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

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Supervising Section Editor: Sean Henderson, MD
Submission history: Submitted September 9, 2013; Revision received September 16, 2013; Accepted September 16, 2013
Electronically published December 9, 2013
Full text available through open access at \( \text{http://escholarship.org/uc/uciem_westjem} \)
DOI: 10.5811/westjem.2013.9.19507


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).
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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.\textsuperscript{1,2} CTP of the brain is a rapid means of distinguishing between viable and non-viable brain tissue.\textsuperscript{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.

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\textit{Conflicts of Interest}: By the WestJEM article submission agreement, all authors are required to disclose all affiliations, funding sources and financial or management relationships that could be perceived as potential sources of bias. Thomas G. Devlin has research funding from Covidian and Brainsgate, speaker’s honoraria from Genetech, and consultant for Codman. The other authors disclosed none.

\textbf{REFERENCES}
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