Audiovestibular impairment presenting as a portent of vertebrobasilar infarction

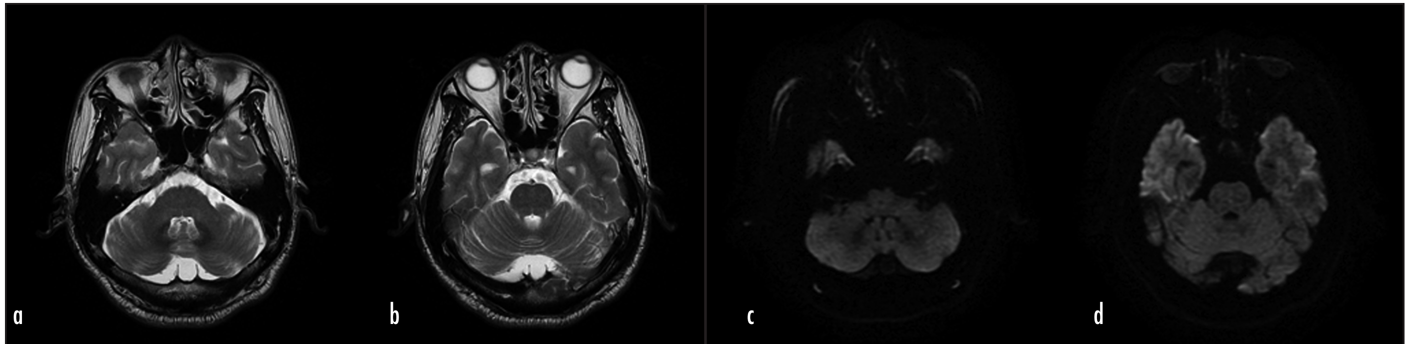

Figure 1. Initial (a, b) T2-weighted and (c, d) diffusion-weighted magnetic resonance imaging do not reveal any abnormalities corresponding to the patient's symptoms.

Introduction

Acute audiovestibular symptoms (hearing loss and vertigo) can be caused by labyrinthine disorders such as viral labyrinthitis, cerebrovascular diseases, perilymphatic fistula and acoustic neuroma. If neurological symptoms are not present, it is more likely that viral labyrinthitis is the cause, especially in the absence of abnormal findings on imaging (Lee et al, 2002).

This article discusses a 55-year-old man who presented with sudden vertigo and unilateral hearing loss without other neurological symptoms and progressively developed posterior circulation infarction. This highlights the need to consider a posterior circulation infarction in a patient presenting with hearing loss and vertigo, even if the patient does not show related neurological symptoms and abnormal imaging findings.

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Discussion

Vertebrobasilar infarction usually presents with vertigo, hearing impairment, and neurological symptoms such as facial paralysis, ataxia, Horner syndrome and sensory loss of the ipsilateral limb and face. Anterior inferior cerebellar artery infarction can cause otological symptoms such as vertigo and hearing impairment without neurological signs, especially in the early stage (Lee et al, 2002; Kim et al, 2009). Vertebrobasilar infarction causing hearing loss and vertigo without neurological symptoms is relatively rare. Bilateral hearing loss caused by vertebrobasilar infarction has been rarely reported, and unilateral hearing loss and vertigo related to vertebrobasilar infarction is extremely rare (Ohki and Tanaka, 2012). Therefore, it is not easy to diagnose verte-

Case Report

A 55-year-old man developed sudden onset of severe vertigo and hearing loss in the left ear lasting for several hours. He also complained of buzzing, tinnitus and a feeling of fullness in the same ear. He had taken medication for diabetes mellitus and hypertension for several years. On neurological examination, he showed a spontaneous right-beating horizontal torsional nystagmus, and the direction of nystagmus did not change in any gaze position. Motor and sensory examinations were normal. He did not have any other neurological deficits such as facial paralysis, dysarthria, dysphagia or Horner's syndrome. Pure tone audiogram showed a sensorineural hearing loss of with a threshold of 75 dB hearing loss in the left ear and 15 dB in the right ear. Other laboratory tests were not significant except for an elevated blood glucose level. On the first day in hospital, brain magnetic resonance imaging was performed. T1, T2 and diffusion-weighted images did not show abnormal findings (*Figures 1a–d*). However, the left vertebral artery (the white arrow), basilar artery (the black arrow) and its branches were poorly visualized in magnetic resonance angiography (*Figure 2*).

These magnetic resonance angiography findings suggested that the otological symptoms may be caused by ischaemic injury. The patient was referred to the department of neurology, and antithrombotic treatments, such as aspirin and intravenous heparin, were started. Vertigo was slightly improved, but there was no change in hearing during the first 2 days in hospital. However, on the third day, he developed facial numbness on the left side, hiccups, facial paralysis on the right side and right hemiplegia. Follow-up magnetic resonance imaging revealed progressive multiple ischaemic changes in the pons, both cerebellums, left midbrain and right thalamus (*Figures 3a–d*). The patient was discharged without improvement of facial paralysis or hemiplegia.

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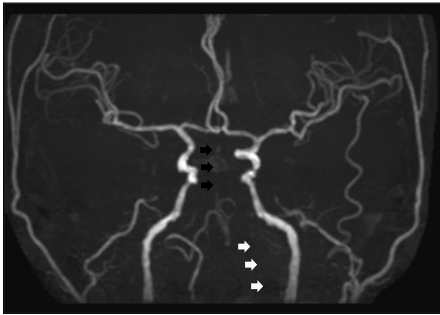

Figure 2. The basilar artery (black arrow) is faintly visualized and left distal vertebral artery (white arrow) is not shown on the time-of-flight magnetic resonance angiography image.

LEARNING POINTS

- The possibility of vertebrobasilar infarction should be considered in patients presented with hearing loss and vertigo despite not showing any neurological symptoms and signs.
- Consultation with an otolaryngologist, neurologist and radiologist is required for proper diagnosis and management.
- Magnetic resonance imaging with diffusion-weighted images is not sufficient to rule out vascular causes in the early stage of the disease.
- Magnetic resonance angiography is helpful for detecting vascular problems in patients with high vascular risk factors, such as hypertension, diabetes, dyslipidaemia, obesity and cigarette smoking.

brobasilar insufficiency in a patient who presents with unilateral hearing loss and vertigo without other neurological symptoms and signs.

Diffusion-weighted magnetic resonance imaging is the best diagnostic tool to detect acute brain infarction, but there is a risk of a false negative result in early lesions, especially within 3 days of the development of symptoms (Seo et al, 2006). Of patients with anterior inferior cerebellar artery infarction, 7.4% presented with only audiovestibular symptoms. Those without neurological symptoms showed normal findings in the initial magnetic resonance imaging including diffusion-weighted imaging (Kim et al, 2009). These false negative findings were relatively common for posterior fossa lesions (Yi et al, 2005).

In this case, there were no specific lesions related to the patient's symptoms on T1, T2 and diffusion-weighted images from brain magnetic resonance imaging on the first day. In contrast, magnetic resonance angiography demonstrated severe stenosis of the left vertebral artery and basilar artery, which made the authors suspect a vascular origin despite the absence of abnormal findings on diffusion-weighted magnetic resonance imaging.

Follow-up diffusion-weighted images taken after the development of neurological symptoms showed multiple high signal pathological lesions in wide areas of the pons and cerebellum. Contrast-enhanced magnetic resonance angiography showed good sensitivity and specificity for detecting vertebrobasilar stenosis (Khan et al, 2007). The authors suggest that magnetic resonance angiography is helpful for assessing the risk of progressive infarction in patients with high risk factors such as hypertension, diabetes, dyslipidaemia, obesity and cigarette smoking (Ishiyama and Ishiyama, 2011).

Conclusions

Physicians should be aware of the possibility of vertebrobasilar infarction in patients with acute labyrinthine symptoms (hearing loss and vertigo) who do not show any neurological symptoms and signs. Proper consultation with an otolaryngologist and neurologist is needed for early diagnosis and management. In addition, appropriate advice should be given to patients discharged from the emergency department diagnosed with peripheral vestibulopathy.

Diffusion-weighted magnetic resonance imaging is the best diagnostic tool, but magnetic resonance imaging alone is not sufficient to rule out vascular causes in the early stage of the disease. In such cases, magnetic resonance angiography is helpful in detecting vascular problems in patients at high risk from vascular factors. **BJHM**

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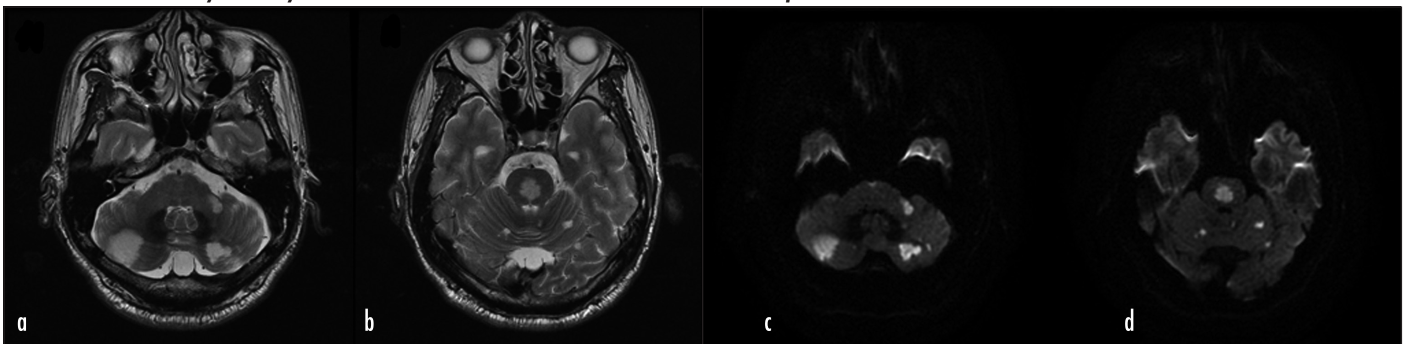
Figure 3. a, b. T2-weighted and (c, d) diffusion-weighted magnetic resonance imaging show multi-focal subacute infarction in the central pons, bilateral posterior inferior cerebellar artery territory, cerebellum and in the left side of the middle cerebellar peduncle.



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