



Evaluation of the Contralateral Ear in Patients with Chronic Otitis Media

Kronik Otitis Medialı Hastalarda Karşı Kulağın Değerlendirilmesi

Contralateral Ear

Ömer Bayır¹, Ahmet Uluat², Meltem Tuğar³, Mehmet Eser Sancaktar⁴, Ali Özdek¹, Gülezer Saylam¹, Emel Çadallı Tatar¹, Mehmet Hakan Korkmaz¹⁻⁵

¹Department of Otolaryngology, Head and Neck Surgery, Ministry of Health, Dışkapı Yıldırım Beyazıt Training and Research Hospital, Ankara,

²Department of Otolaryngology, Head and Neck Surgery, Dumlupınar University, Evliya Çelebi Training and Research Hospital, Kütahya,

³Department of Audiology, Yıldırım Beyazıt University, Faculty of Medicine, Graduate School of Health Sciences, Ankara,

⁴Department of Otolaryngology, Head and Neck Surgery, Ministry of Health, Samsun Training and Research Hospital, Samsun,

⁵Department of Otolaryngology, Head and Neck Surgery, Yıldırım Beyazıt University, Faculty of Medicine, Ankara, Turkey

Özet

Amaç: Kronik otitis medialı (KOM) hastalarda karşı kulağı değerlendirmek ve meliyat edilen kulağın patolojisi ile karşı kulağın durumunu karşılaştırmak. **Gereç ve Yöntem:** Timpanoplasti, timpanomastoidektomi ya da radikal mastoidektomi yapılan KOM tanılı hastalar retrospektif olarak analiz edildi. Ameliyat edilen kulaklar; preoperatif tanı, cerrahi tipi, cerrahi sayısı, intraoperatif bulgular (orta kulak mukozasının durumu, kolesteatom varlığı, kemikçik zincir destrüksiyon varlığı, fasiyal kanal dehissansı varlığı, lateral semisirküler ve dural defekt varlığı), ve postoperatif kulağın durumuna göre değerlendirildi. Karşı kulaklar intakt, perforasyon varlığı, retraksiyon, adezyon ve kavite varlığı olarak sınıflandırıldı. **Bulgular:** Yaş ortalaması 31.87 ± 14.75 olan toplam 523 hasta çalışmaya dahil edildi. Karşı kulakta en sık tespit edilen patoloji perforasyon idi (30.6%). Karşı kulağın durumu ile cerrahi sayısı, kemikçik zincir destrüksiyon varlığı, fasiyal kanal dehissansı varlığı, lateral semisirküler kanal defekt varlığı ve dural defekt varlığı arasında istatistiksel bir ilişki bulunmadı ($p > 0.05$). Ancak, karşı kulağın durumu ile preoperatif tanı, cerrahi tipi, orta kulak mukozasının durumu, kolesteatom varlığı ve postoperatif durum arasında istatistiksel bir ilişki saptandı ($p < 0.05$). **Tartışma:** Karşı kulakta anormal bulgu varlığında orta kulağın perioperative durumu cerrahi başarı için bir risk faktörü olarak kabul edilmelidir.

Anahtar Kelimeler

Karşı Kulak; Kronik Otitis Media; Kulak Cerrahisi

Abstract

Aim: To evaluate the contralateral ear of patients with chronic otitis media (COM) and compare the pathology of the operated ear with the condition of the opposite ear. **Material and Method:** Patients with COM who had undergone tympanoplasty, tympanomastoidectomy, or radical mastoidectomy were analyzed retrospectively. The operated ears were evaluated for preoperative diagnoses, surgery types, the number of surgeries, intraoperative findings (middle ear mucosal conditions, presence of cholesteatoma, ossicular destructions, facial canal dehiscence, lateral semicircular, and dural defects), and postoperative ear conditions. The contralateral ear was classified as intact, or as presence of perforation, retraction, adhesion, and cavity. **Results:** In total, 523 patients with a mean age of 31.87 ± 14.75 years were included in the study. Perforation (30.6%) was the most frequently detected pathology in the contralateral ear. There was no statistically significant association between the number of surgeries, presence of ossicular destruction, facial canal dehiscence, lateral semicircular defect, and dural defect, and contralateral ear condition ($p > 0.05$). However, there was a significant association between preoperative diagnosis, type of surgery, middle ear mucosal condition, presence of cholesteatoma, and postoperative condition, and contralateral ear condition ($p < 0.05$). **Discussion:** The perioperative condition of the middle ear should be acknowledged as a risk factor for surgical success in the presence of any abnormalities in the contralateral ear.

Keywords

Contralateral Ear; Chronic Otitis Media; Ear Surgery

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Corresponding Author: Ahmet Uluat, Department of Otolaryngology, Head and Neck Surgery, Dumlupınar University, Evliya Çelebi Training and Research Hospital, 4300, Kütahya, Turkey. GSM: +905059250531 E-Mail: opdrahmetuluat@gmail.com

Introduction

Global incidence and prevalence of chronic otitis media (COM) vary between 1-3% and 1-30%, respectively [1-3]. Published studies that report surgical results of patients diagnosed with COM generally present only data of the operated side. Only rarely do they provide data about the contralateral ear. Similarly, only auditory results of the operated side are reported. However, in practice, the hearing acuity of both ears is important to the patient. Since the operated ear has decreased hearing acuity because of COM, the hearing acuity of the contralateral ear is especially important for both the patient and the physician.

The aim of the present study was to evaluate the contralateral ears of patients who had undergone surgery with the indication of COM and to define the association of the pathology of the operated ear with the condition of the opposite ear.

Material and Method

Study design: Data of the patients operated on in Diskapi Yildirim Beyazit Training and Research Hospital, Department of Otorhinolaryngology between January 2006 and December 2011 were retrospectively analyzed. Patients lost from postoperative follow-up and those with missing audiology test results were excluded from the study. Perioperative diagnoses of the operated ear with otomicroscope included dry perforation without cholesteatoma, granular COM, adhesive otitis, tympanosclerosis, and COM with cholesteatoma. Surgeries performed were classified as tympanoplasty without mastoidectomy, canal wall-up (CWU) or canal wall-down (CWD) tympanomastoidectomies, and radical mastoidectomies. The contralateral ear was classified otoscopically as either intact, or with perforation, retraction, adhesion and cavity (in patients with a history of tympanoplasty with mastoidectomy and/or radical mastoidectomy). The postoperative condition of the operated ear was classified similarly. In addition, the operated ears were evaluated as primary or revised cases, for the presence of destruction of ossicular chain, facial canal, lateral semicircular canal (LSC), or dural defects and cholesteatoma. Pre- and postoperative pure tone audiometry tests were performed on patients.

Statistical analysis: Analyses were performed using SPSS 13.0. For the statistical analysis of the results, chi-square test was used. $p < 0.05$ was considered as statistically significant.

Results

In total, 523 patients with a mean age of 31.87 ± 14.75 (range 5 to 84) years were included in the study. The study population consisted of 308 (58.9%) female and 215 (41.1%) male patients. Two hundred and eighty-one (53.7%) right and 242 (46.3%) left ears were operated on. The ears were operated on for the first ($n = 420$), second ($n = 95$), or third time ($n = 8$). In the contralateral ears, mean bone conduction thresholds (7.9 ± 14.40 dB), mean air conduction thresholds (0.68 ± 8.01 dB), and mean air bone gap (7.22 ± 12.02 dB) were measured. The corresponding values in the operated ear were found to be 28.25 ± 10.55 dB, 12.60 ± 14.55 dB, and 15.70 ± 14.55 dB, respectively. A total of 523 ears were operated on with the indication of benign perforation without cholesteatoma ($n = 247$; 47.2%), granular COM ($n = 77$; 14.7%), adhesive otitis ($n = 47$; 9%),

tympanosclerosis ($n = 35$; 66.7%), or cholesteatoma ($n = 117$; 22.4%). The cases were operated on for the first time ($n = 420$; 80.3%) or for revision ($n = 103$; 19.7%).

The contralateral ear was found to be intact in 266 patients (50.8%) and abnormal in 257 patients (49.2%). Perforation ($n = 160$; 30.6%) was the most frequently detected pathology in the contralateral ear. Also retraction ($n = 73$; 14%), adhesion ($n = 15$; 2.9%), and cavity ($n = 9$; 1.7%) were reported in some patients (Table 1).

Table 1. Contralateral ear's condition.

| Normal n (%) | Pathologic n (%) | | | | Total |
|-----------------|---------------------|-------------|--------------|-------------|----------------|
| | Perforation | Retraction | Adhesive | Cavity | |
| 266 (50.8%) | 160 (30.6%) | 73 (14%) | 15 (2.9%) | 9 (1.7%) | 257 (49.2%) |

The contralateral ears of 132 (53.4%) out of 247 cases with preoperative diagnosis of benign perforation were normal, while 115 (46.5%) patients had abnormalities in their contralateral ears without cholesteatomas ($p < 0.05$). Pathologies were detected in the contralateral ears of the cases with preoperative diagnosis of granular COM (34 / 77; 44.15%), adhesive otitis (22 / 47; 53.13%), tympanosclerosis (20 / 35; 57.14%), or with cholesteatomas (68 / 117; 58.11%) ($p < 0.05$) (Table 2).

The patients had undergone tympanoplasty without mastoidectomy ($n = 169$; 32.3%), canal wall-up (CWU) ($n = 231$; 44.2%) or canal wall-down (CWD) ($n = 76$; 14.5%) tympanomastoidectomies, and radical mastoidectomies ($n = 47$; 9%) (Table 2).

Middle ear mucosa of the operated ears of 236 (45.1%) cases were intact, while middle ear mucosa of operated cases were granular ($n = 111$; 21.3%), tympanosclerotic ($n = 63$; 12%) or with cholesteatomas ($n = 113$; 21.6%) (Table 3). Ossicular destruction was not observed in 288 (55.1%) cases, while it was detected in 235 (44.9%) cases. Facial canal ($n = 52$; 9.9%), lateral semicircular canal (LSC) ($n = 16$; 3.1%), and dural ($n = 4$; 0.8%) defects were also reported (Table 3). In 124 out of 236 (45.1%) cases with intact middle ear mucosa, the contralateral ears were normal, while 112 (47.4%) contralateral ears had abnormalities ($p < 0.05$). Pathologies were detected in cases with granular middle ear mucosa (55 / 111; 49.5%), tympanosclerosis (32 / 63; 50.9%), and cholesteatomas (58 / 113; 51.3%). Abnormalities were observed in the contralateral ears of 113 cases (113 / 235; 48.08%) with ossicular destruction ($p > 0.05$). During postoperative follow-ups, the implanted graft was intact in 370 (71%) cases; however, perforations ($n = 105$; 20%) and cavities ($n = 48$; 9%) were also observed (Table 3). In 190 (51.35%) cases out of 370 patients with intact grafts, the contralateral ears were intact while in 180 (48.64%) of them, the contralateral ears were pathologic ($p < 0.05$). During postoperative follow-ups, abnormalities were detected in the contralateral ears of 64 (56%) out of 105 cases with perforations ($p < 0.05$). Bilateral disease was most frequently (54.6%) seen in cases with cholesteatomas.

Discussion

The presence of an abnormality in the contralateral ear has been indicated in some publications, but very few have analyzed

Table 2. Features of the operated ear.

| | n (%) | Normal contralateral ear | Pathologic contralateral ear | P Value | |
|------------------------|--|--------------------------|------------------------------|--------------|--------------|
| Gender | Female | 308 (58.9%) | 163 (52.92%) | 145 (47.08%) | >0.05 |
| | Male | | 215 (41.1%) | 103 (47.91%) | 112 (52.09%) |
| Operated side | Right | 281 (53.7%) | 144 (51.25%) | 137 (48.75%) | >0.05 |
| | Left | 242 (46.3%) | 122 (49.59%) | 120 (50.41%) | |
| Preoperative diagnosis | Benign perforation without cholesteatoma | 247 (47.2%) | 132 (53.45%) | 115 (46.55%) | <0.05 |
| | Granular chronic otitis media | 77 (14.7%) | 43 (55.85%) | 34 (44.15%) | |
| | Adhesive otitis | 47 (9%) | 22 (46.87%) | 25 (53.13%) | |
| | Tympanosclerosis | 35 (6.7%) | 15 (42.86%) | 20 (57.14%) | |
| | Cholesteatoma | 117 (22.4%) | 59 (41.89%) | 68 (58.11%) | |
| Preoperative diagnosis | Benign perforation without cholesteatoma | 247 (47.2%) | 132 (53.45%) | 115 (46.55%) | <0.05 |
| | Other pathologies | 276 (52.8%) | 134 (48.56%) | 142 (51.44%) | |
| Type of surgery | Tympanoplasty | 169 (32.3%) | 94 (55.63%) | 75 (44.37%) | <0.05 |
| | Canal wall up | 231 (44.2%) | 112 (48.49%) | 119 (51.51%) | |
| | Canal wall down | 76 (14.5%) | 33 (43.43%) | 43 (56.57%) | |
| | Radical | 47 (9%) | 27 (57.45%) | 20 (42.55%) | |
| The number of surgery | Primary | 420 (80.3%) | 217 (51.67%) | 203 (48.33%) | >0.05 |
| | Revision | 103 (19.7%) | 49 (47.58%) | 54 (52.42%) | |

Table 3. Intraoperative findings.

| | n (%) | Normal contralateral ear | Pathologic contralateral ear | P Value | |
|-----------------------------|------------------|--------------------------|------------------------------|--------------|-------|
| Middle ear mucosa | Normal | 236 (45.1%) | 124 (52.6%) | 112 (47.4%) | <0.05 |
| | Granular | 111 (21.3%) | 56 (50.5%) | 55 (49.5%) | |
| | Tympanosclerosis | 63 (12%) | 31 (49.1%) | 32(50.9%) | |
| | Cholesteatoma | 113 (21.6%) | 55 (48.7%) | 58(51.3%) | |
| Cholesteatoma | Absent | 382 (73%) | 202 (52.9%) | 180 (47.1%) | <0.05 |
| | Present | 141 (27%) | 64 (45.4%) | 77 (54.6%) | |
| Ossicular destruction | Absent | 288 (55.1%) | 144 (50%) | 144 (50%) | >0.05 |
| | Present | 235 (44.9%) | 122 (51.9%) | 113 (48.1%) | |
| Facial canal dehiscence | Absent | 471 (90.1%) | 240 (50.96%) | 231 (49.04%) | >0.05 |
| | Present | 52 (9.9%) | 26 (50%) | 26 (50%) | |
| Lateral semicircular defect | Absent | 507 (96.9%) | 256 (50.5%) | 251 (49.5%) | >0.05 |
| | Present | 16 (3.1%) | 10 (62.5%) | 6 (37.5%) | |
| Dural defect | Absent | 519 (99.2%) | 264 (50.87%) | 255 (49.13%) | >0.05 |
| | Present | 4 (0.8%) | 2 (50%) | 2 (50%) | |
| Postoperative condition | Intact | 370 (71%) | 190 (51.36%) | 180 (48.64%) | <0.05 |
| | Perforation | 105 (20%) | 50 (44%) | 64 (56%) | |
| | Cavity | 48 (9%) | 28 (58.34%) | 20 (41.66%) | |

this issue in detail. As a general opinion, any pathology in the contralateral ear decreases the success of school performance of children [4]. However, some studies have indicated that the condition of the contralateral ear does not have an impact on achievement of successful school performance [5]. In a study, patients who had undergone primary tympanoplasties (n = 617) or revision tympanoplasties (n = 94) were evaluated; the contralateral ears of these patients had some abnormalities (44.6 and 41.7% of the cases, respectively). Success rates were reported as 79.2% and 67.2%, respectively. The authors also asserted that the condition of the contralateral ears is important for the success of primary tympanoplasties [6]. In a study performed on 73 patients with cholesteatomas, some pathologies were detected in contralateral ears of 53.4% of the cases, most of them being retraction pockets which were attributed to the Eustachian tube dysfunction [1]. In a study where 72 patients

were followed up for 10 years, 39% of the contralateral ears were found to be normal, while tympanosclerosis and atrophic tympanic membranes were the most frequently encountered pathologies. The hearing acuity of 86% of the cases was normal [7]. Yazicioglu et al. [8] evaluated the contralateral ears and detected some pathologies in 69.4% of the contralateral ears, most of them being retraction pockets. Among prognostic, intra- and postoperative risk factors (MERI) reported by Becvarovsky and Kartush for tympanoplasty surgery, determining the condition of the contralateral ears was not indicated [9]. However, Olusesi et al. [10] investigated 51 cases and detected abnormalities in 75% of the contralateral ears, which they defined as a poor prognostic factor for the success of tympanoplasty. In our study, abnormalities were observed in the contralateral ears of 54.9% of the patients with diseased middle ear mucosa. The most frequently seen pathol-

ogy was perforation. A statistical correlation was detected between middle ear mucosa and pathologies in the contralateral ears. Therefore we think that the risk of having a pathological condition in the contralateral ear is increased in cases with extensively damaged ears.

In a study conducted with 500 patients who had undergone surgery for COM, some pathologies were found in the contralateral ears of the patients with or without cholesteatomas (83.3% and 69.9%, respectively). The most frequently seen pathologies were retraction and perforation in patients with or without cholesteatomas, respectively. It has been stated that a pathological condition in one ear might affect the contralateral ear; this is especially more likely in ears with cholesteatomas [11]. In our study, in 54.6% of the chronic otitis media patients with cholesteatomas, an abnormality was detected in the contralateral ears ($p < 0.05$). Perforations were observed in 48.05% of these cases. We entertain the opinion that especially in chronic otitis media patients with cholesteatomas, contralateral ears are more likely involved, necessitating their long-term follow-up.

Rosito et al. [3] performed a histopathological study on 85 donors and found some abnormalities in the contralateral ear, while granulation tissue in the middle ear was the most frequently encountered pathology. A correlation between the extent of cholesteatoma and severity of the contralateral abnormality was found. Compared to normal individuals, in patients with COM, impairment of the contralateral ear was more frequent and severe. This phenomenon has been explained by the “crystal ball effect.” Accordingly, it is said that if a pathologic condition starts and then becomes chronic on one side, then a contralateral abnormality emerges. It has also been suggested that the ears are not independent organs from each other and that the worse side determines the prognosis [3, 12].

Limitations of this study are the lack of tympanometric and radiologic evaluations. In our clinic, we do not perform tympanometric evaluation if the patients undergo tympanoplasty/tympanomastoidectomy. We could not find our patients' radiological images because our radiology software has been changed several times.

According to the outcomes of our study, preoperative diagnosis is closely related to the perioperative condition of the middle ear, its postoperative status, and the condition of the contralateral ear. During the preoperative diagnostic work-up, the risk should be estimated regarding the contralateral ear and its impact on postoperative prognosis should be evaluated. The contralateral, un-operated ear of the chronic otitis media patients with cholesteatomas should be emphasized at least as much as the operated ear and they must be followed up for a long term. Perioperative condition of the middle ear should be acknowledged as a risk factor for surgical success in the presence of any abnormalities in the contralateral ear.

Competing interests

The authors declare that they have no competing interests.

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