

Letters to the Editor

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Postcontrast Time-of-Flight MR Angiography Demonstrating Collateral Flow in Acute Stroke

To the Editor:

In their interesting study, Pedraza et al¹ showed that the postperfusion contrast-enhanced time-of-flight (TOF) MR angiography (Post-CE-MRA) can demonstrate arterial segment with low flow and avoid overestimation of vascular obstruction. We agree that Post-CE-MRA supplies additional information of vascular status in patients of acute ischemic stroke. But Pedraza et al¹ did not confirm the arterial status by using conventional angiography, and they mentioned that the limitation of Post-CE-MRA was difficult to differentiate between 2 situations: the presence of distal flow beyond a proximal vascular stenosis or the presence of a vascular occlusion with distal flow caused by the collateral circulation.

In our institution, we also used acute stroke MRI protocol including precontrast TOF MRA and Post-CE-MRA. We studied 10 patients (5 men, and mean age 66 years) with middle cerebral artery (MCA) infarction within first 6 hours (mean 2.5 hours) from symptom onset. We performed acute stroke protocol MRI. All patients had occlusion of MCA proximal segment (M1) on precontrast TOF MRA and the presence of distal flow beyond a proximal complete signal loss segment on Post-CE-MRA (Figure). After MRI, all patients performed digital subtraction angiography. Time interval of the 2 imaging was 47 to 102 minutes (mean 76 minutes). No patients received thrombolytic therapy before angiography. Conventional angiography revealed complete occlusion of the M1 segment of MCA (TIMI 0 flow) in all 10 patients with contrast filling the distal branches in a retrograde fashion beyond the occlusion site of the MCA via leptomeningeal and parenchymal collateral flow. The complete signal loss segment of POST-CE-MRA correlated with the site of complete MCA occlusion segment on conventional angiography. Our experience would suggest that Post-CE-MRA flow voids represent complete occlusion with distal retrograde collateral filling. The subtotal occlusion situation was not seen on conventional angiography. This may be attributable to the sample size, and further experience is required. It is possible in some cases that the occlusion progressed from subtotal to complete in the time between the post-CE-MRA and conventional angiography studies.

Distinguishing between subtotal occlusion and distal retrograde collateral filling may be helpful in early stroke treatment decision-making. Presence of residual flow or subtotal occlusion is associated with better recanalization rates with intravenous thrombolytic therapy.² The IV tissue plasminogen activator alone approach may be sufficient. Complete occlusion with distal retrograde collateral filling has been demonstrated to

predict good outcomes in patients receiving intra-arterial thrombolysis.^{3,4} Because IV tissue plasminogen activator is less successful at recanalization in complete occlusion, an intra-arterial approach could be justified.

We agree with Pedraza et al¹ that post-CE-MRA has value in acute stroke for detected clot burden and ruling out slow flow from no flow. We agree that post-CE-MRA should be included in MRI of acute stroke MR.⁵ Our initial experience confirms that distal flow signal intensity beyond the obstruction represents retrograde collateral filling in most cases.

Disclosures

None.

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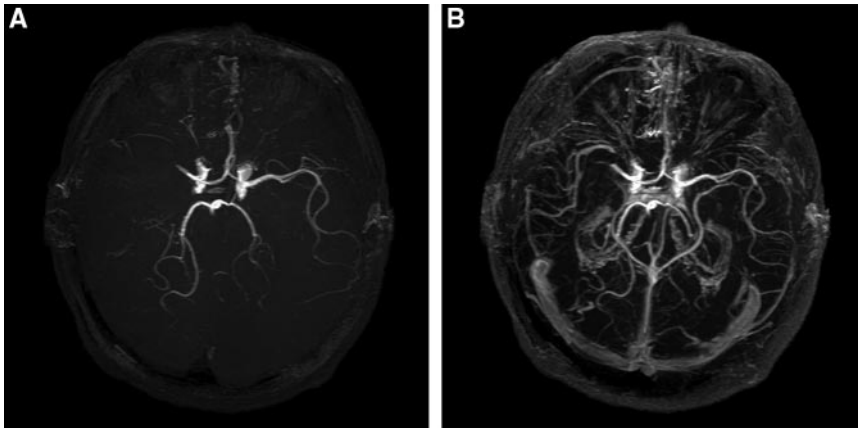
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1. Pedraza S, Silva Y, Mendez J, Inaraja L, Vera J, Serena J, Davalos A. Comparison of preperfusion and postperfusion magnetic resonance angiography in acute stroke. *Stroke*. 2004;35:2105–2110.
2. Labiche LA, Malkoff M, Alexandrov AV. Residual flow signals predict complete recanalization in stroke patients treated with tPA. *J Neuroimaging*. 2003;13:28–33.
3. Khatri P, Neff J, Broderick JP, Khoury JC, Carrozzella J, Tomsick T. Revascularization end points in stroke interventional trials: recanalization versus reperfusion in IMS-I. *Stroke*. 2005;36:2400–2403.
4. Takada T, Yasaka M, Minematsu K, Naritomi H, Yamaguchi T. Predictors of clinical outcome in patients receiving local intra-arterial thrombolysis without subsequent symptomatic intracranial hemorrhage against acute middle cerebral artery occlusion. *AJNR Am J Neuroradiol*. 2004;25:1796–1801.
5. Yang JJ, Hill MD, Morrish WF, Hudon ME, Barber PA, Demchuk AM, Sevick RJ, Frayne R. Comparison of pre- and postcontrast 3D time-of-flight MR angiography for the evaluation of distal intracranial branch occlusions in acute ischemic stroke. *AJNR Am J Neuroradiol*. 2002;23:557–567.



Precontrast (A) TOF MRA shows occlusion of right MCA proximal portion. Post-contrast (B) TOF MRA visualizes complete signal loss segment with contrast filled distal MCA branches at the right MCA.

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