

Intravenous Versus Intra-arterial Thrombolysis for Acute Ischemic Stroke Secondary to Basilar Artery Occlusion

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TO THE EDITOR

I read with great interest a recent article in the Journal of Cerebrovascular and Endovascular Neurosurgery by Park et al. titled 'Endovascular mechanical thrombectomy in basilar artery occlusion: Initial experience'.⁶⁾ The authors report the outcomes of 16 patients with symptomatic basilar artery occlusion (BAO) treated with endovascular thrombectomy. Four patients presented within three hours of symptom onset and were administered the standard dose of intravenous (IV) recombinant tissue plasminogen activator (tPA). Endovascular therapy was performed in these patients for clinical deterioration despite IV thrombolysis. The remaining 12 patients presented after the three hour window and were treated with primary endovascular intervention. The median time interval between symptom onset and endovascular procedure initiation was 5.8 hours. The initial mechanical thrombectomy was attempted

using the Penumbra clot aspiration system (Penumbra, Alameda, CA, United States). The Solitaire stentriever device (ev3, Plymouth, MN, United States) was used if recanalization with the Penumbra system failed. The BAO site was evenly split between proximal and distal.

The authors achieved a recanalization of Thrombolysis in Cerebral Ischemia (TICI) grade IIa or higher in 81% of patients. Marked or complete neurological improvement, as determined by the National Institute of Health Stroke Scale (NIHSS), was observed in 44% of patients. At three month follow-up, the modified Rankin scale (mRS) score was 2 or less in 56% of patients. Post-treatment hemorrhagic transformation occurred in 38% of cases, and the mortality rate was 6%. Interestingly, it appears from the results that patients treated six hours after symptom onset tended to fare better than those treated within six hours of

symptom onset although the study was not adequately powered to detect a statistically significant treatment difference.

The supratentorial and infratentorial compartments have many anatomical disparities. The most notable distinction between the compartments is the relatively confined boundaries of the infratentorial space. Even moderately sized space-occupying lesions, such as posterior fossa hematomas, may result in rapid neurological decline due to brainstem compression or obstructive hydrocephalus. Therefore, clinicians are particularly fearful of tPA-induced symptomatic intracerebral hemorrhage (SICH) in patients with posterior circulation stroke (PCS). The Safe Implementation of Thrombolysis in Stroke (SITS) score was described by Mazya et al. as a tool to predict the risk of SICH following administration of IV tPA in acute ischemic stroke patients.⁴⁾ The score was derived from analyzing the baseline characteristics, presenting symptoms, and clinical outcomes of over 31,000 stroke patients treated with IV tPA. Based on nine independent risk factors for SICH including baseline NIHSS, serum glucose, systolic blood pressure, age, weight, time interval from symptom onset to treatment, use of antiplatelet therapy, and history of hypertension, a SITS score between 0 and 12 is calculated. The predicted risk of SICH varies widely, from 0.2% for a score of 0, to 14.3% for a score of 10 or greater. However, a recent study by Sung et al. suggests that the SITS score may overestimate the risk of SICH in PCS patients by a wide margin.⁹⁾

Ischemic lesions of the posterior circulation are unforgiving due to the multiple perforator branches from the vertebral, basilar, and cerebellar arteries which supply the brainstem. Occlusion of even a single perforator vessel may be neurologically devastating. Therefore, an aggressive approach to revascularization of acute thromboembolic posterior circulation lesions may be warranted. From a prospective, multicenter registry of 619 patients with BAO, Vergouwen et al. found that increasing time to revascularization ther-

apy, either IV or intra-arterial, was associated with a higher risk of poor functional outcome, defined as mRS score of 4 or higher, at one month follow-up.¹⁰⁾ Patients who received treatment over six hours after symptom onset were significantly more likely to have poor outcomes. Strbian et al. reported the outcomes of 184 patients with BAO who were treated with IV tPA and concomitant full-dose heparin.⁸⁾ Greater age, higher baseline NIHSS, failure to achieve recanalization of Thrombolysis in Myocardial Infarction (TIMI) grade 2 or higher, history of atrial fibrillation, and SICH were independent predictors of poor outcome (mRS score 3 or higher). However, the time interval from symptom onset to treatment (range 0 to 48 hours) was not associated with functional outcome, leading the authors to conclude that for cases of BAO without extensive baseline ischemia, recanalization should be attempted up to 48 hours after symptom onset.

IV thrombolysis is the standard therapy for acute ischemic stroke. Despite the initial promise of endovascular mechanical thrombectomy, recent randomized controlled trials have failed to demonstrate a benefit of mechanical thrombectomy over IV thrombolysis.¹⁻³⁾ Novel endovascular clot retrievers, known as stentriever devices, have exhibited angiographic and clinical superiority to first generation mechanical thrombectomy technologies.⁵⁾⁷⁾ The median baseline NIHSS score was 24, and the median time between symptom onset and treatment was 4.2 hours. The rate of successful recanalization, defined as a TICI grade of 2b or 3, with thrombectomy alone was 75% and for combined thrombectomy and stent placement was 88%. At three months follow-up, the mortality rate was 29% whereas the rate of favorable outcome (mRS score of 2 or lower) was 33%. These sobering results highlight the discrepancy between angiographic and clinical outcomes achievable with current endovascular approaches and the dismal prognosis associated with BAO.

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RESPONSE

In acute ischemic stroke due to large artery occlusion, device improvements have led to a high rate of successful recanalization; more than 90% success can be achieved now. In actual practice, however, clinical improvement after successful recanalization is not more frequent than expected. Recent trials show this futility of intra-arterial thrombectomy,¹⁻³⁾ a gap between successful recanalization and good clinical outcome. This gap has now become apparent and will be a main target of future research.

In a recent article in the *Journal of Cerebrovascular and Endovascular Neurosurgery* by Park et al. titled 'Endovascular mechanical thrombectomy in basilar artery occlusion: Initial experience', the authors achieved a good clinical outcome in 56% of their cases.⁴⁾ However, intra-arterial thrombectomy does not lead to a good clinical outcome in every patient with acute ischemic stroke in the posterior circulation, because the posterior circulation is strongly associated with the futile recanalization.

Therefore, if intra-arterial thrombectomy in the posterior circulation is futile, the recommendation of posterior circulation stroke that favors aggressive treatment will be only for neurointerventionists, and regarded by patients and other physicians. We still need further evidence and research.

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