

Acute Ischemic Stroke: Potential Applications of Mean Transit Time (Mtt) Perfusion Maps Observed on a 320-Detector Row Ct Scanner

Michael F. Waters, MD, PhD,

Corresponding author

Michael F. Waters, MD, PhD,
Departments of Neurology and Neuroscience, University of
Florida College of Medicine, HSC Box 100236 Gainesville,

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Abstract

Background and Purpose: We present three individuals who experienced acute ischemic stroke and underwent using an Aquilion ONE for tomography perfusion (CTP) imaging (Toshiba Medical Systems, Nasu, Japan) Singular Value Decomposition Plus (SVD+) technique is used in a 320-detector row CT scanner to produce perfusion images. maps. The ischemic penumbra (IP) and infarct may be accurately predicted using these MTT maps in a sensitive and particular manner. core (IC) (IC)

Methods: Patients who had an acute ischemic stroke, undergone successful pharmacological and/or interventional reperfusion therapies, obtained high-quality whole-brain CTP scans, and a follow-up MRI or non-contrast CT (NCCT) scan were chosen for examination. Images were examined by a neuroradiologist using Vitrea FX 3.1 software, and the IC volumes were computed.

Conclusion: Muscle spindles may be hurt by the tourniquet's intense pressure. Ia-afferent activity may decline. drastically restricting voluntary motor activity.

Keywords

Mean transit time; Ischemic penumbra; Infarct core;CT Perfusion; Singular Value Decomposition plus; Deconvolution;Interventional endovascular procedures.

Introduction

Astrup first introduced the concept of ischemic penumbra (IP) in 1981.[1] referring to areas of the brain's tissue where there is enough blood flow reduced to the point of hypoxia and physiologic malfunction, yet not severe enough to result acute necrosis and permanent harm to a transient ischemia attack [2,3]. Finding the discrepancy between Identification of potential patients using IC and IP a greater chance of gaining from aggressive interventions therapies. The current medical benchmark for IP rescue is Tissue plasminogen activator intravenously given within 4.5 hours after the start of the symptoms. According to a few research, systemic Up to 9 hours postictus, thrombolysis is safe [4, 8]. additional new improvements in interventional techniques like Penumbra and Merci the window of opportunity for treatment for a recent stroke. Recently, More CTP is now available in emergency rooms for evaluation between IC and IP [9]. studies using earlier, 64-multi-dector predominantly IP has been identified as the dynamic CT scanner (MDCT), CT perfusion, and brain region with reduced CBF but normal or elevated CBV [10-12]. The region with CBV less than 2mL/100g is known as the IC. IP considered the surrounding tissue with a greater consideration than brain tissue. a CBF decrease of 145% and an increased mean transit time as well as compared to the hemisphere on the other side [13,14]. Prior to recently, CTP was limited to taking pictures of discrete tissue sections. Nevertheless, introduction modified the kinetics of perfusion scanning because of the Aquilion ONE. enabling isophasic and physiological imaging of the entire brain uniformity. It makes use of delay and whole head volumetric coverage. software that is insensitive to brain perfusion, allowing for more precise and thorough examination of cerebral perfusion The MTT maps are now more responsive to variations in flow thanks to the SVD+ algorithm for perfusion. Areas of reduced mean have been seen, as well. Areas of restricted diffusion correlate with travel duration on MTT maps. MR imaging,

Conclusion

We believe that the MTT maps produced by the Aquilion ONE 320 detector row CT scanner and calculated with SVD+ algorithm may be a sensitive and specific marker for capillary velocity in acute stroke. Thus, in IC where capillary velocity is

increased there is a corresponding decrease in the MTT. In IP where capillary velocity is decreased the MTT is increased. If this observation holds true in further studies, MTT maps generated in this fashion may prove to be a valuable imaging modality in differentiating between penumbra and infarct core, potentially allowing for greater extension of the thrombolytic treatment window in instances when the IC remains relatively small in the presence of a large IP. This would be particularly valuable in identifying salvageable brain tissue in patients with unknown time of symptom onset where brain physiology may be more valuable criteria than the clock in treatment decision making.

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