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Authors

Fesmire, Francis M
England, Bryan S
Shell, Jared S
[et al.](#)

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Usefulness of Computed Tomography Perfusion in Treatment of an Acute Stroke Patient with Unknown Time of Symptom Onset

Francis M. Fesmire, MD
Bryan S. England, MD
Jared S. Shell, MD
Thomas G. Devlin, MD
Ron C. Buchheit, MD

University of Tennessee College of Medicine Chattanooga, Chattanooga, Tennessee

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A 43-year-old Caucasian male with history of mechanical mitral valve was found down outside a recreational park shortly after daybreak. Examination on arrival to the emergency department revealed altered mental status, right hemiplegia, forced leftward gaze, and complete aphasia. Patient was ineligible for tissue plasminogen (TPA) therapy due to unknown time of symptom onset. Computed

tomography angiogram (CTA) revealed occlusion of the left middle cerebral artery (MCA) with acute thrombus (Figure 1). Computed tomography perfusion scan (CTP) revealed a large ischemic penumbra with no evidence of infarcted brain tissue (Figure 2). The patient was taken for emergent endovascular therapy with successful retrieval of left MCA thrombus. The patient had almost complete resolution of symptoms with a

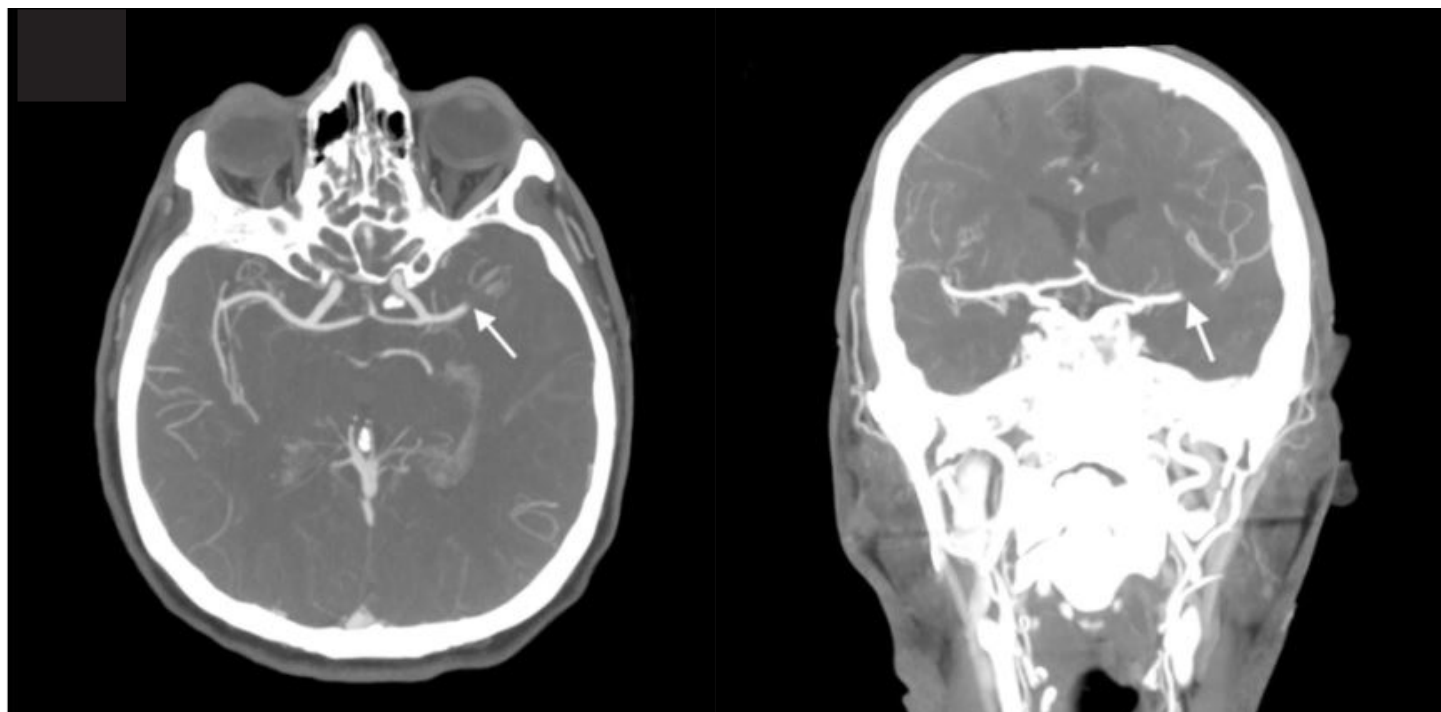


Figure 1. Transverse (left) and coronal (right) computed tomography angiogram demonstrating abrupt cutoff of the left middle cerebral artery at the site of the thrombus (marked by arrows).

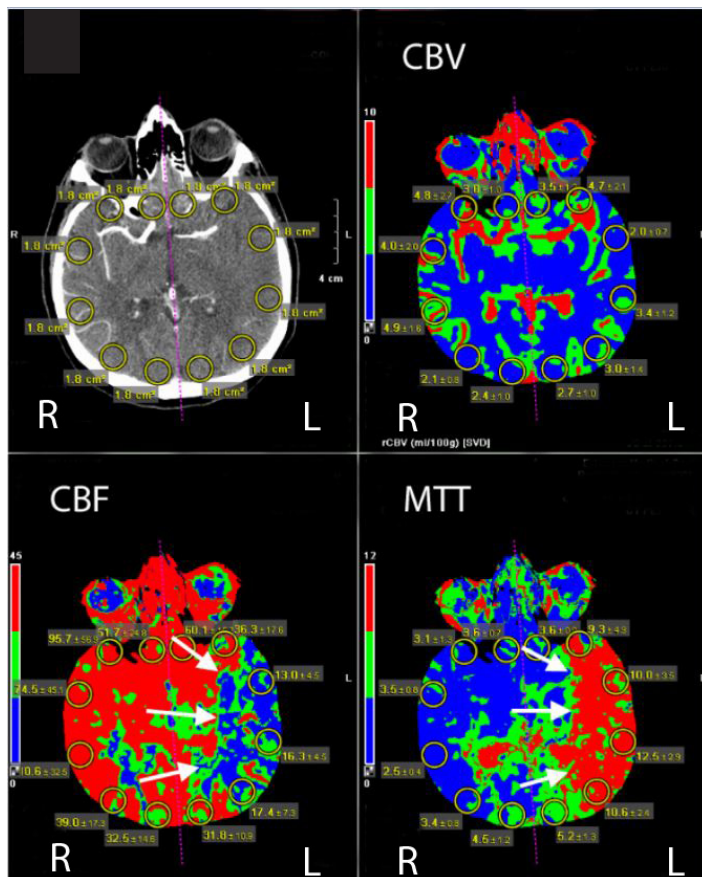


Figure 2. Computer-generated perfusion map demonstrating the region of the left cerebral hemisphere (CBV) with decreased cerebral blood flow and prolonged mean transit time (MTT) (marked by arrows). Note that this region of the brain has normal cerebral blood volume (CBV) indicating potentially salvageable brain tissue.

pre-discharge National Institute of Health Stroke Scale of 1. History prior to discharge revealed that the patient was non-compliant and had been off of his warfarin therapy for months prior to the stroke. The patient was discharged home on warfarin and statin therapy.

Acute stroke patients with unknown time of symptom onset are traditionally excluded from acute interventional therapy due to increased rates of fatal intracranial

hemorrhage when patients with infarcted brain are treated with TPA or endovascular therapy beyond the recommended time windows.^{1,2} CTP of the brain is a rapid means of distinguishing between viable and non-viable brain tissue.³ Early in the course of stroke, there is prolonged mean transit time (MTT), decreased cerebral blood flow (CBF), and equal or greater cerebral blood volume (CBV) in ischemic areas of the brain. As brain tissue infarcts, both the CBF and CBV decrease. Assessment of differences between CBF and CBV in areas of brain with prolonged MTT allows one to determine both the size of the stroke as well as the amount of salvageable brain tissue. CTP has the potential to guide acute stroke interventional therapy in patients with unknown time of symptom onset.

Address for Correspondence: Francis Fesmire, MD, University of Tennessee College of Medicine Chattanooga, 960 East Third Street, Suite 100, Chattanooga, TN 37403.
 Email: francis.fesmire@gmail.com.

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