

Bilateral Sudden Sensorineural Hearing Loss after Treatment of Aneurysmal Subarachnoid Hemorrhage by Angiographic Embolization: A Case Report

Case Report

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Abstract

Bilateral sudden sensorineural hearing loss is a rare otologic emergency and constitutes 0.44%-4.9% of overall sudden sensorineural hearing loss cases. Microvascular dysfunction secondary to systemic cardiovascular diseases, such as embolism, vasospasm, and hypercoagulability, is the main cause of non-idiopathic bilateral sudden sensorineural hearing loss. In this study, a case

of bilateral sudden sensorineural hearing that occurred after angiographic embolization for treatment of aneurysmal subarachnoid hemorrhage was presented as a rare clinical condition.

Key Words: Bilateral, sudden, hearing loss, angiographic embolization

Introduction

Bilateral sudden sensorineural hearing loss (SSNHL) is a rare otologic emergency requiring appropriate and specific treatment following rapid and careful clinical evaluation, and it constitutes 0.44%-4.9% of all SSNHL. Microvascular dysfunction secondary to systemic cardiovascular diseases, including embolism, vasospasm, and hypercoagulability, is the main cause of non-idiopathic bilateral SSNHL (1-4). In the literature, many protocols have been described for the treatment of SSNHL. Systemic steroid treatment is the most commonly used method. For the patients for whom this treatment method is not appropriate and/or who are resistant to it, successful auditory outcomes obtained with transtympanic steroid injection have been reported in the literature (5-7).

This study presented a case of bilateral sudden sensorineural hearing loss that developed after angiographic embolization performed for treatment of aneurysmal subarachnoid hemorrhage as a rare clinical picture and for which transtympanic dexamethasone injection was preferred, since systemic therapy was not appropriate. Also, the characteristics of the disease were summarized.

Case Report

A 21-year-old male patient, who had been treated due to a diagnosis of polycystic kidney disease and hypertension since his childhood and who had undergone angiographic embolization for treatment of aneurysmal subarachnoid hemorrhage second-

ary to hypertension 2 weeks ago, presented to our clinic with the complaint of post-intervention bilateral hearing loss that he had noticed after recovery of his consciousness. In the otoscopy, both the external auditory canals and tympanic membranes were found to be normal. Pure tone audiogram revealed mean bone threshold values (0.25, 0.5, 1, 2 kHz) of 84 dB and 60 dB for the left and right ears, respectively (Figure 1). The results of other ear-nose-throat examinations were normal. The patient was diagnosed with SSNHL. Systemic treatment of SSNHL was considered to be inappropriate for this patient because of his existing serious systemic health problems, including hypertension and recently occurring subarachnoid hemorrhage. We decided to treat with transtympanic dexamethasone injection. After the patient was informed about the intervention in detail and his written informed consent was obtained, dexamethasone injection was applied to both ears alternately, in 3 doses every other day. The treatment was ended on the 6th day. In the pure tone audiogram that was performed on the 5th and 7th days of the treatment, the mean bone threshold values were 53 dB/38 dB and 42 dB/32 dB for the left/right ears, respectively (Figure 2, 3).

Technique

The patient was put on the operating table in the supine position, and his head was rotated 45 degrees. Following topical and local infiltration anesthesia, 0.5 cc dexamethasone was transtympanically injected into the tympanum frontal-lower quadrant with a 22-gauge spinal needle (Figure 4). The



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Figure 1. Audiogram of the patient after embolization, showing sensorineural hearing loss of 84 dB in the left ear and 60 dB in the right ear



Figure 2. Audiogram performed on the 5th day after the 2nd dose of transtympanic dexamethasone injection applied alternately into both ears every other day

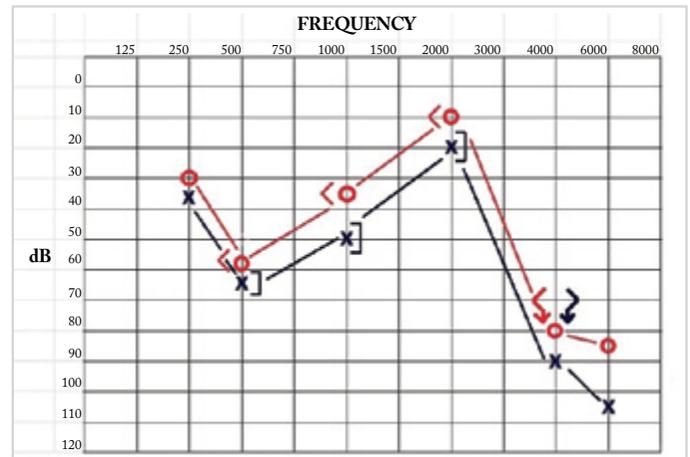


Figure 3. Audiogram performed on the 7th post-treatment day during the last control examination. The mean bone threshold values for left and right ears are 42 dB and 32 dB, respectively

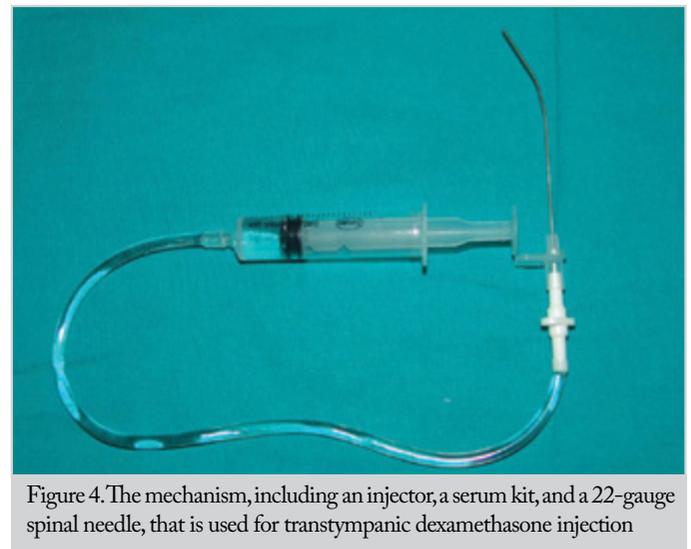


Figure 4. The mechanism, including an injector, a serum kit, and a 22-gauge spinal needle, that is used for transtympanic dexamethasone injection

patient was suggested to lie down on his healthy ear without moving his head and to avoid gulping for 30 minutes as much as possible.

Discussion

Sudden hearing loss is an otologic emergency that is described as sensorineural hearing loss of 30 dB and at over successive 3 frequencies within 3 days. It is usually seen as unilateral acute deafness (5, 6). Bilateral sudden sensorineural hearing loss occurs rarely and constitutes 0.44%-4.9% of all SSNHL. Microvascular dysfunction secondary to systemic cardiovascular diseases, such as embolism, vasospasm, and hypercoagulability, is the main cause of non-idiopathic bilateral SSNHL. Hypoxia that develops in this situation results in cochlear damage and dysfunction (1). Besides this, systemic autoimmune diseases, abnormalities of lipid panel, and diabetes mellitus can also lead to vascular occlusion (1-3).

In patients with bilateral SSNHL, anti nuclear anticor (ANA) titer positivity was observed to be higher compared to unilateral

cases (1-3). It generally occurs in advanced age (1-3). Hearing loss is generally asymmetric, the cause of which is unknown. It is basically treated as in unilateral cases. However, there is a tendency to use the combination of a steroid and vasodilator more frequently. Auditory gain is obtained in two-thirds of the cases, and this ratio is not statistically different from that for the unilateral group (1). High-dose systemic steroid therapy is commonly used for treatment of sudden sensorineural hearing loss. Nonetheless, some side effects, such as gastrointestinal problems, gluteal abscess formation, and avascular necrosis, can occur in some patients during systemic therapy. Moreover, despite oral or intravenous high-dose steroid therapy, 30%-50% of the patients do not respond to the treatment (5, 7).

Transtympanic steroid injection is useful as an alternative treatment when systemic therapy is unsuccessful or contraindicated for sensorineural hearing loss (8). In animal studies, inner ear and perilymph steroid concentrations were found to be significantly higher in the procedure of intratympanic steroid injection than in intravenous or oral steroid therapy (7, 9, 10). With

this technique, the side effects associated with systemic steroid therapy are avoided (5, 7, 10). A high concentration of steroid in the inner ear occurs with better auditory recoveries. However, there is no certain information about the mechanism of intratympanic steroid action (9). While many researchers applied transtympanic treatment for patients who displayed no response to systemic therapy, some prefer transtympanic therapy as the primary treatment method due to the successful results obtained from it (5, 7).

In the case presented, bilateral asymmetric SSNHL was present, and cochlear hypoxia that developed as a complication of angiographic embolization was the possible etiological factor. Routine systemic steroid therapy was considered to be inappropriate for his treatment because of his existent hypertension and recently controlled subarachnoid hemorrhage. Transtympanic dexamethasone injection was planned as an alternative treatment, and a significant auditory gain was obtained without any side effects, in consistency with literature. Our patient, who will probably be a candidate for cochlear implant, has obtained his hearing substantially with the help of this alternative treatment modality, which does not have any systemic risk.

Conclusion

Angiographic embolization can pose a risk for bilateral SSNHL. Transtympanic dexamethasone injection is an easy, effective, and safe treatment option for the clinical cases for which systemic treatment is not appropriate.

Informed Consent: Written informed consent was obtained from patient who participated in this case.

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References

1. Fetterman BL, Luxford WM, Saunders JE. Sudden bilateral sensorineural hearing loss. *Laryngoscope* 1996; 106: 1347-50. [\[CrossRef\]](#)
2. Oh JH, Park K, Lee SJ, Shin YR, Choung YH. Bilateral versus unilateral sudden sensorineural hearing loss. *Otolaryngol Head Neck Surg* 2007; 136: 87-91. [\[CrossRef\]](#)
3. Xenellis J, Nikolopoulos TP, Stavroulaki P, Marangoudakis P, Androulakis M, Tsangaroulakis M. et al. Simultaneous and sequential bilateral sudden sensorineural hearing loss: are they different from unilateral sudden sensorineural hearing loss? *ORL J Otorhinolaryngol Relat Spec* 2007; 69: 306-10. [\[CrossRef\]](#)
4. Yanagita N, Murahashi K. Bilateral simultaneous sudden deafness. *Arch Otorhinolaryngol* 1987; 244: 7-10. [\[CrossRef\]](#)
5. Rauch SD. Intratympanic steroids for sensorineural hearing loss. *Otolaryngol Clin North Am* 2004; 37: 1061-74. [\[CrossRef\]](#)
6. Plaza G, Herraiz C. Intratympanic steroids for treatment of sudden hearing loss after failure of intravenous therapy. *Otolaryngology Head and Neck Surgery* 2007; 137: 74-8. [\[CrossRef\]](#)
7. Parnes LS, Sun AH, Freeman DJ. Corticosteroid pharmacokinetics in the inner ear fluids: an animal study followed by clinical application. *Laryngoscope* 1999; 109: 1-17. [\[CrossRef\]](#)
8. Ho HG, Lin HC, Shu MT, Yang CC, Tsai HT. Effectiveness of intratympanic dexamethasone injection in sudden deafness patients as salvage treatment. *Laryngoscope* 2004; 114: 1184-9. [\[CrossRef\]](#)
9. Ahn JH, Yoo MH, Yoon TH, Chung JW. Can Intratympanic dexamethasone added to systemic steroids improve hearing outcome in patients with sudden deafness? *Laryngoscope* 2008; 118: 279-82. [\[CrossRef\]](#)
10. Alles MJ, Der Gaag MA, Stokross RJ. Intratympanic steroid therapy for inner ear disease, a review of the literature. *Eur Arch Otorhinolaryngol* 2006; 263: 791-7. [\[CrossRef\]](#)