

Comparison of histopathological characteristics and clinical behavior of acquired cholesteatoma

Edinilmiş kolesteatomun semptomlarının ve histopatolojik özelliklerinin karşılaştırılması

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ABSTRACT

Objective: Acquired cholesteatoma is a severe middle-ear pathology affecting both adults and children. The clinical behavior of cholesteatoma depends on the histopathological characteristics of the disease. The present study aimed to compare the histopathological characteristics of acquired cholesteatoma in patients who had undergone tympanomastoidectomy.

Patients and Methods: This retrospective chart analysis was conducted on 370 patients who had undergone tympanomastoidectomy presenting with the pathological indication of cholesteatoma. All cholesteatoma specimens were collected intraoperatively and were preserved for histopathological examination. The patients were divided into two groups according to the histopathological findings: 1- patients with pure cholesteatoma 2- patients with cholesteatoma plus other pathologies. Then, the two groups were compared regarding the clinical variables, including age, gender, duration of disease, occurrence of relapse, and complications.

Results: No significant difference was found between the two groups regarding the clinical variables. Nevertheless, the incidence of pure cholesteatoma was higher among the patients who had experienced the recurrence of the disease and underwent tympanomastoidectomy one more time.

Conclusion: In the present study, no significant difference was observed between the two histopathologically different groups regarding the clinical variables, except for recurrence rate.

Keywords: Acquired cholesteatoma, Clinical and histopathological features, Tympanomastoidectomy

ÖZET

Amaç: Edinilmiş kolesteatom hem yetişkinleri, hem de çocukları etkileyen ciddi bir orta kulak patolojisidir. Kolesteatomun klinik özellikleri, hastalığın histopatolojik özelliklerine bağlıdır. Bu çalışmada, timpanomastoidectomi uygulanan hastalarda edinilmiş kolesteatomun histopatolojik özelliklerinin karşılaştırılması amaçlanmıştır.

Hastalar ve Yöntem: Bu retrospektif çalışma 370 hasta üzerinde gerçekleştirilmiştir. Patolojik olarak kolesteatom tesbit edilen hastalara timpanomastoidectomi uygulanmıştır. Tüm kolesteatom örnekleri intraoperatif toplanmış ve histopatolojik inceleme için muhafaza edilmiştir. Hastalar histopatolojik özelliklerine göre iki gruba ayrılmışlardır: 1. saf kolesteatomlu hastalar, 2. kolesteatom ile birlikte diğer patolojileri olan hastalar. Ardından, iki grup arasında yaş, cinsiyet, hastalık süresi, hastalığın tekrarlama ve komplikasyonlar da dahil olmak üzere klinik özellikler karşılaştırılmıştır.

Bulgular: Klinik değişkenler açısından iki grup arasında istatistiki olarak bir fark bulunmamıştır. Bununla birlikte, saf kolesteatom insidansı, hastalığı tekrarlayan ve bir kez daha timpanomastoidectomi uygulanan hastalarda daha yüksek bulunmuştur.

Sonuç: Bu çalışmada, hastalığın anlamlı tekrarlama oranı hariç, iki farklı histopatolojik grup arasında klinik değişkenlikler açısından istatistiki olarak bir fark gözlenmemiştir.

Anahtar kelimeler: Edinilmiş kolesteatom, Klinik ve histopatolojik özellikler, Timpanomastoidectomi

Introduction

Cholesteatoma is a cyst-like lesion of the temporal bone including matrix and perimatrix. It is characterized by the existence of a keratinized stratified squamous epithelium (matrix) which is surrounded by a mesenchymatous granulation tissue (perimatrix) inside any pneumatized portion of the temporal bone [1]. Cholesteatoma most frequently involves the middle ear and mastoid, but it may develop at any place in the air-filled area of the temporal

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bone [2]. The annual incidence of cholesteatoma was about 3 and 9 per 100000 in children and adults, respectively [3]. Cholesteatoma can be either congenital or acquired [4]. The acquired type affects children as well as adults, while the congenital type is specific to childhood. Acquired cholesteatoma is the most common type and is associated with chronic otitis media (COM). Middle ear cholesteatoma is characterized by a severe inflammatory reaction that results in active destruction in tissue and bone [5, 6]. Middle ear cholesteatoma can cause hearing loss and occasionally facial nerve palsy and it can recur after surgical treatment [7]. The only treatment known for cholesteatoma is tympanomastoidectomy which is done using two techniques, namely wall-down and wall-up [8]. Up to now, studies have shown inconsistent findings regarding the difference between cholesteatoma behavior among children and adults [3]. Yet, the histopathological differences in surgical specimens can explain different behaviors of cholesteatoma in the patients [8]. Therefore, the current study aims to compare the histopathological structure of acquired cholesteatoma in the patients undergoing tympanomastoidectomy.

Patients and Methods

This retrospective chart analysis was conducted on 370 patients who had undergone tympanomastoidectomy for COM, with specimens submitted for pathological review between 2004 and 2009. This study has been approved by our research ethics committee. Among the patients admitted to our otorhinolaryngology referral center, 108 were in the pediatric age group (<18 years) and the rest were adults (>18 years). Diagnosis of cholesteatomatous COM and presence of matrix and perimatrix in the cholesteatoma were considered as the inclusion criteria in this study. On the other hand, the patients who presented with congenital cholesteatoma were excluded from the study. All the patients signed written informed consents to participate in the study and completed the demographic questionnaires. These patients were evaluated with regard to detailed history, thorough otological examination, and full audiological assessment. Then, the patients underwent tympanomastoidectomy and all cholesteatomas were surgically removed. The collected specimens were immediately fixed in 10% formaldehyde for histopathological examination. The biopsies were cut into 5 μ m thick sections and stained with H and E method for histopathological examination.

According to the histopathological findings, the patients were divided into two groups:

- 1- Pure cholesteatoma
- 2- Cholesteatoma plus other pathologies, including

chronic inflammation, tympanosclerosis, cholesterol granuloma, glandular metaplasia, giant cell foreign body reaction, granulation tissue, and aural polyp.

These two groups of patients were then compared regarding age, gender, duration of disease, occurrence of relapse, and complications.

Statistical analysis

The statistical analyses were performed using the SPSS statistical software (version 16.0). Chi-square test was used to determine the correlation between the histopathological findings and the clinical variables. Besides, P values less than 0.05 were considered as statistically significant.

Results

All the patients underwent surgery for an acquired middle ear cholesteatoma and the operative specimens were all collected. Among the 262 adults, 141 patients (69.5%) were male and 121 (72.5%) were female. Also, among 108 children, 62 patients (30.5%) were boys and 46 (27.5%) were girls. The age of the patients ranged from 5 to 67 years old. Moreover, 228 patients (62%) had pure cholesteatoma and 142 ones (38%) were in the second group. Thus, pure cholesteatoma pathology was much more common among the patients compared to cholesteatoma with other pathologies. The frequency of pathologies in cholesteatoma plus other pathologies group has been presented in Table I.

Table I. The frequency of pathologies in cholesteatoma plus other pathologies group

	Number	Percent (%)
Chronic inflammation	54	31
Aural polyp	40	23
Tympanosclerosis	30	17
Cholesterol granuloma	20	11.5
Glandular metaplasia	9	5
Giant cell foreign body reaction	8	4.5
Granulation tissue	8	4.5
Other	6	3.5
Total	175	100

The study results revealed no significant difference between the two groups in the terms of age ($P=0.4$) and gender ($P=0.19$) (Table II). In addition, no significant correlation was observed between the histopathological findings and duration of the disease ($P=0.47$) (Table II).

The incidence rates of otorrhea and hearing loss among the patients with pure cholesteatoma were 87% and 68%, respectively. These symptoms were also detected in respectively 85% and 61% of the patients who had cholesteatoma plus other pathologies. The total incidence rate of other symptoms, including tinnitus, otalgia, vertigo, headache, nausea, vomiting, and mastoid swelling was 30% among all patients. The results of the present study indicated that there was no correlation between the symptoms of the patients at presentation time and the histopathological findings ($P>0.05$). Among the 370 patients under study, 129 ones (about 35%) experienced the recurrence of the disease. They showed the recurrence of symptoms and underwent a second tympanomastoidectomy treatment. Additionally, most of the relapse and revision cases had pure cholesteatoma in their pathology reports which was statically significant (Table II). Furthermore, 31 (8.5%) out of the 370 patients presented, developed complications after tympanomastoidectomy. The reported complications were deafness, facial nerve palsy, wound infection, and bleeding. However, no significant difference was found between the two groups regarding the occurrence of complications (Table II).

Discussion

Acquired cholesteatoma is characterized by aggressive expansion leading to the destruction of the ossicular

chain and other surrounding bony structures. According to the histopathological findings, it is defined as a multilayered squamous epithelium (matrix) surrounded by a mesenchymatous granulation tissue (perimatrix). Up to now, studies have shown inconsistent findings regarding pediatric and adult cholesteatoma. On one hand, some studies have revealed that pediatric cholesteatomas are less extensive, leading to a lower rate of complications [9-11].

Other studies, on the other hand, have indicated that pediatric cholesteatomas are more aggressive and have more extensive growth patterns [12-16].

Numerous studies have compared the histopathological differences between pediatric and adult cholesteatomas. They have investigated the histopathological aspects, such as perimatrix thickness and degree of inflammation, among various age groups [8, 17, 18]. However, paying attention to other dimensions, such as comparing the histopathology of cholesteatomas with different clinical variables, may result in more helpful information. The present study aimed to determine the correlation between the histopathological findings and clinical variables of acquired cholesteatoma, including age, gender, disease duration, relapse, and complications. Quaranta et al. [19] stated that the histopathological characteristics of the perimatrix might explain the clinical differences between pediatric and adult cholesteatomas. Dornelles et al. [8] showed no differences between the adults and children concerning the histopathological characteristics of acquired cholesteatoma, which is consistent with the results of the present study. Similarly, Welkoborsky et al. [17] could not identify any obvious differences between adult and pediatric cholesteatomas in the cellular level. Therefore, the more

Table II. The comparison of clinical variables in the groups according to the histopathological findings

		Pure cholesteatoma N (%)	Cholesteatoma plus other pathologies N (%)	Total N (%)	P value
Age	< 18 years	63 (27.6)	45 (31.7)	108 (29.2)	0.40
	> 18 years	165 (72.4)	97 (68.3)	262 (70.8)	
Gender	Male	119 (52)	84 (59)	203 (54.8)	0.19
	Female	109 (48)	58 (41)	167 (45.2)	
Duration of ear discharge	< 5 years	83 (36.5)	57 (40)	140 (37.8)	0.47
	> 5 years	145 (63.5)	85 (60)	230 (62.2)	
Complication	Yes	19 (8.3)	12 (8.5)	31 (8.4)	0.40
	No	209 (91.7)	130 (91.5)	339 (91.6)	
Revision case	Yes	92 (40)	37 (26)	129 (34.8)	< 0.05
	No	136 (60)	105 (74)	241 (65.2)	

invasive pattern of pediatric cholesteatoma may depend on other parameters, such as severe inflammation, disturbed middle ear ventilation, or decreased calcium salt content of pediatric bone [2,20]. On the basis of the recent findings, one may conclude that “in the absence of concern for other pathology, intraoperative findings of cholesteatoma are adequate to confirm diagnosis in patients undergoing tympanomastoidectomy for chronic otitis media without the use of histopathology” [21]. This study also revealed no significant relationship between the patients’ gender and the histopathological findings.

In one study, otorrhea, otalgia, and hearing loss were the most prevalent symptoms in both primary (PAC) and secondary (SAC) cholesteatoma patients [22]. In our study, most of the patients also presented with otorrhea and hearing loss. Nonetheless, no significant difference was observed between the two groups regarding the incidence rates of these symptoms.

Early diagnosis and effective treatment of the complications are the bases for a good prognosis [23]. Vikram et al. [22] evaluated the clinicopathologic behavior of complications in PAC and SAC cholesteatoma. They observed that presence of cholesteatoma resulted in a 2.3-fold increase in the risk of complications. In another study, 422 (12.54%) out of the 3,364 patients with suppurative otitis media (acute and chronic) returned with complications [24]. According to the present study findings, 8.4% of the patients presented with complications after tympanomastoidectomy, but no significant difference was found between the two groups in this regard. In two separate studies, Schraff and Strasnick [25] and De Corso et al. [26] respectively reported the recurrence rate of cholesteatoma to be 16% and 26.6% in the children undergoing surgical resection. In this study, nearly 35% of the patients experienced the recurrence of the disease. Moreover, the patients with pure cholesteatoma pathology had a significantly higher risk of recurrence.

In conclusion, in the present study, no significant differences were observed between the two histopathologically different groups regarding the clinical variables, except the patients with pure cholesteatoma pathology showed higher risk of recurrence.

Conflict of Interest

The author have no financial or commercial conflicts of interest.

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