

Acute Hearing Loss Caused by Decreasing Anterior Inferior Cerebellar Arterial Perfusion in a Patient with Vertebral Artery Stenosis

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We report a case of bilateral hearing loss caused by decreased vascular flow in the anterior inferior cerebellar artery (AICA) territory. A 74-year-old man who experienced right hearing loss 5 months ago presented with bilateral deafness and right cerebellar ataxia; however, no ischemic lesion was detected in the bilateral AICA area. After stroke treatment, hearing loss was improved. One month later, we obtained blood flow improvement in the left AICA territory on single-photon-emission computed tomography and vertebral artery stenosis on magnetic resonance angiography. Therefore, clinicians should recognize that bilateral hearing loss may be related to stroke in the vertebrobasilar artery area. **Key Words:** Anterior inferior cerebellar artery—magnetic resonance angiography—single-photon-emission computed tomography—bilateral deafness.

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Introduction

Acute hearing loss with vertigo is generally considered a peripheral pathological condition. Bilateral hearing loss is rare (1.7% of cases of hearing loss)¹ and is related to a high incidence of vascular disease.² Hearing loss is one of the findings in patients with anterior inferior cerebellar artery (AICA) infarction.^{3,4} We report a case of bilateral hearing loss where we detected the time course of magnetic resonance imaging and single-photon-emission computed tomography (SPECT) changes.

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Case Report

A 74-year-old man had poorly controlled diabetes, dyslipidemia, and hypertension. On January 2016, the subject experienced right hearing difficulty, which gradually worsened. On April 30, the subject suffered right cerebellar infarction and was treated with clopidogrel.

On July 10, the subject complained of vomiting, dizziness, and deafness in the left ear, then visited our hospital. On magnetic resonance imaging, new ischemic lesions appeared in the right cerebellar hemisphere (but no lesion in the AICA area) and the description of the vertebral artery was decreased (Fig 1), so the subject was hospitalized because of the recurrence of acute cerebral infarction. On examination, the patient's systolic blood pressure was 160/92 mm Hg with sinus rhythms. The patient had bilateral deafness, and therefore can only perform written communications, and marked bilateral directionality nystagmus and mild ataxia with right predominance (National Institutes of Health Stroke Scale [NIHSS] score of 2 points). The three-dimensional computed tomography angiography result showed that the left vertebral artery stenosis worsened; in addition, a decrease in blood flow in the

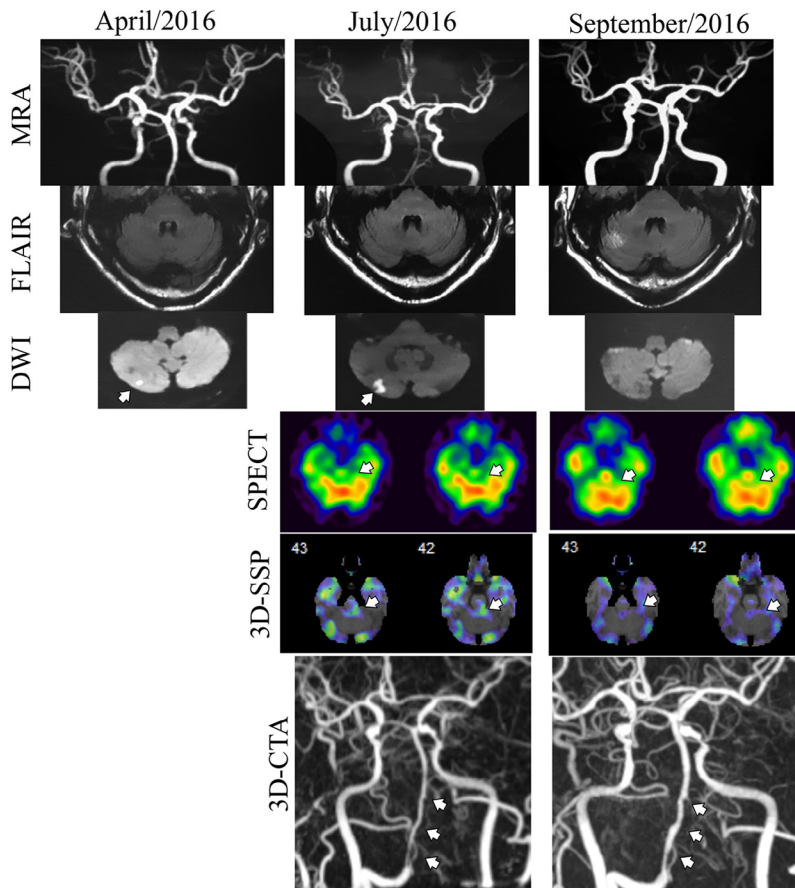


Figure 1. Chronological changes in the magnetic resonance or SPECT image. Basilar artery description and AICA perfusion were decreased on July 2016. After treatment, basilar artery description and AICA decreased perfusion were improved on September 2016. The arrows indicate the infarct area on DWI, the AICA on SPECT/3D-SSP, and the stenosis lesion on 3D-CTA. Abbreviations: 3D-CTA, 3-dimensional computed tomography angiography; 3D-SSP, 3-dimensional stereotactic surface projection; AICA, anterior inferior cerebellar artery; DWI, diffusion-weighted imaging; FLAIR, fluid-attenuated inversion-recovery; MRA, magnetic resonance angiography; SPECT, single-photon emission computed tomography.

left AICA territory was observed on 3-dimensional stereotactic surface projection SPECT (Fig 1). Then we diagnosed that the patient's deafness was caused by ischemic changes in the left AICA territory. After starting treatment, the hearing loss in the left ear improved day by day, and the patient was able to do stable walking (NIHSS score of 0 point). We selected clopidogrel and cilostazol for secondary prevention. One month later, the imaging study showed improving visualization of the vertebral arteries and left AICA territory perfusion (Fig 1). And now, the patient felt no hearing difficulty and ataxias.

Discussion

Ischemic AICA syndrome is very rare (only .9% of all patients with cerebral infarction and only 13% of patients with posterior territory infarction) and is caused by vertebral artery stenosis (or occlusion).^{3,4} The AICA territory includes the V, VII, and VII cranial nerves, the lateral spinothalamic tract, and the inferior cerebellar peduncle.⁴ The clinical presentation of AICA infarction may mimic more common vestibular disorders, including vestibular neuritis or Ménière disease. In this case, we detected a decrease in AICA area perfusion on 3-dimensional stereotactic surface projection SPECT and vertebral-basilar artery description on magnetic reso-

nance angiography-computed tomography angiography.⁵⁻⁸ Because the decrease in AICA area perfusion resulted from the improvement in the vertebral-basilar artery visualization, we speculated that the deafness in the left ear resulted from insufficient perfusion in the AICA area. However, we could not rule out the possibility of a hypoperfusion effect on the internal auditory artery, which supplies the inner ear and the vestibulocochlear nerve and stems from the AICA.⁹ But deafness in the right ear might be coming from that effect, according to detect no decreasing right AICA perfusion.

On summary, we reported a rare case of bilateral deafness caused by ischemia. Besides, we obtained a chronological change in the improvement not only on clinical symptoms but also on blood flow on magnetic resonance angiography and on SPECT; therefore we indicate the usefulness of the diagnosis of images.

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