The Value of Diagnostic Imaging in Stroke—Are We Asking the Right Question?

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Cabral Frade et al report the findings of a single-center retrospective observational study of the potential value of magnetic resonance imaging (MRI) after initial computed tomography (CT) imaging in patients with ischemic stroke. They did not find any improvement in death or dependence at discharge or in death or recurrent stroke at 1 year in patients who had MRI (indeed the numeric trend was toward worse outcomes in patients who had MRI). The authors concluded that a CT-only imaging strategy met their prespecified noninferiority criteria, and that the value of routine MRI is questionable.

There is no plausible explanation for why performing an MRI would cause worse outcome 1 year later (noting this difference was not statistically significant). There may be confounding factors that contributed to both the clinician’s desire to obtain MRI and the worse outcome. Hence, is concluding that these results create doubt about the value of MRI in stroke patients a consequence of asking the wrong question?

There are probably very few investigations that should be performed routinely in all patients. Clinical judgment and discretion are required to ask whether the test will add value in addressing a clinical question about diagnosis, prognosis, or treatment selection, and therefore potentially change management. This may have been the intention of several acute stroke guideline recommendations issued by the AHA in 2018, chaired by Dr Powers, the senior author of Cabral Frade et al. One notable recommendation was that routine use of brain MRI in all patients with AIS is not cost-effective and is not recommended for initial diagnosis or to plan subsequent treatment. This recommendation regarding MRI along with recommendations against routine intracranial arterial imaging and echocardiography were subsequently rescinded after objections from clinicians in the stroke community.

A 2013 study has suggested a need for greater evidence that investigations lead to improved outcomes. This is a noble aim, but the standard of proof should probably be tempered against the cost, invasiveness, and risk profile of the investigation, as well as the opportunity cost of delaying the investigation for other patients when resources are limited. The practicality of obtaining such evidence is less certain, given the potentially very large sample sizes required to address small minimally important clinical differences and confounding variables. Furthermore, very few proven stroke interventions (including thrombolytic agents and endovascular thrombectomy) significantly reduce death. Most interventions reduce disability or recurrent stroke. It should therefore not be surprising that a diagnostic test performed during the acute admission would have no association with mortality.

There have been attempts to address the value of diagnostic stroke imaging in prospective studies. The Penumbra and Recanalisation Acute Computed Tomography in Ischaemic Stroke Evaluation (PRACTISE) randomized trial assessed routine CT perfusion and found reduced use of IV thrombolytic agents but equivalent outcomes, suggesting the omission of thrombolytic intervention based on imaging profile may have been appropriate. The French Acute Multimodal Imaging Study to Select Patients for Mechanical Thrombectomy (FRAME) prospective cohort study assessed MR perfusion imaging and found that patients with perfusion mismatch benefited from reperfusion whereas as those without probably did not. These are examples of focused questions and appropriate achievable outcomes.

Performing a diagnostic intervention does not in itself change outcome. The intervention may provide information that contributes to a therapeutic decision that changes outcome, but there are
many events that may intervene and be a potentially confounding factor in functional outcomes and mortality. Stroke is a clinically complex area, and it is important to consider whether there is a specific clinical question that a test will address before ordering any investigation. In the case of MRI after stroke, it may be to confirm the diagnosis, clarify stroke localization (eg, to confirm likelihood of a stenosis being symptomatic), provide hints of stroke causes, determine timing of anticoagulation, assess the severity of underlying small vessel disease, or assess prognosis. Asking any of these valid clinical questions may help improve clinical care by targeting subsequent therapies most appropriately. However, asking whether the imaging alters mortality may not be the right question.

ARTICLE INFORMATION
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