Multimodal CT to Differentiate Acute Ischemic Stroke From Stroke Mimics

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A 64-year-old man was evaluated in the emergency department after reportedly being found unconscious and “stiff.” A “stroke alert” was called from the field prior to arrival. At the time of initial evaluation, collateral history was not available.

On examination, the patient was agitated, did not follow commands, and had a left gaze preference. There were symmetric and semipurposeful movements of the limbs. The patient was sedated and intubated to facilitate additional testing. Head computed tomography (CT) showed no hemorrhage. Computed tomography angiography (CTA) demonstrated diminished flow in the left hemispheric convexity branches without the evidence of proximal occlusion. CT Perfusion (CTP) showed reduced cerebral blood volume, cerebral blood flow, and increased time to peak perfusion

involving the left cerebral hemisphere diffusely. The urine toxicology was positive for methamphetamine and cannabis. No thrombolytic therapy was administered and the patient recovered over the subsequent 24 hours.

Multimodal CT has been adopted by many stroke centers as the neuroimaging modality of choice to guide acute stroke treatment. In this patient, the absence of proximal vascular occlusion and the diffusely reduced left-hemisphere blood flow and blood volume were suggestive of postictal hypoperfusion rather than focal cerebral ischemia.¹ The CTP

Figure 1. Demonstrated is reduced cerebral blood flow (A) on the order of 10-30 mL/100 mg tissue per minute in the entire left hemisphere across the anterior, middle, and posterior cerebral artery territories with relative sparing of the basal ganglia. Likewise, there is holo-hemispheric loss of cerebral blood volume (B) and increased time to peak (C) with predilection for the smaller and more peripheral cortical vessels.

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images for this patient are shown in Figure 1 (A-C), and they demonstrate the typical findings for postictal hypoperfusion, which includes holo-hemispheric involvement, crossing of multiple vascular distributions, sparing of the basal ganglia, and predilection for the smaller cortical vessels.² This patient's left gaze preference is therefore explained in the context of loss of cortical function in the hypoperfused hemisphere postictally. In acute ischemic stroke, the CTP would show an area of decreased relative cerebral blood flow (CBF) and relative cerebral blood volume (CBV) with increased time to peak (TTP) at the site of focal stenosis or occlusion surrounded by an area of decreased rCBF, increased rCBV, and increased TTP due to autoregulation.

Additionally, there would be no sparing of any structures within the affected vascular distribution.

This case illustrates the diagnostic utility of CTP in differentiating between stroke and stroke mimic when collateral history is limited or the examination is confounded.

References

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