

# Huge Free-Floating Thrombus in the Internal Carotid Artery Under Duplex Ultrasound Surveillance

## A Case Report

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**Introduction:** Carotid free-floating thrombus (FFT) is an unusual finding in acute ischemic stroke. Atherosclerosis is the most common etiology of FFT formation.

**Case Report:** Here we report a 42-year-old male patient admitted to our department with left temporal and parietal lobe ischemic stroke with normal magnetic resonance angiography. A huge FFT in the left internal carotid artery were found by duplex ultrasound. Acute thrombosis based on atherosclerotic plaque were considered as the reason of this embolization. The thrombus shrunk significantly under anticoagulation and antiplatelet treatment.

**Conclusions:** Evaluation of the intracranial vessel in the emergency is not enough and early carotid duplex ultrasound can help find of the FFT in time, which help to choose the early intervene by neurosurgeon. Early antithrombotic treatment can be a safe treatment option for reducing huge thrombus based on the nature of thrombus formation. Computed tomography angiography and high-resolution magnetic resonance imaging to certify the character of the plaque are recommended for plaque evaluation.

**Key Words:** free-floating thrombus (FFT), ischemic stroke, duplex ultrasound (DUS), atherosclerotic plaque

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Intraluminal free-floating thrombus (FFT) in the internal carotid artery is an unusual finding in patients with acute ischemic stroke. It is a blood clot attached to the arterial wall with surrounding blood flow at its distal component, and 29.5% FFT were diagnosed by carotid duplex ultrasound (DUS).<sup>1</sup> Early application of DUS to evaluate carotid artery may help to select timely and proper treatment for cerebral infarction patients. Computed tomography angiography and high-resolution contrast-enhanced magnetic resonance

angiography of cervical arteries are recommended for plaque evaluation to certify the characteristics of the plaque. There is still no consensus on whether patients with FFT should undergo anti-coagulation in the acute phase, receive monoclonal or dual-antiplatelet agents, or combine antiplatelet and anticoagulant agents. Acute carotid revascularization should be performed with caution because of the increased risk of stroke.

### CASE REPORT

A 42-year-old man was found with sudden onset of slow response by his wife and was admitted to the emergency of neurology within 6 hours. He had no history of hypertension, coronary artery disease, diabetes mellitus, and stroke before. Neck injury were denied. Specific medical, family, and psychosocial history were denied. The neurological examination suggested Gerstmann syndrome, and brain magnetic resonance imaging indicated left temporal and parietal lobe ischemic stroke (Figs. 1A, B). Early assessment of intracranial vessel with magnetic resonance angiography indicated no significant vascular stenosis (Figs. 1C, D). Blood tests showed increased high sensitive C-reactive protein (6.37 mg/L, 0 to 3 mg/L) and low folate status (2.66 ng/mL, 3.89 to 26.8 ng/mL). No abnormality was found in blood routine examination, hepatic and renal function, electrolyte, triglyceride, cholesterol, high-density lipoprotein, low density lipoprotein and homocysteine. Aspirin was started first in the emergency and he was admitted in hospital 24 hours after the onset. On the first day of hospitalization, a huge FFT was found in the left internal carotid artery by DUS (Fig. 1E). Intima-media thickness can be seen at axial and longitudinal view of carotid artery (Figs. 1E, J). Motion of thrombus near the vascular wall at proximal was more weaken compared with the motion of thrombus free in the vascular, and was almost the same with vessel wall (Fig. 1I). Motion of thrombus at distal was in consistent with blood flow (Fig. 1J). Neurosurgeons suggested carotid endarterectomy after 2 weeks. Aspirin, clopidogrel, argatroban, atorvastatin, and probucol were taken. After the combined treatment, the patient showed no neurological deficit. We conducted DUS monitoring on the third and seventh day of admission, and FFT gradually decreased and the effective vascular cavity gradually increased. FFT significantly shrunk after 11-day-treatment (Figs. 1F, G) and was almost disappeared after 32 days (Fig. 1H). Ulcer plaque can be seen at distal section of common carotid artery, while vessel wall was smooth in the internal carotid artery (Fig. 1H), which further provided evidence of atherosclerotic plaque.

### DISCUSSION

Carotid FFT is very rare in patients with acute stroke. Although atherosclerosis is the most common etiology of FFT formation, FFTs can be formed by different pathophysiology and occur in various dimensions and localizations, the choice of treatment should be evaluated carefully on a patient basis.<sup>2</sup> Lacking computed tomography angiography or high-resolution magnetic resonance imaging to certify the character of the plaque is shortcoming and are highly recommended in the future plaque evaluation. In this case, a huge thrombus in left internal carotid artery was found by DUS and no certain history was found for the formation of this FFT. On the basis of the DUS results, nature of the thrombus was analyzed. Hypoechoic

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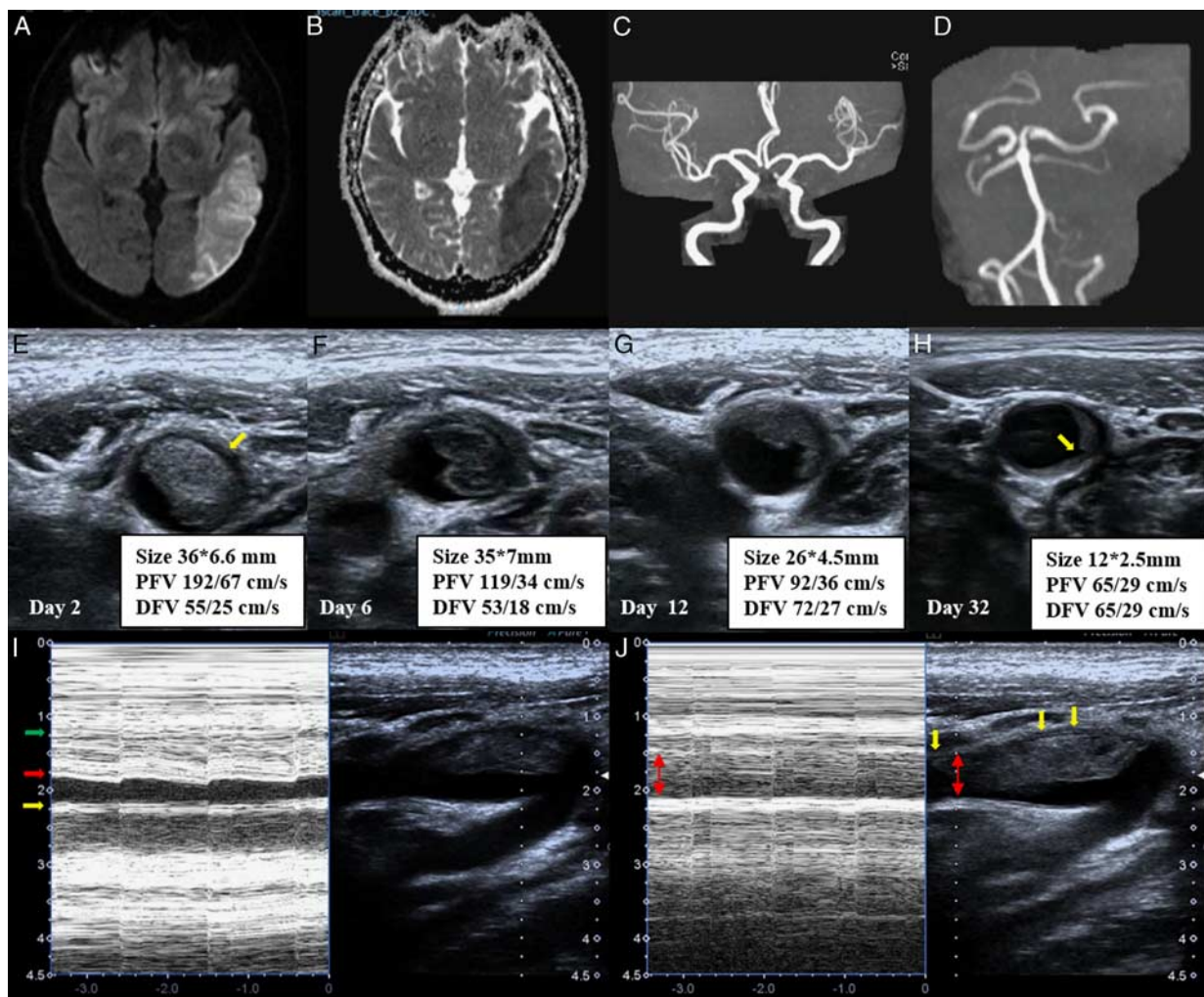
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**FIGURE 1.** A, Diffusion weighted imaging. B, Apparent diffusion coefficient. C and D, Magnetic resonance angiography. E–H, Free-floating thrombus changes detected by duplex ultrasound. The space between intact intima and thrombosis (yellow arrow in E), tiny ulcer of the residual plaque (yellow arrow in H). I, Motion of thrombus at proximal. Motion of thrombus near the vascular wall at proximal was more weakened compared with the motion of thrombus free in the vascular, and was almost the same with vessel wall as the arrows show. J, Motion of thrombus at proximal and distal was in consistent with blood flow, intima-media thickness can be seen at axial and longitudinal view of carotid artery as the yellow arrows show. DFV indicates distal flow velocity; PFV, proximal flow velocity.

plaque in the vessel wall can be seen, with rough surface. Acute thrombosis based of the atherosclerotic plaque was considered as the reason of this formation of FFT.

Furthermore, evaluation of the intracranial vessel in the emergency is not enough and early carotid DUS can help early finding of the FFT, which help to choose the early intervene by neurosurgeon. In this case, the thrombus shrunk significantly under anticoagulation and antiplatelet treatment. Carotid stenosis was finally < 50% and carotid endarterectomy was not recommended as a first-line treatment.<sup>3</sup> Critical stenosis of the internal carotid artery was alleviated, so endarterectomy was no more needed for him. Early antithrombotic treatment can be a safe treatment option for reducing huge thrombus. No further ischemic events and recurrence occurred during the 1-year of follow-up after this stroke. Although, as the patients have benefits from the anticoagulation and antiplatelet therapy or surgical approaches in previous reports.<sup>4,5</sup> Which is the most appropriate management for FFT still needs to be individualized

by detailed arterial imaging evaluation and dynamic monitoring of the thrombus.

**REFERENCES**

1. Fridman S, Lownie SP, Mandzia J. Diagnosis and management of carotid free-floating thrombus: a systematic literature review. *Int J Stroke.* 2019;14:247–256.
2. Vassileva E, Daskalov M, Stamenova P. Free-floating thrombus in stroke patients with nonstenotic internal carotid artery—an ultrasonographic study. *J Clin Ultrasound.* 2015;43:34–38.
3. Tolaymat B, Irizarry K, Reif M, et al. Considerations beyond stenosis for carotid endarterectomy in treating free-floating thrombus of the carotid artery. *Ann Vasc Surg.* 2019;60:221–228.
4. Bhogal P, AlMatter M, Aguilar Pérez M, et al. Carotid stenting as definitive treatment for free floating thrombus—review of 7 cases. *Clin Neuroradiol.* 2020. [Epub ahead of print].
5. Bhatti AF, Leon LR Jr, Labropoulos N, et al. Free-floating thrombus of the carotid artery: literature review and case reports. *J Vasc Surg.* 2007;45:199–205.