The early period of spontaneous recanalization is commonly described as within hours to weeks after internal carotid artery (ICA) occlusion. Of occlusion due to carotid artery dissection (CAD), early recanalization is observed in 57–69% of cases.[1] CAD is a highly dynamic process with dramatic morphological changes in the early stage of the disease; however, little is known about the radiographic findings in the initial week.

A 62-year-old male with a history of Type 2 diabetes and long-term smoking presented at the Department of Neurology, China-Japan Friendship Hospital for loss of vision in the left eye and right hemiparesis, which lasted for four days. He denied the history of recent head and neck trauma or previous radiation to the neck. The history of any valvular or ischemic heart disease was unremarkable. General physical examination was normal. Neurological examination showed incomplete motor aphasia, right central facial palsy, and right-sided hemiparesis, with 4 of 5 muscle strength. Routine biochemical tests were normal except for mild elevated triglycerides (1.94 mmol/L) and glycosylated hemoglobin (7.5%). Other hematologic tests were within normal ranges. The head MRI showed watershed and a small cortical ischemic infarction in the left cerebral hemisphere with diffusion abnormality on the diffusion-weighted image (DWI), which disclosed the evidence of acute ischemia in the left ICA territory. Reconstruction of computed tomography angiography (CTA) that was performed six days after onset confirmed flame-like occlusion of left ICA 2 cm above the carotid artery bifurcation, suggesting ICA dissection [Figure 1a–1c]. A color duplex carotid ultrasound also revealed total occlusion of the left ICA. ECG and echocardiography were normal. Transthoracic echocardiography did not disclose thrombus formation, valvular disease, or intracardiac shunt pathways. Contrast transesophageal echocardiography did not find patent foramen ovale or pulmonary arteriovenous malformation.

Given the history of acute stroke, the absence of heart abnormalities, and the morphological characteristic of ICA occlusion in CTA, the patient was suspected to have a CAD. He was treated with 100 mg aspirin and 75 mg clopidogrel daily. Then, the patient’s neurologic status slightly improved.

Digital subtraction angiography (DSA) was performed 19 days after stroke, revealing spontaneous recanalization of the left proximal ICA with forward flow [Figure 1d]. The left common carotid artery and the aortic arch were well visualized without any stenosis or atherosclerotic plaque. No surgical intervention was performed. The carotid ultrasound showed that the thrombus in the left extracranial ICA had disappeared and the blood flow velocity and waveform had returned to normal. The microembolic screening by transcranial Doppler was carried out one day later, and two microembolic signals (MES) were observed in the left middle cerebral artery in 30 min. To find out the source of microembolus, the high-resolution MRI (HRMRI) of
cervical artery was performed four days later; however, no typical appearance of dissection or atherosclerotic plaque was found [Figure 1e and 1f].

In CAD, a tear in the intima of the artery allows blood to enter the wall of the artery and split its layers to form an intramural hematoma, which can expand to the point that the artery becomes stenotic, irregular, or completely occluded. As the majority of ICA occlusions are due to atherosclerosis,[1] the differentiation between the atherosclerotic disease and CAD is important. In CAD patients, the occlusion frequently locates 2–3 cm distal to the common carotid bifurcation and has a tapered, flame-like appearance, which is consistent with the findings in CTA of our patient. In contrast, atherosclerotic changes usually only locate at the ICA origin. Moreover, in this case, other causes of ICA occlusion such as trauma, radiation, tumor invasion, fibromuscular dysplasia, and cardiogenic emboli were ruled out because no relevant evidence was found. Above all, we speculated that the occlusion in our case might be caused by spontaneous dissection.

Nevertheless, several aspects made this case interesting. First, the DSA performed 19 days after onset did not find any features of dissection such as an intimal flap or a double lumen. The CTA showed the occlusion of ICA after six days of the onset, so the recanalization should occur in the recent 13 days before DSA. The probability of completely healing of intima or absorption of intramural hematoma in 13 days was extremely low even though after recanalization. In addition, Akiyama et al.[2] observed the intimal flap persisting even after vascular recanalization, which was confirmed by the DSA. DSA, which can only show the morphological feature of the lumen, cannot reveal the feature of the vessel wall, especially after the healing of tear in the intima. Compared with DSA, HRMRI can provide excellent depiction of both the lumen (occlusion, stenosis, and luminal thrombus) and the vessel wall (crescent mural hematoma, pseudoaneurysm, double lumen, and intimal tear). Hence, we performed HRMRI, expecting to discover the subtle changes in the vessel wall. Limited previous studies suggested that, in CAD, the walls of injured vessels are thickened, often with the presence of a demonstrable flap.[3] However, the HRMRI in this case did not show any specific abnormalities. Second, the detection of MES after recanalization was quite unpredictable. It is reported that more than 90% of infarcts due to dissection are thromboembolic, and the prevalence of MES in acute CAD varied from 56% to 66%, but the prevalence after recanalization remains unclear. In this case, DSA and HRMRI did not find any abnormalities in the lumen and vessel wall, so where the microemboli came from was still unclear.

The morphological change in CAD after early recanalization is ill-defined. To our knowledge, reports regarding the features of both lumen and vessel wall through HRMRI in the early recanalization is rare. Radiology plays a pivotal role in the analysis of mechanism of recanalization and the decision of treatment. Follow-up in the early period after occlusion is necessary so as to reveal recanalization timely.

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Conflicts of interest
There are no conflicts of interest.

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