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# Dysphagia as the Predominant Symptom in Posterior Circulation Stroke: A Case Report

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**Corresponding Author:** Edward Durant, e-mail: [edward.j.durant@kp.org](mailto:edward.j.durant@kp.org)**Conflict of interest:** None declared**Source of support:** Funding for the publication of this manuscript was provided by the Kaiser Permanente Central Valley Graduate Medical Education Office**Patient:** Male, 55-year-old  
**Final Diagnosis:** Stroke  
**Symptoms:** Dysphagia • headache • vertigo  
**Medication:** —  
**Clinical Procedure:** —  
**Specialty:** Neurology**Objective:** Challenging differential diagnosis**Background:** Cerebrovascular disease is a common reason for presentation to the emergency department (ED). Posterior circulation strokes can be diagnostically challenging because the presenting symptoms are often subtle or non-focal and can be missed by commonly used stroke scales. This case report describes a patient who presented to the ED with symptoms of progressive dizziness over a 12-h period, which was followed by the rapid onset of an inability to swallow and, at the time of his presentation, no other neurologic deficits.**Case Report:** The patient was a 55-year-old man with a history of diabetes, chronic obstructive pulmonary disease, tobacco and electronic cigarette use, and aortic atherosclerosis who presented to the ED for evaluation of his inability to swallow. His National Institutes of Health Stroke Scale score was zero. Non-contrast brain magnetic resonance imaging showed multiple foci of acute infarction in the left dorsolateral medulla and left cerebellar hemisphere in the posterior inferior cerebellar artery distribution. In the hospital, the patient developed an inability to stand, without loss of balance. Persistent dysphagia and inability to swallow necessitated the placement of a percutaneous endoscopic gastrostomy tube.**Conclusions:** This case describes a relatively rare type of posterior circulation stroke. In addition to traditional risk factors, this patient had risk factors, such as electronic cigarette use, for which there is limited emerging evidence of association with stroke.**Keywords:** Brain Infarction • Emergency Medicine • Neurology • StrokeFull-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/930502>

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## Background

Cerebrovascular disease is a common reason for presentation to the emergency department (ED) and accounts for approximately 492 000 of the estimated 139 000 000 annual ED visits in the United States [1,2]. Patients can be readily screened for anterior circulation strokes based on traditional stroke scales, prompt rapid imaging, and intervention protocols. However, posterior circulation strokes can be diagnostically challenging because the presenting symptoms are often subtle or non-focal and can be missed by commonly used stroke scales, despite the strokes causing significant morbidity and mortality.

One way to classify strokes is by the location of the infarct in either the anterior or posterior circulation. The anterior circulation consists of the arteries that branch from the internal carotid arteries. The posterior circulation consists of the vasculature supplied by the vertebral arteries, which provide blood supply to the brainstem and cerebellum [3]. These 2 systems connect via the posterior communicating artery. Posterior circulation strokes are relatively rare, accounting for approximately 20% of all strokes [4]. The most common symptoms of posterior circulation stroke are dizziness, unilateral limb weakness, dysarthria, headache, and nausea or vomiting [5]. Perhaps because of these less predictable symptoms, traditional stroke scales such as the National Institutes of Health Stroke Scale (NIHSS) correlate poorly with posterior circulation stroke severity. Consequently, posterior circulation strokes are 2.5 times more likely to be misdiagnosed than are anterior circulation strokes, resulting in a missed or delayed diagnosis in 28% to 59% of cases [1]. Posterior circulation strokes are also associated with a delay in evaluation by a neurologist and administration of time-sensitive thrombolytic therapy, such as tissue plasminogen activator (tPA) [6]. Even when clinically suspected, posterior circulation strokes are more likely to be missed on advanced imaging studies than are anterior circulation strokes [7,8]. To further illustrate these diagnostic challenges, we present a case report of a patient who presented to the ED with nonspecific neurological symptoms and a combination of risk factors, which eventually led to a diagnosis of a posterior circulation stroke.

## Case Report

The patient was a 55-year-old man with a history of diabetes, chronic obstructive pulmonary disease, tobacco and electronic cigarette (e-cigarette) use, and aortic atherosclerosis who presented to the ED for evaluation of symptoms of headache, vertigo, and inability to swallow. He had been in his usual state of health on the night prior to his presentation to the ED. He noted on the morning of presentation that he was choking on food and water when he tried to swallow. He also noted

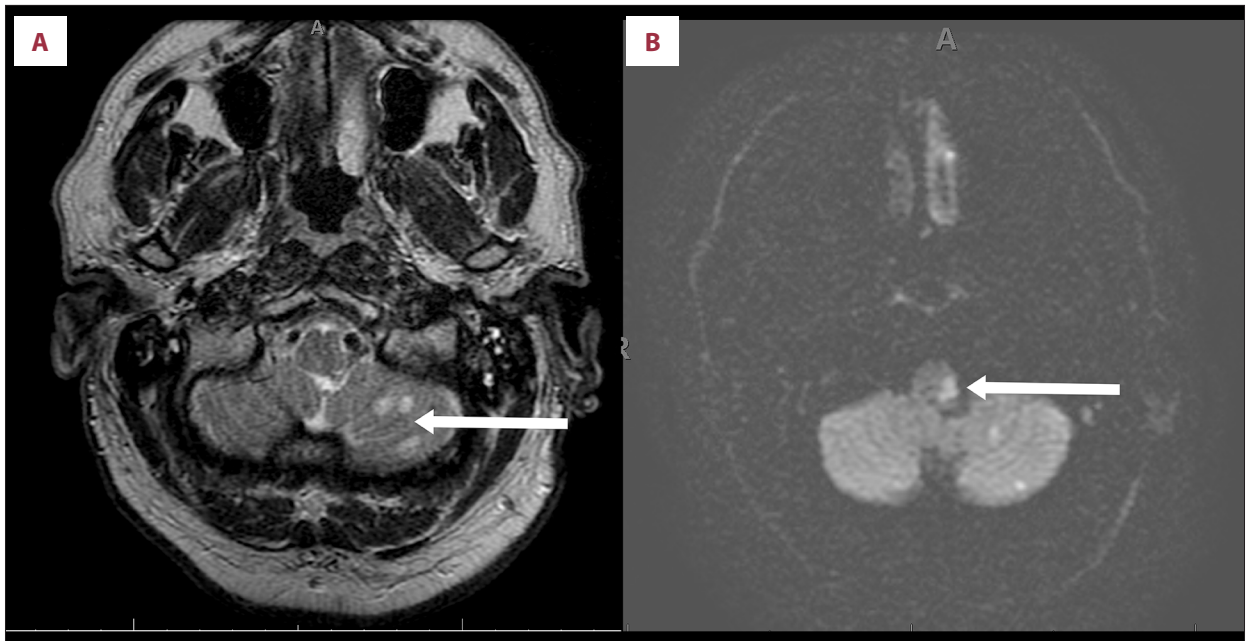
tingling in his right upper extremity, mild vertigo, and an occipital headache. He proceeded with his usual daily activities for most of the day. That night, while trying to eat dinner, he noticed that he was still unable to swallow food or water, so he came to the ED for evaluation. The patient denied odynophagia, and his most recent endoscopy, which was performed for gastric esophageal reflux disease 3 years prior, had been notable only for mild esophagitis, without evidence of stricture.

The patient's physical examination was notable for dry oral mucosa and tenderness to palpation of his bilateral sternocleidomastoids. His neurologic exam was notable for an absent gag reflex. The remainder of the cranial nerve examination, as well as his mental status, confrontational strength testing, and sensory, coordination, and gait testing (including tandem walk) were all normal. His physical examination was normal, without evidence of cardiovascular or pulmonary abnormalities or trauma.

Although stroke was considered in the initial differential diagnosis, it was not thought to be sufficiently likely, so the stroke team was not notified. The NIHSS score at the time of physical examination was zero, and the etiology of the dysphagia was unclear. Two hours after his initial presentation, the patient remained unable to swallow. We consulted with the on-call neurologist, who recommended ordering a non-contrast head computed tomography (CT) scan, CT angiography (CTA) of the head and neck, and brain magnetic resonance imaging (MRI) to evaluate for a possible stroke. The CT scan revealed no acute pathology. The CTA of the head and neck revealed that the left posterior inferior cerebellar artery (PICA) could not be visualized in its entire length, suggesting significant stenosis or occlusion. The patient was admitted to the hospital for further laboratory testing and workup, which was notable for a hemoglobin A1c level of 10.2% (standard range, less than 5.7%) and abnormal brain imaging.

A non-contrast brain MRI (**Figure 1A, 1B**) showed multiple foci of acute infarction in the left side of the dorsolateral medulla and left cerebellar hemisphere in the left PICA distribution. This pattern of infarction was suggestive of multiple emboli, which prompted further investigation for cardioembolic disease or an intracardiac shunt process. Two subsequent transthoracic echocardiograms were normal, with no evidence of shunting, atrial septal defect, or patent foramen ovale.

On admission to the hospital, the patient's physical examination was notable for the progression of stroke symptoms, with an NIHSS score of 3 given for development of ataxia of the left upper extremity, mild dysarthria, and decreased sensation to pinprick in the left upper extremity, with preservation of other sensation. On hospital day 3, the patient was evaluated by the on-call neurologist who noted that the cerebellar



**Figure 1.** T2-weighted (A) and diffusion (B) magnetic resonance imaging demonstrating multiple foci of acute infarction in the left cerebellar hemisphere in the left posterior inferior cerebellar artery distribution (white arrow in A) and the left side of the medulla (white arrow in B). Cerebellar infarcts are also visible in Figure B (no arrows).

symptoms progressed, and the patient had developed an inability to stand without loss of balance (Romberg sign) and had to lean to the left and step to prevent falling. The patient ambulated with an ataxic gait and was unable to tandem walk. Persistent dysphagia and inability to swallow necessitated the placement of a percutaneous endoscopic gastrostomy tube. The patient was discharged home with the feeding tube in place and a referral for outpatient physical therapy. A 14-day cardiac event monitor that was used by the patient after discharge from the hospital revealed no arrhythmias, and the results of hypercoagulable testing were negative.

## Discussion

Posterior circulation strokes are relatively rare, accounting for about 20% of all strokes [4]. The most common symptoms of posterior circulation stroke are dizziness (47%), unilateral limb weakness (41%), dysarthria (31%), headache (28%), and nausea or vomiting (27%) [5]. The present case describes the presentation of an infarction in the PICA cerebellar territory accompanied by infarction in the dorsolateral medulla. This combination is typically caused by an occlusion of the intracranial vertebral artery (ICVA), which blocks both the PICA and lateral medullary penetrators and occurs in approximately 20% of PICA territory cerebellar infarcts [9]. Dizziness and gait instability are associated with PICA cerebellar and lateral medullary infarcts. Occipital headache can be present when the full PICA cerebellar territory is involved. In the case of lateral medullary

infarct, bulbar muscle weakness is due to the involvement of the lower cranial nerves.

Given the predominant symptom of dysphagia in this patient, the diagnosis of stroke was not immediately apparent to the emergency physician. The differential diagnosis of acute dysphagia is broad and includes infectious, metabolic, myopathic, and structural etiologies as well as several non-stroke neurological etiologies, such as trauma, Guillain-Barré syndrome, and multiple sclerosis. This patient was also not a candidate for tPA administration because he presented to the ED 14 h after the onset of his first neurologic symptom. However, had he presented to the ED within the appropriate time window, his stroke could still have easily been missed because his NIHSS score was zero. The NIHSS is historically poor at detecting the severity of posterior circulation strokes, which may cause significant morbidity despite relatively low scores on that scale.

This case is also interesting because the patient's MRI results were more suggestive of multiple embolic ischemic events as opposed to a single thrombotic event, despite the absence of common risk factors for thromboembolic events. The patient did not have a history of atrial fibrillation, nor did the echocardiogram show any evidence of a shunt process. There was no evidence of vertebral artery dissection, significant atherosclerosis, or stenosis in the vessels of the circle of Willis, although the PICA was noted to have significant stenosis and could certainly have been an embolic source. The stenosis observed in

the PICA could have also been due to vertebral artery hypoplasia, which can increase the risk of ischemic stroke in the PICA and lateral medullary distributions owing to regional hypoperfusion [10]. Other possibilities include aortic embolism or vertebral artery dissection, which would not be entirely excluded by the imaging studies that were performed.

This patient had a history of microvascular disease secondary to longstanding type 2 diabetes mellitus. He also had a 20-year history of smoking cigarettes and had recently switched to using e-cigarettes 6 months prior to aid in smoking cessation. In a recent study of younger patients, the use of e-cigarettes either concurrently or with a history of use of combustible cigarettes increased the risk of stroke 1.83-fold above the use of combustible cigarettes alone and 2.91-fold above that of non-smokers [11]. This may pose a significant health risk to a wide population of smokers who utilize e-cigarettes as a smoking cessation tool, as was the case with this patient. The present case may be an example of an association between the concurrent use of combustible and e-cigarettes and increased risk of stroke, although the evidence for this is limited.

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## Conclusions

This case report describes a relatively rare type of posterior circulation stroke. In addition to traditional risk factors, this patient also had additional risk factors for which there is limited emerging evidence of association with stroke. This case highlights the need for both a high clinical index of suspicion for stroke in patients with vague neurological symptoms as well as the need to be mindful of emerging risk factors, such as e-cigarette use, when taking a patient's social history.

## Conflicts of Interest

None.