

CASE REPORT

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# Rapid resolution of newly formed carotid free-floating thrombus through anticoagulation therapy

Fuli Xie<sup>1†</sup>, Lili Liang<sup>1,2†</sup> and Yuzhou Wang<sup>1,2\*</sup>

## Abstract

**Background** Carotid free-floating thrombi (CFFT) are uncommon but pose a high risk of embolic stroke. While vascular intervention is often favored, this case study demonstrates the potential of short-term anticoagulation, guided by thorough imaging, as an alternative treatment strategy.

**Case presentation** We present a patient with an acute ischemic stroke (NIHSS 15) due to middle cerebral artery (MCA) occlusion. Intravenous alteplase successfully revascularized the MCA. However, subsequent imaging revealed a CFFT as the likely source of the occlusion. Rather than immediate surgical intervention, we opted for a treatment strategy guided by comprehensive radiological assessments, including high-resolution MRI and serial ultrasounds. These assessments suggested the thrombus was newly formed. Based on this, we hypothesized it would be responsive to anticoagulation. Indeed, short-term enoxaparin therapy resulted in significant resolution of the CFFT.

**Conclusions** This case highlights the efficacy of anticoagulation for treating newly formed CFFT, suggesting a potential alternative to immediate intervention when guided by detailed radiological evaluation. This case introduces a novel approach that may expand treatment options for this challenging condition.

**Keywords** Carotid free-floating thrombus, Ischemic stroke, Radiology, Anticoagulation

## Background

A carotid free-floating thrombus (CFFT) is a clot attached to the carotid artery wall, exhibiting periodic fluctuations with the cardiac cycle [1]. The etiology of CFFT is diverse and commonly attributed to atherosclerosis and hypercoagulation [2]. Given the rarity of CFFTs,

current treatment approaches have historically relied on expert opinions and institutional experiences, often resulting in variable outcomes. Consequently, mechanical thrombectomy, a well-established clot retrieval method for various large intravascular thrombi, including those attaching to artery walls, is rapidly becoming the mainstream treatment for CFFT [3]. In this case, contrasting this prevailing trend, we present alternative options and provide supporting evidence that anticoagulant therapy can be equally effective and prompt, particularly in the context of a recently formed CFFT [4].

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## Case presentation

A 53-year-old female presented to the Neurology service with an acute onset of right hemiparesis and dysarthria, persisting for approximately 30 min prior to admission. Neurological examination revealed marked dysarthria, left-sided facial weakness, left-sided tongue paresis, and significant left-sided limb weakness (MRC grade I in the upper extremity and grade II in the lower extremity). This constellation of deficits yielded a National Institutes of Health Stroke Scale (NIHSS) score of 15, indicative of moderate-to-severe stroke. An initial non-contrast computed tomography (CT) scan of the brain was unremarkable. However, subsequent CT angiography (CTA) revealed a filling defect within the distal segment of the right middle cerebral artery (MCA), accompanied by hypoperfusion in the corresponding right-sided MCA territory, encompassing the frontal, parietal, and temporal lobes. Based on this clinical and radiographic presentation, a diagnosis of acute ischemic stroke was confirmed. Intravenous alteplase was promptly administered at a standard dose of 0.9 mg/kg within one hour of symptom onset. Notably, the patient demonstrated a substantial clinical improvement by the following day, with a near-complete resolution of her neurological deficits and a corresponding NIHSS score reduction to 1.

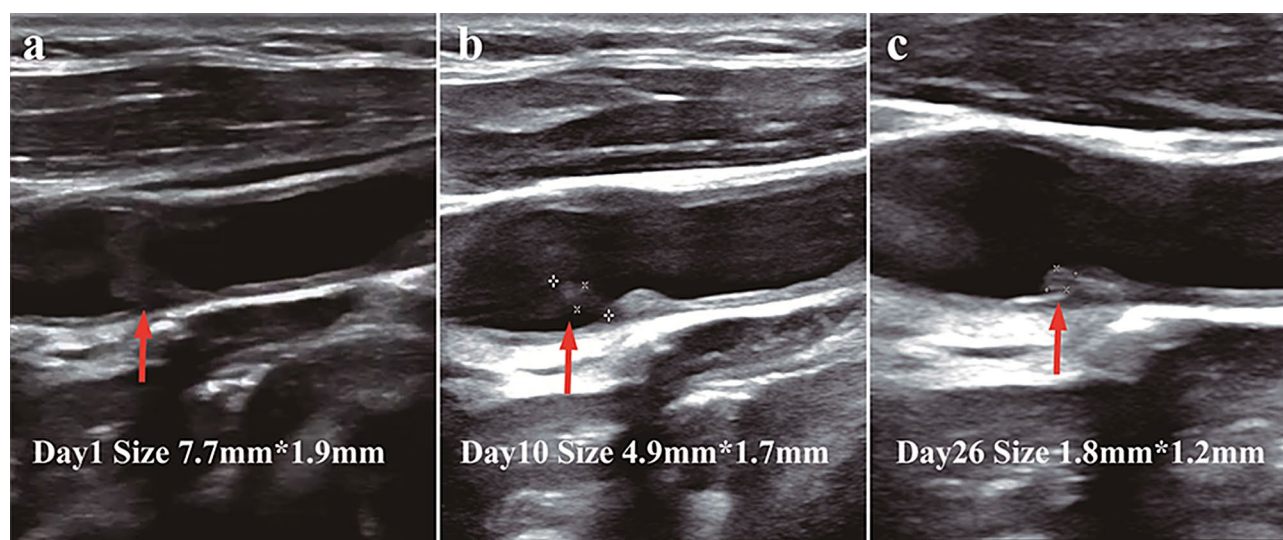
A stroke risk assessment in this patient, who presented with no prior history of diabetes mellitus, hypertension or atrial fibrillation, revealed several significant findings. These included elevated serum D-dimer levels at 3.86  $\mu\text{g/mL}$  (reference range: 0–0.5  $\mu\text{g/mL}$ ) and hypercholesterolemia with a total cholesterol of 8.09 mmol/L (reference range: 2.9–5.68 mmol/L). However, the most significant finding was the incidental detection of a CFFT. This

CFFT was associated with a 5.8 mm x 2.1 mm irregular, heterogeneously echogenic plaque located on the posterior wall of the right carotid bifurcation. The thrombus itself measured approximately 7.7 mm x 1.9 mm and exhibited a characteristic distal, low-echo floating signal (Fig. 1a). This unexpected finding was confirmed via high-resolution magnetic resonance (MR) imaging, which corroborated the presence of the thrombus and demonstrated contrast enhancement within the blood vessel wall (Fig. 2). MR imaging (Fig. 2, panels h and i) further characterized the associated plaque (highlighted by red arrows) as exhibiting a heterogeneous signal. The thrombus was observed to be attached to this plaque, suggestive of a thrombotic event potentially arising from plaque rupture.

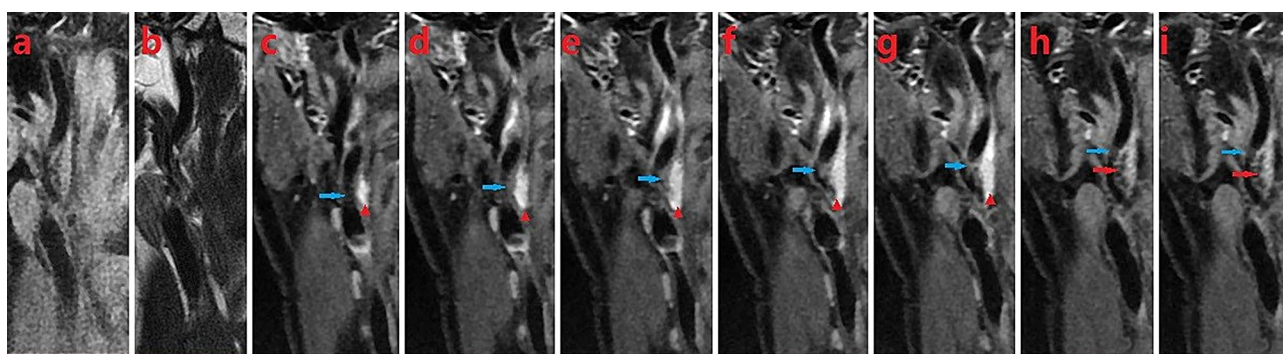
Following MRI confirmation, which was already five days post-admission, the patient was initiated on subcutaneous enoxaparin (0.4 mL twice daily) for a duration of ten days. This weight-based dosing (patient weight: 51 kg) was consistent with established clinical guidelines for enoxaparin administration. Ultrasound imaging subsequently demonstrated rapid thrombus resolution following this therapeutic intervention (Fig. 1b). At the time of discharge, the patient's medication regimen included daily aspirin (150 mg), clopidogrel (75 mg), and atorvastatin (40 mg). A follow-up ultrasound performed 16 days post-initial presentation (Fig. 1c) showed near-complete thrombus resolution.

## Discussion

Cervical carotid free-floating thrombus is identified in approximately 1.6% of patients presenting with ischemic stroke [5]. Despite its relatively low incidence, CFFT is



**Fig. 1** Serial Ultrasound Imaging of Carotid Thrombus Resolution. (a) Initial Doppler ultrasound of the right carotid artery demonstrates a free-floating thrombus at the bifurcation. (b) Repeat imaging on day 10 post-treatment reveals significant reduction in thrombus size. (c) Further thrombus dissolution is observed on day 26, with near-complete resolution



**Fig. 2** Imaging of Right Carotid Artery Thrombosis and Atherosclerotic Plaque (Coronal Plane). (a) T1-weighted and (b) T2-weighted magnetic resonance images demonstrate indistinct and poorly defined lesions within the right carotid artery, hindering accurate differentiation between thrombus and plaque. (c–g) Post-contrast T1-weighted images reveal clear delineation of the carotid artery wall (red triangle) and the internal carotid artery lumen. (c–i) A thrombus (blue arrow) is identified with an isointense signal, projecting into the vessel lumen and exhibiting a lack of contrast enhancement. The thrombus appears to abut the contralateral vascular wall. (h–i) An associated atherosclerotic plaque (red arrows) displays a heterogeneous signal and appears contiguous with the thrombus. Note the attachment of the thrombus to the plaque

associated with a substantial risk of embolic events, with over 90% of affected individuals exhibiting symptomatic manifestations [1]. Atherosclerosis is the predominant etiology of CFFT, frequently resulting from mural thrombus formation following localized atherosclerotic plaque rupture [6]. Due to the infrequent nature of this condition, robust randomized controlled trials systematically evaluating pharmacological (anticoagulation, antiplatelet therapy, thrombolysis) or interventional (endovascular or surgical) management strategies are lacking [7]. Consequently, a definitive consensus regarding optimal therapeutic approaches has not been established.

Previous studies have demonstrated the efficacy of anticoagulant therapy in resolving CFFT, with complete dissolution achieved in 86% of patients without complications [1]. Pelz et al. observed the resolution of internal carotid artery lumen thrombosis with anticoagulation. Specifically, complete thrombus disappearance occurred in seven of eight cases, and a reduction in size was noted in the remaining case [8]. Similarly, Karapurkar et al. documented a case of transient ischemic attack associated with a CFFT in the distal internal carotid artery, which resolved entirely following three weeks of enoxaparin treatment [9]. Still, there is a tendency to rely heavily on mechanical thrombectomy in treating CFFT, partly due to the lack of comprehensive pre-procedural thrombus analysis and the potential for overlooking other treatment options. Indeed, the lack of detailed pre-treatment assessment often results in the omission of crucial information regarding thrombus composition, duration, and pro-occlusive properties. Such information, when available, could significantly influence the selection of the most efficacious treatment strategy. In this case, we illustrated how high-resolution MR analysis of the CFFT, by revealing features suggesting recent thrombus formation [10], enabled successful anticoagulation therapy, avoiding

the need for mechanical intervention. This finding, aligning with prior studies demonstrating a higher likelihood of recent thrombi responding well to anticoagulant therapy, holds significant clinical implications. A treatment approach guided by radiological thrombus characterization offers a potentially viable and less invasive alternative for patients who are either not candidates for or who decline surgical intervention. This case underscores the potential advantages of comprehensive pre-procedural thrombus evaluation in guiding more targeted and individualized treatment decisions for CFFT.

In conclusion, this report describes a patient with an ischemic stroke caused by a CFFT, confirmed by Doppler ultrasound and carotid MRI. Anticoagulation treatment, informed by a comprehensive radiological assessment of the thrombus, led to the successful resolution of the CFFT. This case emphasizes the need for a thorough radiological evaluation of CFFT features before considering mechanical thrombectomy.

#### Abbreviations

CFFT	Carotid free-floating thrombus
MCA	Middle cerebral artery
NIHSS	National Institutes of Health Stroke Score
CTA	CT angiography

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#### Author contributions

FLX and LLL collected patient information and drafted the manuscript. YZ W collected the data and figures, and revised the manuscript. All authors read and approved the final manuscript.

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#### Data availability

No datasets were generated or analysed during the current study.

## Declarations

### Ethics approval and consent to participate

Written informed consent was obtained from patient.

### Consent for publication

Written informed consent regarding the submission and potential publication of this manuscript was obtained from patient.

### Competing interests

The authors declare no competing interests.

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