Reply to: "Early neurological deterioration in acute ischemic stroke"

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Dear Editor,

We are very thankful to Çelik et al. for their interest in our recent work[1] and their useful comments.[2] First, early neurological deterioration (END) in the acute phase of ischemic stroke usually leads to a marked increase in disability and mortality rates, after reperfusion treatment due to diverse mechanisms.[3] END was defined as an increment of the National Institutes of Health Stroke Scale score ≥2 points in the first 72 hours. The potential mechanism may involve either brain damage (eg, recurrent stroke, collateral failure, clot progression, hemorrhagic transformation, edema, increased intracranial pressure, seizure) or systemic derangements such as glycopenia, hyponatremia, infection, hyoxemia, and hypotension.[4,5] These mechanisms may not be mutually exclusive but could be seen as a supplementary and may be of varying degrees of different patients. However, not all mechanisms that have proven to be correlative after a stroke are limited to END. Second, END may reflect collateral circulation, not necessarily recanalization or re-occlusion. Angiography may depict collaterals and the vascular disorders of early clinical fluctuations. Dramatic resolution of END and significant clinical response to advanced mechanical thrombectomy may be attributed to exceptional collateral blood flow, whereas collateral failure may be the cause of deterioration following initial improvement. In addition, this is a single-center retrospective study, and only a few patients accepted postoperative evaluation by computed tomography angiography (CTA), magnetic resonance angiography (MRA), or digital subtraction angiography (DSA), which was used to assess collateral circulation. Collateral circulation is an important variable of good functional outcome following thrombolytic therapy, but collateral persistence is erratic.[6] Insufficient collateral circulation is rarely defined by serial angiography, and the pathophysiological mechanism of retrograde leptomeningeal collateral flow remains obscure. Clinical predictors of collateral capacity or endurance remain unclear. Further studies of the pathophysiology of the collateral may reveal predictive clinical or imaging features and reveal collateral therapeutic approaches to enhance revascularization.

There are several limitations in the present study. First, it is a single-center retrospective observational study. Data on some potential predictive variables are lacked. Second, the inclusion criteria were different in individual trials. In our study, all eligible patients within 4.5 hours after the symptom onset were intravenously administered with recombinant tissue plasminogen activator (rt-PA) (0.9mg/kg) and then immediately transferred to the DSA room for repeating imaging. Endovascular therapy was performed in the patients according to the following criteria: catheter-accessible persistent occlusion of internal carotid artery (ICA) and M1 of the middle cerebral artery (MCA) on follow-up DSA after rt-PA therapy. In particular, exclusion criteria comprised (1) renal or hepatic disease, unstable angina, ventricular aneurysm, myocardial infarction, heart failure, malignant disease, vascular malformations, aneurysm, hemorrhagic stroke, and brain surgery and (2) patients with a previous history of carotid endarterectomy or carotid artery stenting. In addition, atherosclerotic stroke was the main type of stroke in this study, excluding most patients with heart disease (cardiogenic embolism accounts for 4/213), whereas troponin[7] and brain natriuretic peptide (BNP)[8] are biochemical markers of myocardial damage and heart failure, respectively. In other words, troponin and BNP may be associated mainly with cardioembolic infarcts. Therefore, even if the two indicators were added, it might not change the results of this study.

In conclusion, it represents a hospital-based cohort and is not population based. Designing an intervention study, for example, with a limited age span might cause a bias in what subtypes will be included in the study. Future research can be explored whether troponin and BNP levels on admission contribute directly to the END and endovascular therapy (EVT) in patients with acute ischemic stroke.

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