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Tympanic membrane perforation in the province of: A retrospective study

Didem Nevreste Sonbay Yilmaz, Ozer Erdem Gur, Oguzhan Ilden, Nuray Ensari, Deniz Mustafa Yilmaz

Antalya Education and Training Hospital, Department of Otorhinolaryngology, Antalya, Turkey

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Abstract

In the current study, a retrospective scan was made of patients presenting at our clinic over the last 10 years and those diagnosed with tympanic membrane perforation were evaluated in 2 separate groups as patients with Chronic suppurative otitis media (CSOM) and Traumatic tympanic membrane perforations (TTMP). In this study patients with tympanic membrane perforation were evaluated through a retrospective examination of patients presenting at the Ear, Nose and Throat Clinic between May 2006 and May 2016. The tympanic membrane perforations were examined in two separate groups; CSOM and TTMP. When these patients were grouped according to the diagnosis criteria, the CSOM group comprised 8,335 (1.13%) patients and the TTMP group 422 (0.06%) patients. These two groups were compared in respect of the items stated age, gender, laterality. When the considerable number of patients is taken into consideration, although the results do not completely show a prevalence rate, they can give preliminary information.

Keywords: Tympanic membrane perforation, chronic suppurative otitis media, traumatic tympanic membrane perforations

Introduction

The tympanic membrane is a membranous structure 0.1mm in thickness and 10-11 mm in length which separates the middle ear cavity from the external ear pathway and transmits sound waves to the middle ear [1]. Tympanic membrane perforation is seen as partial and/or total rupture of the ear membrane which can occur for many reasons such as trauma, infection, malignant tumors or iatrogenic interventions [1,3].

Chronic suppurative otitis media (CSOM) is an infection of the middle ear cavity, the eustachian tube and mastoid and is the most frequent cause of permanent tympanic membrane perforation, especially in developed countries [1,2,4]. Because of perforation, the tympanic membrane is non-intact and there is an intermittent suppurative discharge in the external ear pathway. Conductive hearing loss accompanies the table because of tympanic membrane perforation [1,3,4]. Even though a low socio-economic level, crowded living environments, insufficient intake of maternal breast milk, poor nutrition, cigarette smoking, and allergies are held responsible in the etiology, the main etiological factor is frequently recurring and not fully treated middle ear infections [2,3].

Traumatic tympanic membrane perforations (TTMP) are a result of blunt or penetrating trauma causing increased pressure in the external ear pathway, such as traffic accidents, slap injury, blast injury, terror attacks or self-inflicted injuries [5]. Perforations are generally in the anterior quadrant in the pars tensa and tend to spontaneously recover [6].

There have been several studies related to CSOM prevalence [3,7-10]. However, in Turkey, a database which will collect patient information in the country in general has only started to be used recently. Therefore, previous studies related to CSOM prevalence in Turkey have been conducted on small populations such as creches, student halls of residence and army barracks. Epidemiological studies related to TTMP have been very rarely conducted.

In the current study, a retrospective scan was made of patients presenting at our clinic over the last 10 years and those diagnosed with tympanic membrane perforation were evaluated in 2 separate groups as patients with CSOM and patients with TTMP.

Material and Method

In this study patients with tympanic membrane perforation were evaluated through a retrospective examination of patients presenting at the Ear, Nose and Throat Clinic between May 2006 and May 2016. For patients presenting at more than one polyclinic for the same reason within this period, only one recorded diagnosis

*Corresponding Author: Didem Nevreste Sonbay Yilmaz, *Antalya Education and Training Hospital, Department of Otorhinolaryngology, Antalya, Turkey*
E-mail: didem_ece@yahoo.com

was taken into consideration to determine the number of patients. The diagnosis code used was that defined by the 'Disease class name and disease code' stated in the ICD-10 (International Statistical Classification of Diseases and Related Health Problems) revised in 2015 from the 1994 World Health Organization (WHO) publication. The tympanic membrane perforations were examined in two separate groups. The criteria for inclusion in the CSOM group are shown in Table 1. The TTMP group included patients diagnosed with the 'Ear membrane traumatic tear code' (SO9.2). Statistical evaluation of the patients in both groups was made by sub-dividing them into decade age groups of 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, and ≥ 80 years. Patients were excluded if the tympanic membrane fracture was due to temporal bone fracture or malignancy.

Statistical Analysis

Statistical analyses of the study data were made using SPSS software. Descriptive statistics were stated as frequency, percentage, mean and standard deviation (SD) values. In the analysis of differences between the groups in respect of age, gender and affected side, the Pearson Chi-square test was used. From the results of multi-dimension tables, to determine from which group a significant difference originated, Bonferroni Correction was applied. In the analysis of age values between the groups, the Independent Samples t-test was used. A value of $p < 0.05$ was accepted as statistically significant.

Results

A total of 943,263 patients presented at the ENT polyclinic between May 2006 and May 2016 and after exclusion of repeated presentations, the response number of patients was determined as 736,820. A total of 14,237 patients were diagnosed with tympanic membrane perforation in at least one ear and this number was corrected to 8757 (1.19%). When these patients were grouped according to the diagnosis criteria, the CSOM group (Group 1) comprised 8,335 (1.13%) patients and the TTMP group (Group 2) 422 (0.06%) patients. These two groups were compared in respect of the items stated below.

Age

The mean age of the patients was 40.15 years in the CSOM group and 32.79 years in the TTMP group. The difference between the mean ages of the groups was determined to be statistically significant ($p < 0.001$; Independent Samples t-test). The patients in each group were divided into 9 age groups (Table 2). In the age groups of 0-9, 10-19, and 20-29 years, there was a greater percentage of patients in the TTMP group and in the age groups of 40-49, 50-59, 60-69, and 70-79 years, the rate of patients in the CSOM group was higher (Figure 1) ($p < 0.001$; Pearson Chi-Square test).

Gender

The 8,335 patients in the CSOM group comprised 4,101 (49.2%) females and 4,234 (50.8%) males, while the TTMP group comprised 203 (48.1%) females and 219 (51.9%) males. No statistically significant difference was determined between the groups in respect of gender ($p = 0.660$; Pearson Chi-Square test). The distribution of the genders according to the age groups is shown in Figure 2.

Laterality

In the CSOM group, TMP was determined in the right ear in 3,872 (46.5%) patients, in the left ear in 3,200 (38.4%) and bilaterally in 1,253 (15.2%) patients. In the TTMP group, perforation was determined in the right ear in 309 (73.2%) patients, in the left ear in 109 (25.8%) and bilaterally in 4 (0.9%) patients. The perforation was seen more often in the left ear in the TTMP group and in the right ear in the CSOM group. Bilateral perforation was observed at a higher rate in the CSOM group than in the TTMP group. The difference between the two groups in respect of laterality was determined to be statistically significant ($p < 0.001$; Pearson Chi-Square). The distribution between the groups is shown in Figure 3.

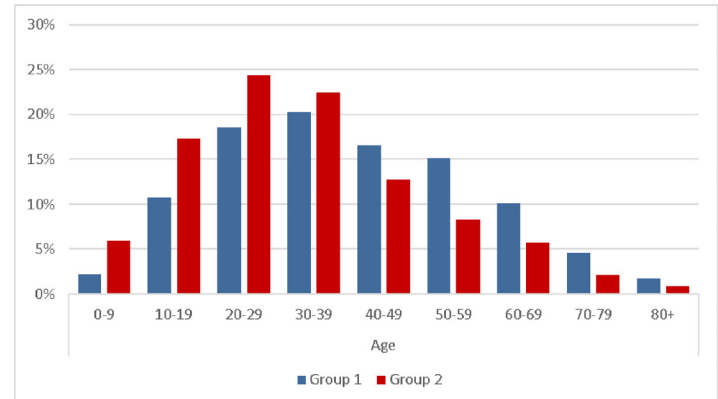


Figure 1. Distribution of patients according to age groups

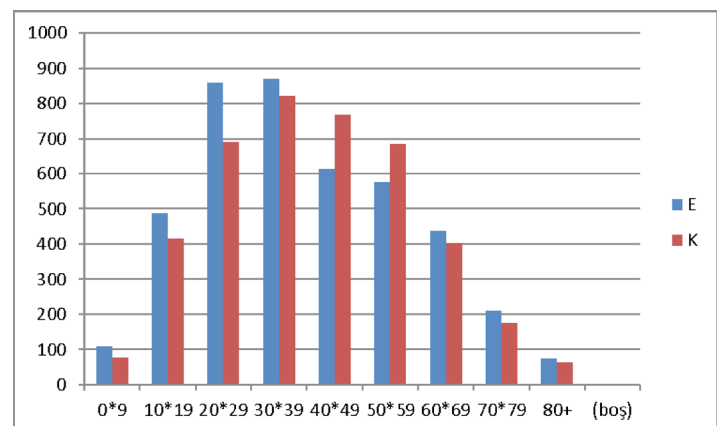


Figure 2. Distribution of gender according to the age groups

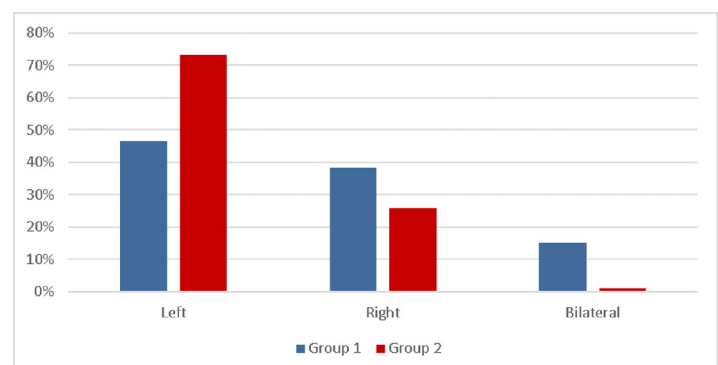


Figure 3. The distribution of laterality in the groups

Table 1. CSOM Group Diagnosis Criteria

ICD Code	Diagnosis
H65.4	Other chronic non-suppurative otitis media
H66: Suppurative and Undefined Otitis Media	
H66.1	Chronic tubotympanic suppurative otitis media
H66.2	Chronic atticotympanic suppurative otitis media
H66.3	Other chronic suppurative otitis media
H66.4	Suppurative otitis media, unspecified
H71: Cholesteatoma of middle ear	
H72: Perforation of tympanic membrane	
H72.0	Central perforation of tympanic membrane
H72.1	Attic perforation of tympanic membrane
H72.2	Other marginal perforation of tympanic membrane
H72.8	Other perforation of tympanic membrane
H72.9	Perforation of tympanic membrane, unspecified

Table 2. Distribution of patients according to age groups

Age group (years)	CSOM Group		TTMP Group	
	Number	%	Number	%
0-9	187	2.2%	25	5.9%
10-19	904	10.8%	73	17.3%
20-29	1549	18.6%	103	24.4%
30-39	1691	20.3%	95	22.5%
40-49	1380	16.6%	54	12.8%
50-59	1261	15.1%	35	8.3%
60-69	839	10.1%	24	5.7%
70-79	386	4.6%	9	2.1%
80+	138	1.7%	4	0.9%
Total	8335	40.15	422	

Discussion

Tympanic membrane perforations are a major health problem frequently seen in many countries [4]. Although TTMP has been seen more often in the last 10 years because of the increase in recent years of terror attacks, explosions and other violent events, there are very few epidemiological studies on this subject [6]. Sometimes a patient with traumatic perforation of the tympanic membrane may not present at a hospital. In these cases, the membrane may spontaneously heal or if no intervention is made, discharge may occur and chronic suppurative otitis media may develop. These circumstances make prevalence studies related to TTMP more difficult.

According to WHO regional classification data, national prevalence rates of CSOM of <2% are considered low, 2% to 4% high and >4% the highest [7]. In epidemiological studies related to CSOM, Alaska, Canada, Australian Aborigines and Greenland were classified in the high-risk group (7%-46%) and the United Kingdom, the United States, Denmark and Finland were in the insignificant risk group (<1%). In the studies conducted in those countries, lack of breastfeeding, cold climate and related to that, the frequent recurrence of upper respiratory tract infections, crowded living conditions, active or passive smoking, middle

ear inflammations and insufficient health care have been held responsible in the etiology of CSOM. Of 736,820 patients in our clinic, 8,337 (1.13%) were determined with CSOM and 423 (0.06%) with TTMP. Although this study was not a prevalence study, it can give an idea of the frequency seen of tympanic membrane perforation as it was a retrospective evaluation of many patients. However, it can be considered that this rate is lower than that of the country in general as the climate of the city is warm, the socio-economic conditions of the region where the hospital is located are good and the hospital is in the city center.

Just as there are studies related to CSOM which have reported a higher frequency in females [7,8] there are also studies reporting male predominance [9,10]. In TTMP, there are also studies stating greater frequencies seen in both females [6] and males [11]. In the current study, the CSOM group consisted of 49.2% females and 50.8% males and the TTMP group comprised 48.1% females and 51.9% males. no significant difference was determined between the genders in either group.

Previous studies related to the prevalence of CSOM have generally focussed on childhood and there have been very few studies on adults and the elderly population [7]. Rudin et al [12]. reported CSOM incidence of 2.1%-2.3% in the 40-50 years age group and an incidence of 0.8% in the 20-29 years age group living in the same city. In a study by Chung et al [7], it was reported that with increasing age, CSOM incidence increased and cholesteatoma rates decreased, and this was associated particularly with the great developments in diagnostic methods and early changes in the tympanic membrane detected with the use of otoendoscopic systems. In the CSOM group of the current study, the number of patients increased with age, with the highest number in the 30-39 years age group, then reduced together with advancing age. That the number of patients in the CSOM group decreased after the age of 30-49 years in the current study could be associated with there being a lower elderly population in our country compared with other countries, treatment of patients and/or surgical treatment or not presenting at polyclinics because of CSOM as patients learned to live with the disease.

TTMP is seen in a younger patient age group. Gür et al [5] reported the mean age of patients with TMP as 28.9 years and Berger et al [13] as 24.1 years. In the current study, TTMP was determined more in the 20-29 years age group compared to the other age groups. The most common cause of TTMP has been reported to be blast injury [5]. As the right hand is more dominant, the left ear is generally affected in slapping incidents. Therefore, TTMP is seen more often in the left ear [5,11,13]. In the current study, traumatic membrane perforation was determined more often in the left ear. While TMP was seen mostly in the right ear in the CSOM group, bilateral perforations were observed more in the TTMP group.

There were some limitations to this study. First, as the record systems were insufficient, the etiological factors could not be determined and although audiological evaluation was applied to each patient, results could not be obtained from the records. Secondly, as the study was conducted on patients presenting at the polyclinic of a tertiary clinic in the city, it was not inclusive of the whole city. However, when the large number of patients is taken into consideration, although the results do not completely show a prevalence rate, they can give preliminary information.

Conclusion

Tympanic membrane perforation is seen very often, especially in developed countries. Due to the limitations of data collection in a single center, prevalence studies in Turkey have been conducted on small groups. There has been no prevalence study related to tympanic membrane perforation in our country. Although the current study does not show a true prevalence value, as many patients were included, it at least sheds some light on the actual prevalence.

Competing interests

The authors declare that they have no competing interest

Financial Disclosure

The financial support for this study was provided by the investigators themselves.

Ethical approval: This work has been approved by the Institutional Review Board.

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