

Case Report

Recurrent Right Middle Cerebral Artery Occlusion from Free-Floating Thrombus: An Approach to Treatment

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• Extracranial carotid artery stenosis; Free-floating thrombus; Therapy

Abstract

Background: Extracranial carotid artery stenosis represents 8.0% of ischemic strokes in the USA. Patients with symptomatic carotid stenosis are those who have had a recent ischemic stroke or TIA along the ipsilateral carotid artery distribution. Aggressive endovascular or surgical treatment is reserved for patients with symptomatic carotid stenosis when there is a moderate or high degree of stenosis. However, there are other morphological features that are associated with a high risk of early recurrent stroke. The presence of a free-floating thrombus (FFT), is a well-documented feature of imminent thrombo-embolism, and should be treated with aggressive therapy irrespective of the degree of carotid stenosis.

Case description: A 62-year-old male presents with recurrent middle cerebral artery occlusion from a free-floating thrombus of the common carotid artery. The degree of carotid artery stenosis was 50% on diagnostic angiogram. He was initially started on dual anti-platelet but had a recurrent right MCA infarction the following month. The treatment strategy then employed was partial thrombectomy followed by continual dual anti-platelet therapy. At 1-month follow-up, total dissolution of the thrombus was achieved.

Discussion: The presence of a free-floating thrombus is another morphological feature suggesting imminent thromboembolic infarction [3-5]. Successful treatments included dual anti-platelet therapy, systemic anticoagulation, endovascular therapy, and surgical therapy [3].

Conclusion: Urgent intervention is needed to reduce the risk of thromboembolic infarction in patients presenting with a FFT of the carotid artery. Partial endovascular thrombectomy followed by dual anti-platelet therapy is an effective approach to achieve complete dissolution of the FFT.

INTRODUCTION

Stroke is a leading cause of morbidity in the U.S.A and worldwide. Acute ischemic stroke represents most new strokes [1]. Of these ischemic strokes, approximately 15% are caused by large vessel cerebrovascular disease with extracranial internal carotid artery stenosis contributing to 8.0% of all ischemic stroke [1].

Atherosclerosis is the underlying cause of extracranial carotid stenosis with subsequent carotid artery lumen narrowing from resultant plaque formation. In addition to the degree of stenosis, there are other markers of carotid artery atherosclerotic stenosis that suggest a high risk of carotid artery thromboembolic infarction, with the presence of a free-floating thrombus being one of these markers [2-10].

Due to its rare presentation, a free-floating thrombus in the extracranial carotid artery is often overlooked as a feature of plaque instability. This phenomenon, when seen on radiological imaging, represents a direct sign of an impending stroke and should prompt more aggressive medical or surgical management irrespective of the degree of carotid stenosis [8].

CASE PRESENTATION

This is a 62-year-old Hispanic American male with medical history significant for ischemic strokes. He was brought to our ED due to worsening dysarthria and worsening left upper extremity weakness. His initial NIHSS was 3. Non-contrast CT of the head showed an area of encephalomalacia in the left frontal and temporal lobe. The following day, his symptoms progressed to more profound dysarthria, facial asymmetry and worsening right-sided weakness. CT Angiogram (CTA) was done and demonstrated total occlusion of the extracranial left internal carotid artery and occlusive filling defect of the proximal M2 segment branches of the right middle cerebral artery (MCA) (Figure 4). In addition, CT Angiogram (CTA) demonstrated a free-floating thrombus (FFT) in the right common carotid artery extending 8.77 mm from its origin when measured from the sagittal plane (Figure 1). He had mechanical thrombectomy with successful TIC1-2b recanalization. He was then started on dual antiplatelet and atorvastatin and subsequently discharged to rehab on hospital day 6 with full strength and only mild dysarthria.

A month from being discharge he presented with worsening dysarthria and recurrence of left upper extremity weakness. CTP showed ischemia within the right MCA distribution with a small core infarct in the parietal lobe. DSA revealed a distal right M1 occlusion (Figure 5). He underwent mechanical thrombectomy with successful TIC1-2b recanalization. CTA neck re-demonstrated the free-floating thrombus in the right common carotid artery which had changed in length and morphology (Figure 2). On HOD 7 endovascular mechanical thrombectomy of the FFT was attempted but only partial thrombectomy was achieved. He was continued on dual antiplatelet and on a 1-month CTA follow-up, the FFT had completely resolved (Figure 3).

DISCUSSION

Symptomatic extracranial carotid artery stenosis is currently defined as transient ischemic attacks (TIAs) or strokes along the ipsilateral carotid artery territory in patients with extracranial carotid artery stenosis [2]. Although there is a correlation between certain morphological features of carotid stenosis and symptomatic carotid artery, the definition of symptomatic carotid stenosis is largely incomplete and doesn't consider other morphological features of carotid artery stenosis in determining which patients are more likely to benefit from urgent revascularization strategies [2]. The degree of stenosis is typically the marker used to determine which patients have a higher risk of early recurrent strokes [2,9,10].

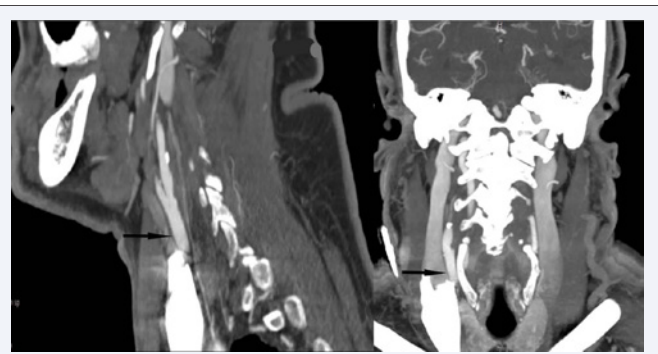


Figure 3 A 1-month CTA follow-up.

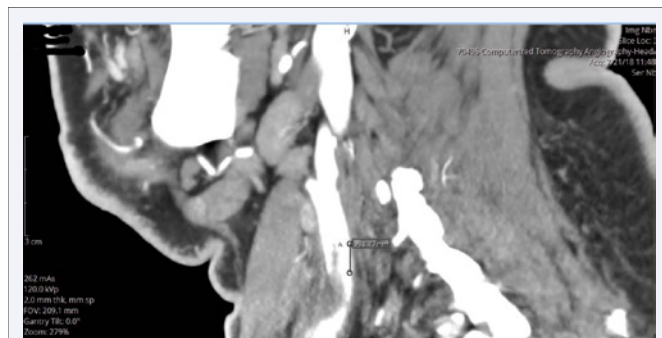


Figure 1 Free-floating thrombus sagittal.

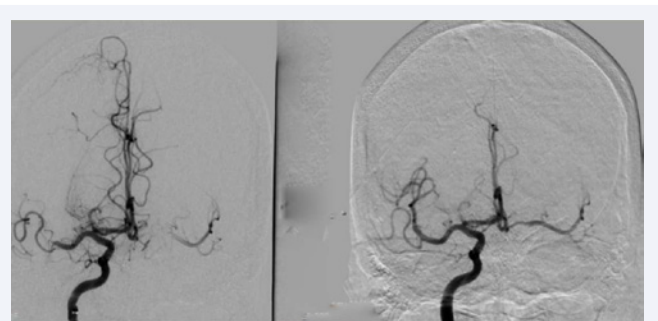


Figure 4 AP view superior M2 occlusion - pre and post intervention.

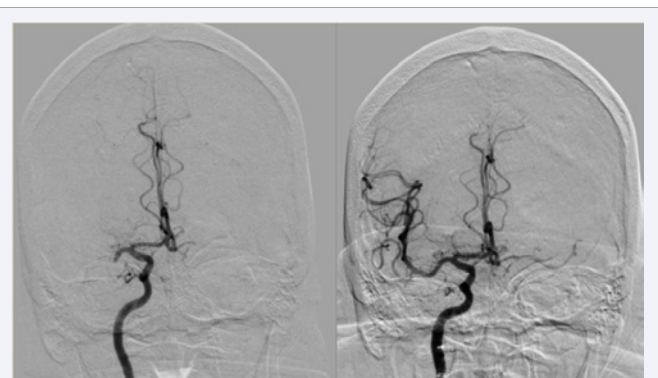


Figure 5 AP view M1 occlusion - pre and post intervention.

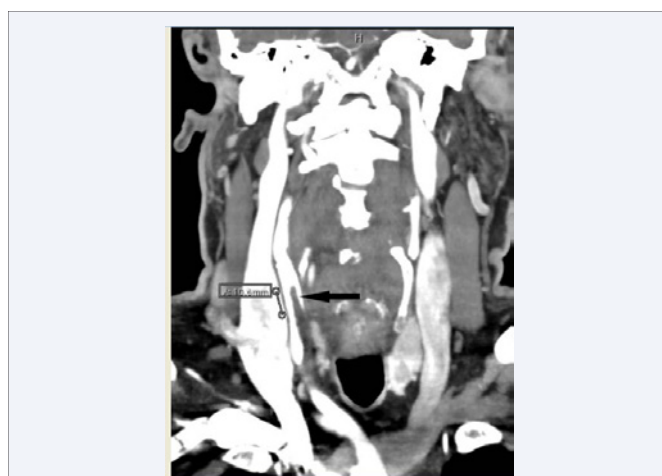


Figure 2 Free-floating thrombus coronal.

In the case of extracranial carotid atherosclerotic disease, a large lipid necrosis core and associated plaque inflammation subsequently leads to thinning and rupture of the fibrous cap. A lack of fibrous cap exposes the matrix of the plaque to cardiovascular circulation leading to thrombus formation at the site of the ruptured fibrous cap [2]. Extensive propagation of the thrombus results in a free-floating thrombus. A portion of this thrombus can then dislodge and travel distally causing an embolic infarct along an intracranial vascular territory [3]. If the free-floating thrombus persists, further propagation and partial dislodgement of the thrombus may create a vicious cycle leading to frequent recurrent thromboembolism [3-5].

The presence of FFT in this patient represented a high risk of recurrent embolism even though the degree of stenosis of the associated carotid artery was only approximately 50%. The

patient in this case report was initially treated medically with statin and dual antiplatelet but had a recurrent ischemic stroke a month later. Thus, irrespective of the degree of carotid stenosis, it may be argued that the presence of FFT in the setting of carotid atherosclerotic disease should prompt a more aggressive management such as surgical or endovascular therapy. This thought is reflected in the medical literature as the vast majority of patients found to have a FFT are indeed symptomatic [3-5].

A lesion is considered to be a free-floating thrombus when it is an elongated lesion emanating from an atherosclerotic plaque measuring more than 3.8 mm in length from its site of attachment to the plaque [4]. The free-floating thrombus should have circumferential flow of circulating blood around it. Ideally, duplex ultrasound should be able to detect cyclic motion of the thrombus with the cardiac cycle [6]. The free-floating thrombus for this patient had all the features typically associated with FFT. The axial CTA view demonstrated the “donut sign” which is as a result of iodine contrast completely surrounding the elongated thrombus. As well, the thrombus is seen protruding 8.77 mm from the site of plaque attachment (Figure 1). Lastly, carotid duplex ultrasound demonstrates a freely mobile thrombus with the cardiac cycle.

Treatment of FFT is uncertain due to its rare presentation and the lack of randomized controlled trials. The three main approaches are aggressive medical treatment with anticoagulation and/or antiplatelet therapy, immediate surgical or endovascular approach, and a delayed surgical or endovascular approach [3].

Surgical treatment employing carotid endarterectomy (CEA) was considered in this patient. Intraoperative embolic infarction is a possible complication if a piece of thrombus is dislodged from the diseased carotid and travels distally during the procedure. Another intraoperative complication that may be encountered during CEA is an ischemic stroke resulting from hypoperfusion as a result of temporary intraoperative ICA occlusion [7]. This risk is obviously minimized if there is adequate collateral flow from the contralateral ICA through the circle of willis. Unfortunately, the patient in this case report had a complete occlusion of the contralateral ICA thereby increasing the risk of intraoperative ischemic stroke and thus CEA was not attempted.

Endovascular treatment has several advantages over the traditional surgical approach. Distal occlusion of the ICA is not necessary while employing endovascular procedure and thus the risk of hypoperfusion is minimized. As well, a distal embolic protection device is usually employed to mitigate the risk of distal embolic phenomenon. Moreover, in the event of intraoperative distal embolization, immediate endovascular thrombectomy can be undertaken [7]. Removal of the free-floating thrombus was attempted in this case report with solitaire stent retriever and penumbra thromboaspiration and a partial thrombectomy was

achieved. Afterwards, dual anti-platelet therapy was resumed. Carotid stenting was avoided due to the high risk of distal embolization of large fragments of the thrombus [4].

The use of anticoagulation with or without antiplatelet therapy has been used extensively in the literature for dissolution of free-floating thrombus [6,9]. Although dual anti-platelet therapy initially failed to dissolve the FFT, partial thrombectomy reduced the size of the free-floating thrombus and thus enabling dual anti-platelet therapy to be more effective in dissolution of the thrombus. This approach, partial thrombectomy followed by medical management with dual anti-platelet therapy, represents a unique approach to the management of free-floating thrombus and should be considered in future cases of large free-floating thrombus that may not be initially amenable to medical management alone.

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