectomy as an adjunct to tympanoplasty had no effect on success rates of closure of tympanic perforation and functional hearing outcomes, not mentioning the extra burden and risk it incurs. Mishiro et al.^[18] disclosed mid-term and long-term follow-up results of the patients who had undergone tympanoplasty with or without mastoidectomy and could not find any difference between hearing outcomes and graft success rates. Besides, they indicated that in cases with noncholesteatomatous COM and tympanic membrane perforation, mastoidectomy could not be performed and in infected ears caution should be instituted. They also reported that tympanoplasty without mastoidectomy could be performed under local anesthesia which might be preferred especially in the elderly and patients with medical complications. In this study also the risks caused by mastoidectomy were reported. As far as we know, sensorineural hearing loss may occur because of drill trauma, secondary meningitis may occur because of dura mater trauma at the

Table 2. Pre- and postoperative statistical data of group A

	n	Mean±SD	Mean±SE	p
Preoperative air-bone gap	92	23.47±4.951	0.516	0.0001
Postoperative air-bone gap	92	11.58±4.765	0.497	

SD: Standard deviation; SE: Standard error.

Table 3. Pre- and postoperative statistical data of group B

	n	Mean±SD	Mean±SE	p
Preoperative air-bone gap	54	25.61±6.208	0.516	
Postoperative air-bone gap	54	6.448±0.877	0.497	0.0001

SD: Standard deviation; SE: Standard error.

tegmens tympani zone, massive bleeding may occur due to sigmoid sinus trauma and facial nerve injury may occur during mastoidectomy. In our study only one patient had sensorineural hearing loss in group B, while no complication was observed in group A.

In our study, we evaluated patients with sclerotic mastoid bone who had undergone tympanoplasty with or without mastoidectomy. We did not detect any statistically significant difference between both groups as to pre- and postoperative hearing outcomes. Closure of tympanic membrane perforation was compared between both groups and at the end of the first year, rates of re-perforations were 7.4% (n=4) and 9.8% (n=9) in patients who had or had not undergone mastoidectomy, respectively.

Mane et al.^[19] reported graft take rate as 96%, with no retraction pockets or displaced grafts observed during follow-up at their 14 patient series. In our study we observed five retractions (5.4%) in group A and two in group B after the first year.

Our patients were evaluated for operative times and in the group that had undergone surgical interventions, operations terminated in a much shorter time and these values were statistically significant different between groups.

A limitation of our study was all the patients included had dry ears and we could not evaluate their eustachian tube function. A longer follow-up period may add value to the present study.

In conclusion, in cases without cholesteatoma that are scheduled for tympanoplasty, mastoidectomy does not create statistically significant differences regarding graft success and postoperative hearing outcomes; on the contrary it prolongs operative times in addition to its risk and financial burden.

In the light of our study, we recommend that:

1. In cases with noncholesteatomatous chronic otitis media, mastoidectomy is not a sine qua non surgical procedure;
2. Mastoidectomy not be performed in cases with type 1 tympanoplasty as it prolongs operative time and is not cost-effective; and

3. In a dry ear when a reconstruction of hearing or closure of the tympanic membrane is planned, attempts at resorting to mastoidectomy convey unnecessary additional risks.

Declaration of conflicting interests

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