Computed Tomography Angiography Versus Computed Tomography for the Diagnosis and Management of Hyperacute Stroke: A Review

Context
A stroke is a sudden loss of brain function caused by the interruption of blood flow to the brain, resulting in damage to the affected area. A patient arriving at the hospital within six hours of the onset of stroke symptoms is said to be experiencing a hyperacute stroke. Hyperacute care refers to the assessment, stabilization, and treatment in the first hours after stroke onset. The principal aim of this phase of care is to diagnose the stroke type, and to coordinate and execute the treatment plan as rapidly as possible.

Technology
Computed tomographic (CT) scans and computed tomography angiography (CTA) can be used to detect the presence of hemorrhage or an intravascular thrombus in the brain. While CT is widely used for distinguishing ischemic from hemorrhagic acute stroke, it is unable to determine the underlying structural vascular abnormality in hemorrhagic stroke, which is critical for instituting the appropriate treatment. CTA, which uses the injection of a special dye along with the CT scan to make blood vessels and tissues visible, is able to detect underlying structural abnormalities.

Issue
A review of the clinical evidence on the effectiveness of CT compared with CTA for the diagnosis of hyperacute stroke, as well as of the evidence-based guidelines, will help inform decisions on the choice of imaging modality for patients presenting with hyperacute stroke symptoms.

Methods
A limited literature search was conducted of key resources, and titles and abstracts of the retrieved publications were reviewed. Full-text publications were evaluated for final article selection according to predetermined selection criteria (population, intervention, comparator, outcomes, and study designs).

Key Messages
- CTA is better at differentiating between irreversibly infarcted and potentially salvageable brain tissue so that patients likely to benefit can be selected for therapy.
- Patients who have immediate access to any type of diagnostic imaging receive prophylactic medication sooner, resulting in better outcomes.
- Adding CT perfusion imaging to CTA can provide additional information that can help identify high-risk patients suitable for aggressive acute stroke prevention treatment.

The findings above are based on lower-quality evidence.

- CTA within three hours of the onset of symptoms is recommended for the diagnosis of hyperacute stroke, if it will not unduly delay the administration of intravenous tissue plasminogen activator (tPA).

Results
The literature search identified 250 citations, and 3 additional reports were retrieved from a grey literature search. Of these, 4 articles met the criteria for inclusion in this review: 3 retrospective studies, and 1 scientific statement containing a set of recommendations.