

AAN Releases Guideline on Magnetic Resonance Imaging for Diagnosing Acute Ischemic Stroke

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Literature search described? Yes

Evidence rating system used? Yes

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Computed tomography (CT) is the diagnostic standard for acute stroke even though its accuracy has not been formally established. The sensitivity of CT, which is estimated to be 12 to 92 percent, depends on the imaging features of infarction, time from onset to examination, and study populations, among other factors. Its sensitivity for diagnosing ischemic stroke in the initial hours is limited; therefore, improved accuracy is needed to develop and provide optimal stroke treatment.

Diffusion- and perfusion-weighted imaging, which are newer magnetic resonance imaging techniques, may improve diagnostic yield. Diffusion-weighted imaging measures the net movement of water in tissue due to random molecular motion, also known as brownian motion. It shows hyperintense ischemic tissue changes within minutes to hours after arterial occlusion caused by a reduced diffusion capacity within the affected tissues. Perfusion-weighted imaging allows the measurement of capillary perfusion. The American Academy of Neurology (AAN) evaluated the evidence for the use of magnetic resonance imaging in the diagnosis of acute ischemic stroke.

Clinical Questions and Recommendations

Diffusion- and perfusion-weighted imaging were assessed to determine their sensitivity

and specificity compared with other imaging modalities, and volume of diffusion- and perfusion-weighted imaging abnormality was evaluated to determine if it predicts initial clinical severity, final infarct size, and late clinical outcomes.

The AAN determined that diffusion-weighted imaging is superior to noncontrast CT for the diagnosis of acute ischemic stroke within 12 hours of symptom onset; however, there is insufficient evidence regarding the accuracy of perfusion-weighted imaging. Baseline diffusion-weighted imaging volume is probably useful in predicting baseline clinical stroke severity and final lesion volume in patients with anterior circulation stroke syndromes. It may also be useful in predicting clinical outcomes as measured by the National Institutes of Health Stroke Scale and Barthel Index. However, it may not be useful in predicting baseline National Institutes of Health Stroke Scale score in patients with posterior circulation stroke syndromes. Baseline perfusion-weighted imaging volume may be useful in predicting baseline clinical stroke severity.

Clinical Context

Noncontrast CT can be used to assess for infarct and to exclude hemorrhage and other structural lesions that can mimic stroke in patients with acute neurologic impairment. Diffusion-weighted imaging is superior to CT in the diagnosis of acute ischemic stroke within 12 hours of symptom onset relative to clinical and imaging outcomes. In clinical practice, however, cost, availability, and medical management requirements must be considered when making decisions about which imaging modality to use.

Practice Guidelines

The sensitivity of diffusion-weighted imaging is estimated to be 80 to 90 percent in the emergency evaluation of patients with possible stroke. Case series and small comparative studies have reported that diffusion-weighted imaging had almost 100 percent sensitivity for diagnosing stroke in the hyperacute stage; however, cases of diffusion-weighted imaging–negative stroke were increasingly reported. False-negative diffusion-weighted imaging may be attributable to mild strokes, brainstem location, and earlier time from onset. False-negative results may become less common as imaging improves.

Positive diffusion-weighted imaging in patients with transient ischemic attacks is common. Acute ischemic lesions on diffusion-weighted imaging are found in

approximately 40 percent of patients with transient ischemic attack; this finding correlates with symptom duration. A recent study determined that diagnoses based on diffusion-weighted imaging could result in increased annual incidence of stroke and reduced annual incidence of transient ischemic attack. ■

Answers to This Issue's CME Quiz

Q1. A	Q8. A, D
Q2. C	Q9. B
Q3. A, B, D	Q10. A
Q4. A	Q11. B, C
Q5. D	Q12. A
Q6. D	Q13. B
Q7. D	Q14. A

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