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## Case Report

## Isolated rotational nystagmus may be the only clue to the early diagnosis of dorsolateral medullary infarction ☆☆☆★

## Abstract

The medulla contains complex nervous structures related to motor, sensory, coordination, and visceral autonomic functions. The medullary infarctions cause various symptoms and signs depending on the location of the lesion. Lateral medullary infarction is caused by a vascular event in the territory of the posterior inferior cerebellar artery or the vertebral artery [1]. We report a case of a patient with falling tendency and whirling sensation. He reported no facial drop, arm drift, slurred speech, difficulty of swallowing, or weakness of his limbs. The neurologic examination revealed no decreased muscle power, dysarthria, dysphagia, or other relevant neurologic deficits. Urgent noncontrast brain computed tomography detected no acute hemorrhage or ischemic lesion. On admission, the oculomotor examination revealed conjugated rotational nystagmus with clockwise direction. The magnetic resonance imaging of the brain demonstrated acute infarct in the medulla oblongata approximately  $0.8 \times 0.5$  cm. The infarct appears bright on diffusion-weighted images (Fig.). A diagnosis of dorsolateral medulla infarction was established, and the patient was started on a therapy of 100 mg aspirin once daily. After standard therapies, the patient's recovery was uneventful.

We wanted to emphasize the importance of thorough history and neurologic examination focused on cerebellar and posterior circulation functions performed in real time, which are keys to the diagnostic workup for patients who present with acute-onset vertigo. It is critical to establish the precise diagnosis and determination of which patients require urgent neuroimaging and acute stroke therapies. With standard therapies and poststroke rehabilitation, the recovery of patients with lateral medullary infarction (LMI) remains favorable.

A 64-year-old man presented to the emergency department (ED) due to falling tendency to the left side and whirling sensation since this morning. His medical history was relevant for hypertension, for which he had no antihypertensive drugs for years. He reported no facial drop, arm drift, slurred speech, difficulty of swallowing, or weakness of his limbs. On examination, he appeared distressed sitting on the wheelchair. The patient had marked truncal ataxia, with a tendency to fall to the left and was unable to ambulate. His vital signs were as follows: blood pressure of 229/109 mm Hg, heart rate of 73 beats per minute, and respiratory rate of 20 breaths per minute. He was afebrile. Serum biochemistry showed hyperglycemic level

(random serum glucose level of 253 mg/dL) and normal sodium, potassium, and renal function. The neurologic examination revealed no decreased muscle power, dysarthria, dysphagia, or other relevant neurologic deficits. Urgent noncontrast brain computed tomography (CT) detected no acute hemorrhage or ischemic lesion.

The patient was transferred and admitted to the neurology inpatient service. On admission, the oculomotor examination revealed conjugated rotational nystagmus with clockwise direction. The magnetic resonance imaging (MRI) of the brain demonstrated acute infarct in the medulla oblongata approximately  $0.8 \times 0.5$  cm. The infarct appears bright on diffusion-weighted images (Fig.). The MRI angiography of circle of Willis reveals tortuosity and irregular caliber of bilateral internal carotid arteries and right middle cerebral artery, which may be atherosclerotic change. A diagnosis of dorsolateral medulla infarction was established, and the patient was started on a therapy of 100 mg aspirin once daily. After rehabilitation program, ataxia of his extremities subsided, but mild numbness remained before discharge. The patient was seen in outpatient regular follow-up in a half year, and these symptoms gradually subsided.

Lateral medullary infarction is an uncommon disorder, accounting for approximately 2.5% or less of all cases of cerebral infarction. Lateral medullary infarction is also known as Wallenberg syndrome and presents with facial sensory disturbance, cerebellar ataxia, Horner syndrome, and paralysis of the soft palate and pharynx on the side of the lesion [2,3]. It is crucial to differentiate dorsolateral medullary infarction from peripheral vertigo, but the most sensitive signs in early phase remain unclear. Nevertheless, in a cerebellar or brainstem ischemia, vertigo can be the only symptom [4].

The Cincinnati Prehospital Stroke Scale is an effective tool to identify stroke, requiring only 30 to 60 seconds at emergency units [5]. However, the Cincinnati Pre-hospital Stroke Scale is not susceptible in patients with LMI. In some cases, the primary cranial imaging does not show any abnormalities, and patients with cerebral ischemia with a diagnosis of peripheral vertigo are misdiagnosed [4].

In our case, the oculomotor examination detected nystagmus with clockwise (contralesional beating, rightward) rotational nystagmus, and the diagnosis of LMI was confirmed. Isolated rotational nystagmus may be the only clue to the early diagnosis of dorsolateral medulla infarction in this patient. The direction of the spontaneous nystagmus in the first days after infarction is consistent with combined stimulation of the horizontal and posterior semicircular canals on the contralesion side [6]. It is useful to help us localize the brain lesion.

Dizziness, vertigo, and imbalance are common presenting symptoms in the ED, accounting for approximately 7.5 million annually in the United States. The complaint of imbalance or difficulty

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**Fig.** The dorsolateral medulla oblongata infarct appears bright on diffusion-weighted images.

walking has been shown to be a predictor for stroke in patients with dizziness [7].

It is important to distinguish patients with central infarct from those with benign peripheral causes because patients with a misdiagnosis will have bad outcomes. In 1 case series, half of the patients with misdiagnosed medullary infarctions were younger than 50 years, the overall mortality rate was 40%, and half of the survivors, approximately 50%, had disabling deficits [8].

Brain CT scans are widely used in the emergency units, but it has poor sensitivity for brain ischemia or infarction, especially in the posterior fossa. Acute posterior circulation infarction can present with nonspecific clinical findings and a normal brain CT. Magnetic resonance imaging is the imaging test of choice, but it has several practical limitations, including its poor real-time availability in the emergent setting [9]. Magnetic resonance imaging still remains the criterion standard test for the diagnosis of acute stroke, with an overall sensitivity of 83% and specificity of 96%. However, the sensitivity of MRI within 48 hours of symptom onset falls to 72% in the subset of patients with brainstem infarction [10].

We wanted to emphasize the importance of thorough history and neurologic examination focused on cerebellar and posterior circula-

tion functions performed in real time, which are keys to the diagnostic workup for patients who present with acute-onset vertigo. It is critical to establish the precise diagnosis and determination of which patients require urgent neuroimaging and acute stroke therapies [10]. Repeat cranial imaging is indicated if vertigo does not improve under standard therapy [4]. With standard therapies and poststroke rehabilitation, the recovery of patients with LMI remains favorable [3].

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