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CASE IMAGE

Doppler sonography in diagnosis of Bow Hunter's syndrome

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Abstract

Bow Hunter's syndrome is a rare condition in which vertebrobasilar circulatory insufficiency develops because of neck rotation. We report a patient with Bow Hunter's syndrome diagnosed by Doppler sonography. This report demonstrates the important role of Doppler sonography in diagnosis of Bow Hunter's syndrome.

KEYWORDS

Bow Hunter's syndrome, Doppler sonography, vertebral artery

A 58-year-old man was referred to our hospital for evaluation and treatment of recurrent vertigo. The patient experienced numbness on the right side of his face and discomfort when he turned his neck to the left. At rest, the patient was conscious and showed no symptoms suggestive of acute or chronic cerebrovascular disease. An otoscopic examination revealed normal tympanic membranes, and an audiogram showed normal hearing. Neurologic examination was normal, except for spontaneous nystagmus to the right. Features of nystagmus did not change when the neck was rotated in either direction or during the Dix-Hallpike maneuver. A caloric test showed normal responses in both ears, and other neurotologic tests were also within normal ranges. Computed tomography (CT) of the head revealed no abnormalities.

The patient's discomfort when turning his neck to the left led us to suspect Bow Hunter's syndrome, and the patient underwent Doppler sonography of the neck, in which the average velocity of the right vertebral artery was found to be lower than that of the left (Figures 1 and 2). In addition, the diastolic waveform of the right vertebral artery disappeared when the neck was rotated to the left (Figure 3), suggesting Bow Hunter's syndrome. Magnetic resonance imaging showed no abnormalities in the pons and cerebellum, such as infarcts or hemorrhages. However, magnetic resonance angiography (MRA) revealed hypoplasia of the right vertebral artery. The patient was advised to avoid excessive left neck rotation, and no intervention was performed.

Bow Hunter's syndrome is a rare condition in which vertebrobasilar circulatory insufficiency develops because of neck rotation.[1] The paired vertebral arteries supply blood to the upper part of the spinal cord, brainstem, cerebellum, and posterior part of the brain. Each artery arises from the first part of the subclavian artery, and then runs up the sides of the neck and joins its partner at the level of the pons to form the basilar artery. There are many possible causes of Bow Hunter's syndrome.[2] Blood flow in the vertebral artery can be studied by many diagnostic modalities, including catheter angiography, CT angiography, MRA, and Doppler sonography. Each modality has its advantages and disadvantages, and the choice of modality depends on the purpose of the examination. Doppler sonography cannot be used to visualize the entire shape of the vertebral artery. However, one of its advantages is the

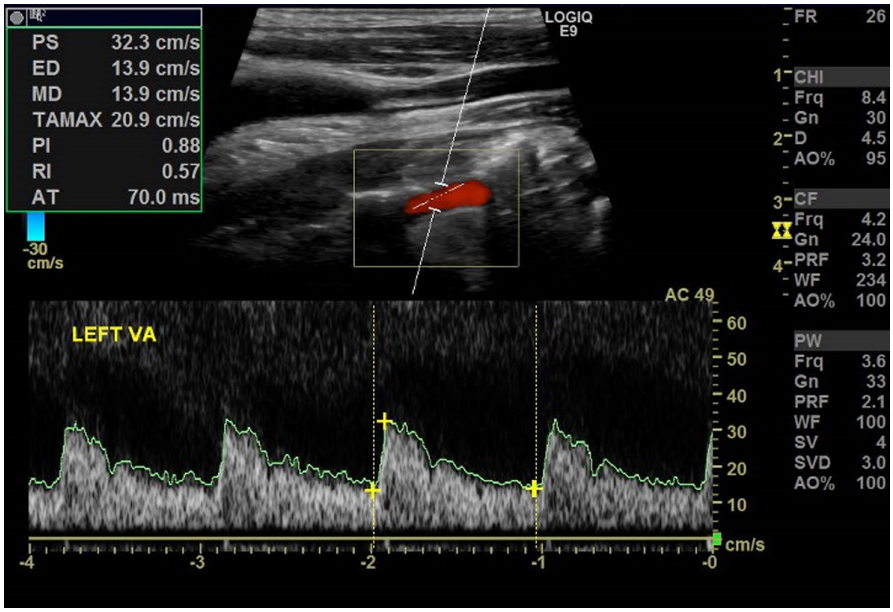

FIGURE 1 Doppler sonography of the neck showing a normal waveform for blood flow in the left vertebral artery.

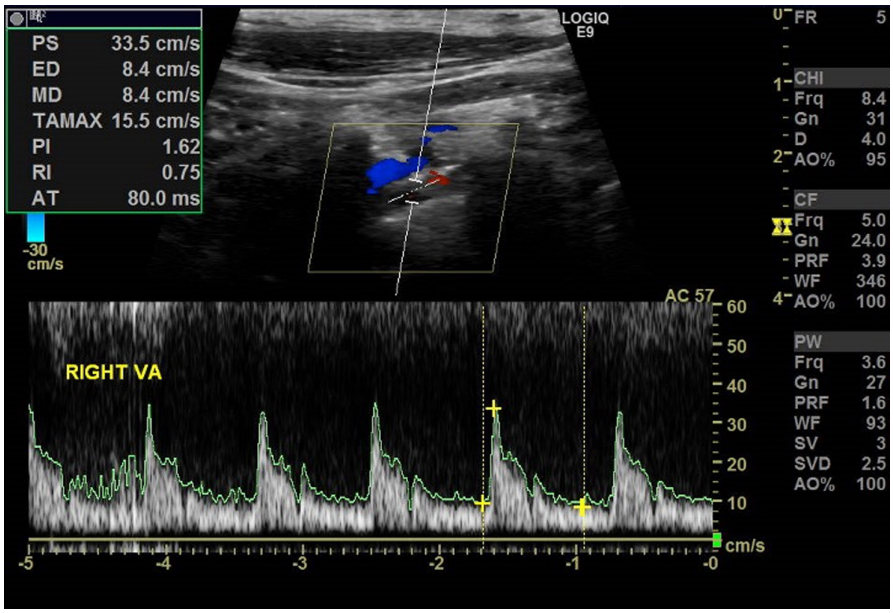

FIGURE 2 Doppler sonography of the neck showing the waveform for blood flow in the right vertebral artery in a neutral position of the neck. The blood flow velocity decreases throughout the cardiac cycle compared to that in the left vertebral artery.

ability to assess the hemodynamic status of the vertebral artery quantitatively, including blood flow velocity during the cardiac cycle. This allows rapid and less invasive detection of hemodynamic changes in patients with Bow Hunter's syndrome.[3] In our patient, the site of blood flow obstruction during neck rotation remained undetermined, and the relationship between the features of nystagmus and the Doppler sonographic findings could not be clarified. However, this case illustrates the utility of vertebral artery Doppler sonography for immediate detection of Bow Hunter's syndrome with minimal risk.

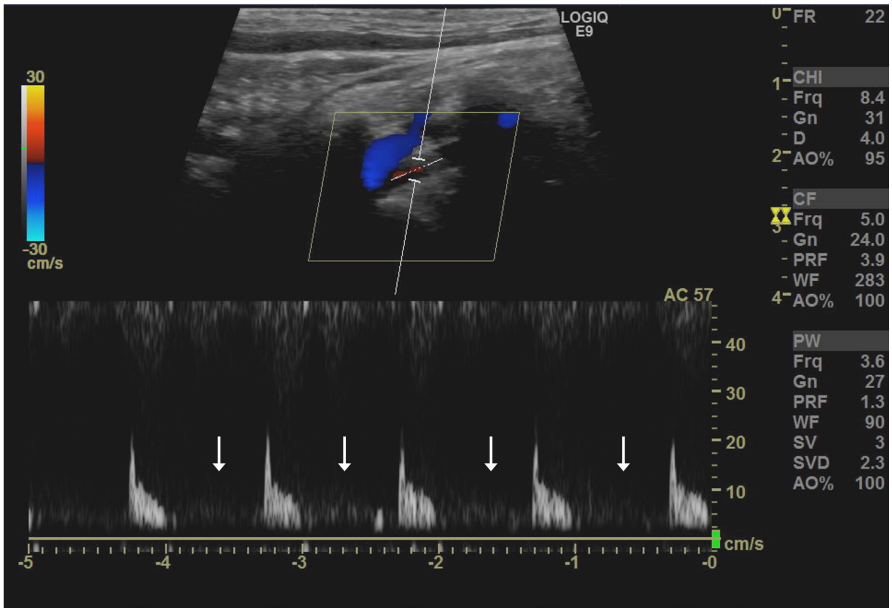

FIGURE 3 Doppler sonography showing the waveform for blood flow in the right vertebral artery with the neck rotated to the left. The systolic velocity decreases, and the end-diastolic waveforms disappear (arrows).

AUTHOR CONTRIBUTIONS

Hiroshi Sakaida: Writing – original draft. **Kazuhiko Takeuchi:** Supervision.

FUNDING INFORMATION

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the finding of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

This study was approved by the Clinical Research Ethics Review Committee of Mie University Hospital (H2021-114).

CONSENT

Written informed consent was obtained from the patient for publication of this report.

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