

A Case of Sudden Unilateral Sensorineural Hearing Loss With Contralateral Psychogenic Hearing Loss Induced by Gunshot Noise

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ABSTRACT The reasons behind sudden sensorineural hearing loss are mostly unknown, but viral infections, blood disorders, ototoxicity, noise trauma, autoimmune disease, acoustic tumor, and even mental stress may be related to the disease. In cases of hearing loss as a result of psychogenic factors, early diagnosis and adequate treatment under collaboration with the psychiatric department are crucial, since failure to take appropriate measures may result in permanent sequela. We report a case, with a review of the literature, of sudden unilateral sensorineural hearing loss with contralateral psychogenic hearing loss induced by gunshot noise.

INTRODUCTION

Acoustic trauma from exposure to sudden, loud noise is known to induce sensorineural hearing loss and tinnitus in some cases.¹ High-pressured shock waves from a gunshot noise cause a very common form of acoustic trauma, and even one exposure might result in permanent hearing loss.² In most cases, this trauma has a unilateral effect and thus does not greatly disturb activities of daily living. We report a case, with a review of the literature, of sudden unilateral sensorineural hearing loss with contralateral psychogenic hearing loss induced by gunshot noise.

CASE REPORT

An 18-year-old male and right-handed patient was admitted to our otorhinolaryngology department as a result of bilateral sudden hearing loss caused by gunshot noise in the process of military training. The patient was referred to our hospital for sudden sensorineural hearing loss after visiting the military hospital, where pure tone audiometry showed a hearing loss of 63 dB in the right ear and 88 dB in the left. In examinations taken at our hospital, an impedance audiogram showed type A, with pure tone audiometry results showing 68 dB in the right ear and total deafness in the left ear (Fig. 1A). Vertigo was not observed, and vestibular function tests showed normal findings. The patient was admitted and treated with a low-salt diet, blood circulator, antiviral medication, and steroids. Ginexin-F (Ginkgo biloba extract) was used for blood circulators, Famvir tablet (Famciclovir) was used for antiviral medication, and for steroids, prednisolone 60mg was used for the first 4 days and was tapered for the next 6 days. After admission, however, auditory brainstem response and auditory steady-state response test results did not match with pure tone audiometry results (Figs. 1B and 1C).

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A computed tomography scan of the temporal bone and temporal magnetic resonance imaging showed no specific findings. As a result, the patient was referred to the neuropsychiatric department upon the diagnosis of noise-induced hearing loss or sudden sensorineural hearing loss of the left ear and psychogenic hearing loss of the right ear. The patient had no history of mental illness but had experienced mental stress from military training for the past 6 months. Because of this, the patient decided to proceed with psychiatric counseling in addition to our treatment. After 7 days of medication and counseling therapy, pure tone audiometry results showed 20 dB in the right ear with matching results in other objective auditory examinations, and the patient's hearing difficulty was relieved as well. After 10 days of admission, pure tone audiometry results showed 11 dB in the right ear and 38 dB in the left ear (Fig. 2). There was improvement in the hearing difficulty of the left ear, but high-frequency hearing loss still remained that was suggestive of sudden sensorineural hearing loss as a result of loud noise. The patient is currently in follow-up with no specific change in test results in the past 2 months after discharge.

DISCUSSION

Acoustic trauma is known to be caused by a sudden, loud noise, which induces mechanical injury of the tympanic membrane or the ossicle of the middle ear and oval window, round window or the Corti organ of the inner ear. In the present day, functional unification or biochemical changes in the outer hair cells and cochlear nerve are also thought to cause hearing loss through cellular destruction.³ Therefore, there is always the possibility of sudden sensorineural hearing loss as a result of acoustic trauma. Especially in cases involving gunshots, unilateral hearing loss as a result of the head shadow effect and left ear hearing loss in right-handed patients may cause asymmetric hearing difficulty.⁴ Theoretically, bilateral sudden sensorineural hearing loss is not possible. However, as in our case, in right-handed patients, sudden sensorineural hearing loss of the left ear and psychogenic hearing loss of the right

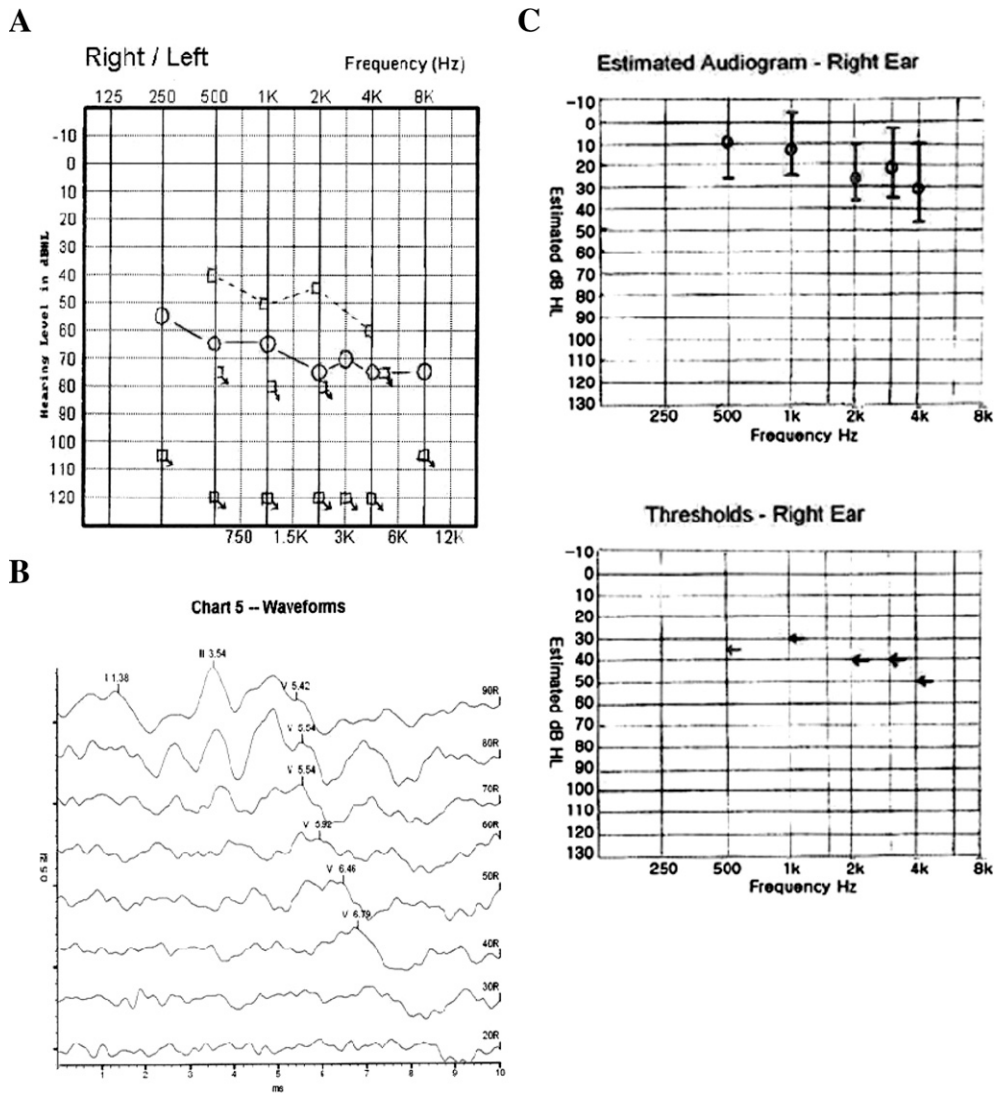


FIGURE 1. On admission day. (A) Pure tone audiogram shows bilateral hearing loss. It shows a discrepancy of the right ear between the pure tone audiogram and (B) the auditory brainstem response and (C) auditory steady-state response.

ear may arise, so early diagnosis with adequate treatment is necessary to avoid permanent sequelae.

In sudden sensorineural hearing loss, age, degree of hearing loss in the early phase, initial audiogram results, time to treatment, and accompanying tinnitus are factors affecting the prognosis.⁴ In psychogenic hearing loss, the perceived mental stress, lack of other mental or medical illness, and shorter time to treatment are factors associated with a good prognosis.⁵

Psychogenic hearing loss is defined as hearing difficulty that cannot be explained by organic lesions.⁶ In patients complaining of hearing loss after mental stress or after having had mental illness associated with conversion disorder or depression, the hearing loss may be as a result of psychiatric reasons.⁶ Psychogenic hearing loss may be diagnosed only after organic lesions are eliminated.

Psychogenic hearing loss is a type of conversion disorder that has several psychiatric characteristics. First, there are no reasonable neurologic or medical causes that may explain the neurologic symptoms. Second, psychological factors are associated with the progress of the symptoms. Lastly, the hearing loss is not fabricated, as may occur in malingering. In psychogenic hearing loss, there may be a difference between the results from subjective tests, such as pure tone audiometry, and objective tests, such as auditory brainstem response and auditory steady-state response.⁵ Malingering may show differences in the results between subjective tests and objective tests as well, but, in contrast to psychogenic hearing loss, a patient who is malingering has an inconsistent history as well as differences of 15 dB or more in pure tone audiometry or speech audiometry.⁵ Collaboration with the psychiatric department is crucial in differentiating the two diseases.

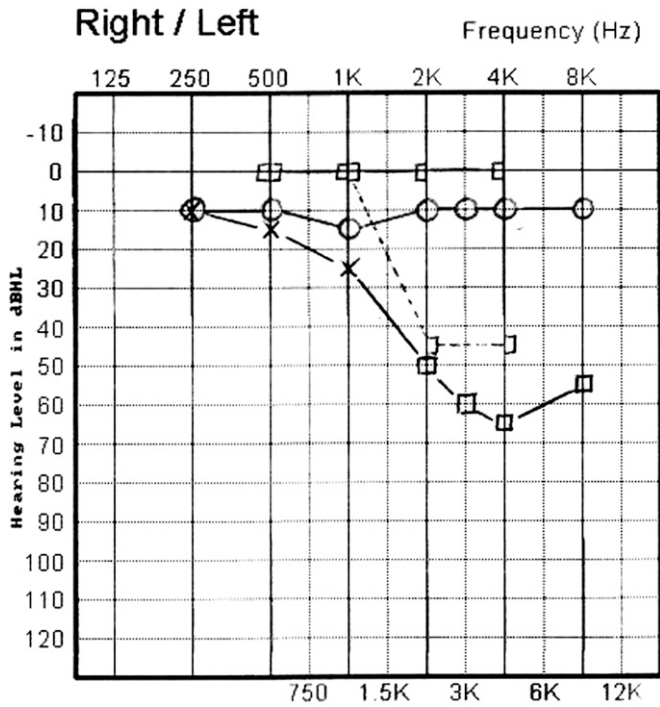


FIGURE 2. On 10th clinical day. Significant improvement in both hearing levels was noted. High-frequency hearing loss remained in the left ear.

CONCLUSION

Bilateral hearing loss as a result of sudden sensorineural hearing loss and psychogenic hearing loss caused by acoustic trauma are very rare, so failing to take appropriate measures may result in permanent sequelae. Therefore, taking a careful history is needed in patients with acoustic trauma, and if malingering seems to be absent, early diagnosis and adequate treatment under collaboration with the psychiatric department may yield good results.

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