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Original Article

Ear laterality in sudden sensorineural hearing loss

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Abstract

Aim: Sudden sensorineural hearing loss (SSHL) is usually diagnosed in a single ear. The main objective of this study is to assess the dominance of affected ear by comparing right versus left-ear cases.

Materials and Methods: We retrospectively examined the records of 105 patients (63 males, 42 females; mean age 41.5±15 years; range 18 to 72 years) between January 2013 and January 2017.

Results: Sixty-three of the included cases were male and 42 were female patients. SSHL was diagnosed on the left ear in 51 (48.6%) patients and on the right ear in 49 (45.7%) patients. No statistically significant dominance on the affected ear side was detected whereas bilateral involvement was significantly low. In male patients, 33 (52.3%) had hearing loss on the right and 29 (46%) had hearing loss in the left ear. Sixteen (32.7%) female patients had right ear and 22 (43.1%) had left ear involvement. There was a slight dominance on the right ear in male and on the left ear in female patients

Conclusion: There is no significant difference between left and right ear involvement in SSHL. The results of our study which showed right ear dominance in males and left ear dominance in female patients are thought to be purely coincidental.

Keywords: Ear, sudden hearing loss, laterality

INTRODUCTION

Sudden idiopathic hearing loss, which is one of the frequently diagnosed otologic emergencies, is defined as a loss of hearing in at least three consecutive frequencies with at least 30 dB or more (1). The yearly incidence rate is reported as between 5-20/100000 (2). Although the etiology of sudden hearing loss is unknown, possible causes are thought to be vascular system diseases, cochlear membrane damage, immunological factors, viral infections, trauma, otologic tumors, toxin exposure, neurological and metabolic factors (3). Sudden hearing loss cases are usually diagnosed with unilaterally. However, ear side dominance was found insignificant in most of the studies, there are few studies showing left side dominance (4). Although several etiological factors are known in sudden sensorineural hearing loss (SSHL), its etiopathogenesis is still unclear. The most commonly accepted view is the disruption of cochlear perfusion. The most accepted causes of this condition are viral infections, vascular incidents, immunological reactions and labyrinth membrane rupture. Other possible causes include acoustic neuromas, perilymph fistulas, meningitis and hematological diseases (5,6). Some studies reported a higher incidence rate of inner ear diseases on the left ear (4,7). Reiss et al reported a higher rate of left ear involvement in female patients. However, the same study did not report a significant difference between the affected sides in male patients (7). The main objective of this study is to evaluate the ear lateralization in 105 SSHL patients.

MATERIALS and METHODS

Case files of 105 patients between 18-74 (mean age 42.5) who were diagnosed with SHL in Gaziantep 25 Aralık Hospital between January 2013 and January 2017 were retrospectively reviewed. Written consent was obtained from participants and ethical approval was not required for a retrospective chart review study.

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İnclusion criteria for sudden hearing loss were as follows: unilateral cases who were sensorineural, began in fewer than 3 days, at least 30 dB at three or more consecutive frequencies. Exclusion criteria were the following: history of a previous otologic disease, history of chronic disease, previous chemotherapy or radiotherapy, previous ear surgery, chronic otitis media, eustachian tube dysfunction, identified etiological factor such as retrocochlear pathology, admission within 30 days after the onset of hearing loss, age 30 dB were accepted marked recovery and PTA 25 ≤ dB or identical to the contralateral, non-affected ear were accepted complete recovery.

The Number Cruncher Statistical System 2007 (NCSS, Kaysville, UT, USA) and Power Analysis and Sample Size 2008 Statistical Software (NCSS) were used for statistical analyses. Triple chi-square test was used for intergroup comparisons of normally distributed parameters, and descriptive statistical methods (mean, standard deviation) were used to compare quantitative data.

RESULTS

Sixty-three male and 42 female patients with a mean age of 41.5 (18-72) were included in the study. Fifty-one (48.6%) of the patients had hearing loss on the right ear and the rest 49 (46.7%) had hearing loss on the left ear. No significant difference was found between the affected sides in sudden hearing loss ($\chi 2$ = 4,645; a degree of freedom = 2). Bilateral involvement of hearing loss was significantly low ($p<0.001$). In male patients, 33 (52.3%) had hearing loss on the right and 29 (46%) had hearing loss in the left ear and 16 (32.7%) female patients had right ear and 22 (43.1%) had left ear involvement. There was a slight dominance on the right ear in male and on the left ear in female patients. Table 1 summarizes the characteristics of the patients and improvements of the SSHL.

Table 1. Charecteristics of the patients

Characteristic	Value
Sex	
-Male	63
-Female	42
Ear laterality	
-Right	49
-Left	51
-Bilateral	5
Recovery	
-Complete recovery	31
-Moderate recovery	14
-Slight recovery	27
-No recovery	33
Complication of vertigo?	
-Yes	37
-No	68
Complication of tinnitus?	
-Yes	71
-No	35

DISCUSSION

In most of the cases, SSHL seems unilateral and bilateral cases are quite rare (8). It does not show a significant difference in terms of incidence rate between the sex and can be seen in almost any age. Studies with large series showed similar incidence rates between right-and-left ear cases (9). However, some studies reported higher incidence rates of inner ear diseases affecting the left ear (4,7). A meta-analysis done by Reiss et al (10) included 17 studies and 3219 patients and reported right ear involvement in 43.6%, left ear involvement in 52.9% and bilateral involvement was seen in 3.5% of the patients. A study done by Zastrow and Amdt (11) reported a slight increase in left ear involvement in both sex but it was more pronounced in female patients. Michel's (12) meta-analysis which included 14 studies' data obtained from 6081 patients reported that SHL was seen slightly more often in males. Sudden hearing loss in children is very rare. No large series on pediatric sudden hearing loss cases were found in the literature. Of all sudden hearing loss types, about 3.5% is seen in children younger than 14 (13). Chung et al (14) reported no significant difference in sex and right-left ear involvement on their sudden hearing loss series done on 37 pediatric cases. Dethia et al (15) reported only 8 bilateral SHL cases in their 20-case pediatric SHL series. Pitaro et al. (16) series which included 19 children reported 9 cases affecting the left ear, 9 cases affecting the right ear and 1 bilateral case.

The petrous part of the temporal bone contains a wide variety of neural, vascular and labyrinthine structures in a relatively small area (17). The cochlea has mainly a single artery (labyrinthine artery). Decreased cochlear blood flow or occlusion of the labyrinthine artery may cause sudden hearing loss (18). The anatomy of the middle ear-related venous system is highly variable. Even the same person may differ between the right and left sides. Dural venous sinuses and jugular vein are dominant on the right side in 75% of the population (19).

Vascular anomalies of the temporal bone are rare, but some are important in the case of middle ear surgery. These vascular variants are aberrant internal carotid artery, high jugular bulb, persistent stapedial artery, carotid artery dehiscence and jugular bulb dehiscence. The high jugular bulb is more common in the right ear. It is usually asymptomatic. However, tinnitus and hearing loss due to this anatomic variation has been reported. Jugular dehiscence accompanying to the higher jugular bulb is also more common on the right side. If the jugular bulb dehiscence compresses the vestibular aqueduct and internal acoustic duct, sensorineural hearing loss may occur (20,21). The absence of bone structure between the cochlea and the carotid artery can cause sensorineural hearing loss triggered by activity (18). Wang et al. (22) reported that there was no statistical difference between the dehiscent carotid artery canal and carotid duct bone thickness in the right and left ear in the temporal bone radiological study. Some studies suggested hearing loss

and tinnitus laterality. Some of these, audiometric hearing results in adults are slightly better in the right ear than the left but this finding is generally confined to males; hearing sensitivity in females is known to be more symmetric (23,24). For the noise-induced hearing loss, the left ear is more susceptible (25,26). Tinnitus occurs more often in the right ears than the left, even when hearing loss is taken into consideration (27).

In our sudden idiopathic hearing loss series with 105 adult patients, no significant difference was detected between the sex or the affected ear. In male patients, 33 (67.3%) had hearing loss on the right and 29 (56.9%) had hearing loss in the left ear and 16 (32.7%) female patients had right ear and 22 (43.1%) had left ear involvement. There was a slight dominance on the right ear in male and on the left ear in female patients. These results were interpreted as a coincidence.

CONCLUSION

Even though there are some studies which report a dominance of left ear in SSHL cases, we found no difference in terms of sex or affected ear. More studies with larger patient series are necessary to evaluate the relationship between the sex and affected ear in SSHL.

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