Recanalization of occluded cerebral arteries is an essential strategy for hyperacute ischemic stroke. Intra-arterial access for thrombolysis of the occluded middle cerebral artery (MCA) is promising (1), although severe carotid stenosis is an obstacle to introduction of the microcatheter to the occlusion site in the MCA. Here, we report a patient with an artery-to-artery embolic stroke originating in the stenotic carotid artery, for whom combined and staged endovascular recanalization of the cervical internal carotid artery (ICA) and MCA was successful.

A 57-year-old right-handed man with untreated hypertension suddenly developed total aphasia and right hemiplegia one morning and was emergently admitted to our hospital. On admission, his blood pressure was 180/88 mmHg and pulse rate was 74/min and regular. The initial National Institutes of Health Stroke Scale (NIHSS) score, indicating neurological severity, was 17. Diffusion-weighted magnetic resonance imaging demonstrated multiple hyperintense lesions in the territory of the left MCA, suggesting fresh infarcts (Fig. 1A). On magnetic resonance angiogram, the left ICA was obscure, and the left MCA was occluded in the middle of the horizontal portion (Fig. 1B). On cervical ultrasound, the left ICA was severely stenotic at the origin due to an echolucent plaque, suggesting a soft atheroma that could be an embolic source to the distal artery (Fig. 1C). The peak systolic velocity of the stenotic ICA exceeded 3.0 m/sec. We therefore diagnosed the patient as having an artery-to-artery embolic stroke, originating in the cervical ICA and going to the MCA.

Endovascular therapy was started 3 hours after stroke onset. After placement of a 6F shuttle sheath (Cook Incorporated, Bloomington, IN, USA) in the CCA, the Guard-Wire plus distal protection balloon (Medtronic, Santa Rosa, CA, USA) was navigated to the ICA through the stenosis at the ICA origin. The stenotic ICA was moderately dilated with a Gazelle balloon (4 mm in diameter, 2 cm in length, Boston Scientific, Fremont, CA, USA) for percutaneous transluminal angioplasty (PTA) to allow a catheter to pass through under the distal protection (Fig. 1D, E); after PTA, the debris was aspirated. Then, a renegade microcatheter (Boston Scientific) was advanced into the occlusion site in the MCA, and 12,000 units of urokinase was infused locally; this was followed by dilatation with the Gateway PTA balloon (Boston Scientific) of 2 mm in diameter, 9 mm in length. Within 6 hours after stroke onset, the posterior branches of the MCA were completely reopened and the anterior branches were partially reopened (Fig. 1G, H). The NIHSS score decreased to 1 on the following day. IV heparin was started after checking for the absence of hemorrhagic infarcts on CT, and it was replaced with oral ticlopidine (200 mg/day) 5 days later. At 35 days after the stroke, in order to obtain complete recanalization, a SMARTRe self-expandable stent (Cordis, Miami Lakes, FL, USA) was placed at the ICA origin (Fig. 1F). The modified Rankin Scale at 3 months was 0. The patient has not developed stroke again for three years with treatment by oral aspirin (100 mg/day).

Although each of these cervical and intracranial endovascular procedures is known to be useful for treating ischemic stroke, their use in combination has been rare, perhaps because of the limited therapeutic time window during the hyperacute phase and the complexity of the technique. Since complete reopening of the severely stenotic carotid artery during the hyperacute phase may cause hyperperfusion syndrome and hemorrhagic transformation of infarcts, staged dilatation of the artery in the chronic stage appears to be a safer option. A problem in the present technique is the risk of distal embolism from the echolucent carotid plaque after PTA, because such a plaque is often unstable and embolicogenic. Our distal protection might not be safe enough. A recently reported technique using a proximal occlusion catheter with reversal of flow appears to decrease the risk of embolic complication (2, 3). Thrombolysis using intravenous recombinant tissue plasminogen activator was not approved in Japan when this patient developed stroke; the strategy has been approved for acute stroke since 2005, and may be available in such a patient now (4). In the present case, the
combined and staged endovascular recanalization as emergent therapy for artery-to-artery embolic stroke originating in a carotid arterial stenosis was effective. After PTA for unstable carotid plaque, however, it is critical to be aware of possible distal embolism, acute restenosis, or occlusion of the operated artery.

References


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