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Review article – *Special issue: Acute Ischemic Stroke*

Role of CT perfusion in acute stroke management

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ABSTRACT

Acute ischemic stroke is a leading cause of adult disability worldwide. Modern endovascular treatment for acute ischemic stroke is predicated on advanced imaging modalities and the identification of salvageable tissue. Unlike noncontrast computed tomographic (CT) imaging or traditional magnetic resonance imaging, CT perfusion (CTP) imaging offers an active view of cerebrovascular physiology with multiple parameters involved. Though limited by the different equipment and analytic software used to quantitatively assess the extent of ischemia and penumbra, CTP imaging nevertheless serves as an excellent tool for neurointerventionists. The rapidity by which CT perfusion may be obtained coupled with its potential for predicting infarct can lead to faster intervention times. Although each imaging modality offers its own set of advantages and disadvantages, we find from our experience that CTP utilized in conjunction with a clinical examination leads to an effective model for identifying patients suitable for endovascular intervention.

Contents

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Abbreviations: ASPECTS, Alberta Stroke Programme Early CT Score; CBF, cerebral blood flow; CBV, cerebral blood volume; CT, computed tomographic; CTA, CT angiography; CTP, CT perfusion; ECASS, European Cooperative Acute Stroke Study; IV, intravenous; MCA, middle cerebral artery; MRI, magnetic resonance imaging; MTT, mean transit time; NIHSS, National Institutes of Health Stroke Scale; NINDS, National Institute of Neurologic Disorders and Stroke (NINDS); NIHSS, National Institutes of Health Stroke Scale; r, relative; tPA, tissue plasminogen activator.

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Introduction

Acute ischemic stroke affects approximately 795,000 persons each year, resulting in an annual cost of $17.5 billion [1]. It remains the leading cause of adult long-term disability, with more than 50% of patients requiring discharge to a rehabilitation facility. Intravenous (IV) tissue plasminogen activator (tPA) remains the only treatment for acute ischemic stroke approved by the U.S. Food & Drug Administration. However, given the strict eligibility criteria, this treatment is administered to only a minority of patients, with less than 10% of stroke patients receiving IV-tPA [2].

Endovascular intervention is ushering in a new wave of stroke treatment. The recent publication of 5 randomized, controlled studies has demonstrated its beneficial effects on reperfusion and clinical outcome in patients with proximal, anterior-circulation occlusion [3–7]. Not limited by the strict

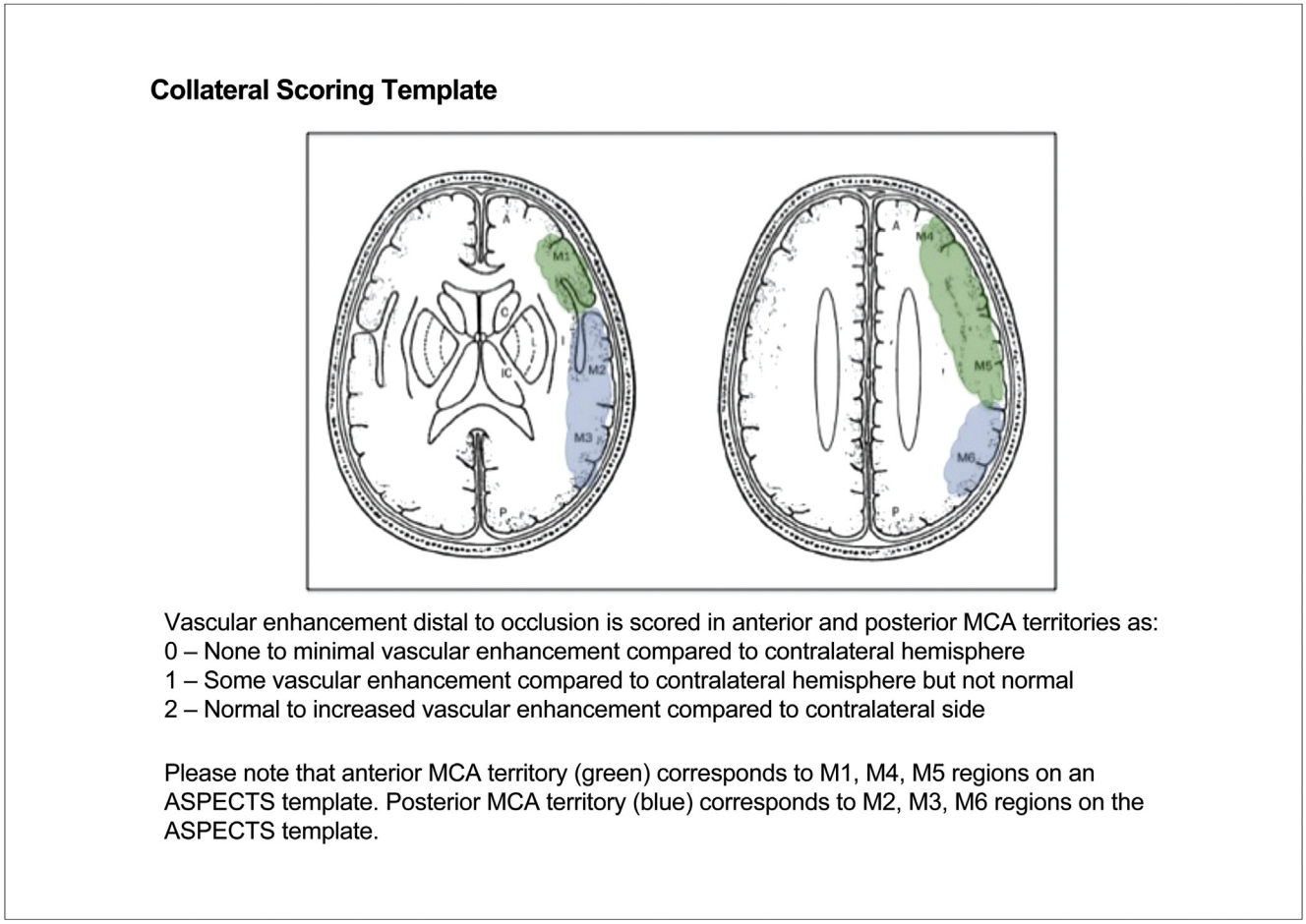

Fig. 1 – Schematic illustrations of head CT scans demonstrating ASPECTS collateral scoring.
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