

## An Ischemic Stroke Patient with Free Floating Thrombus in Carotid Artery, Successfully Treated by Open Carotid Thrombectomy: A First Case Report in Nepal

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### ABSTRACT

Free floating thrombus in the carotid artery is a well-known phenomenon, though relatively rare. We present a case in which we performed open surgery and achieved successful retrieval of the thrombus. A 40 year-old male patient presented with ischemic stroke and mild left hemiparesis. Computerized tomography and magnetic resonance imaging showed infarction in the right parieto-occipital area. Carotid Doppler study showed carotid stenosis on the right side. Further investigation with CT angiography of the neck vessels confirmed significant carotid artery occlusion with a free-floating thrombus in the internal carotid artery. Carotid endarterectomy was planned under EEG monitoring. The right carotid artery was exposed with a vertical incision along the medial margin of the sternocleido-mastoid muscle. The carotid artery was opened and, as expected, showed a soft, mobile thrombus. Thus thrombectomy was planned. A 2 Fr fogarty catheter was introduced distal to the thrombus, the balloon was inflated and pulled back gently, which removed the thrombus completely. There was no postoperative complication and the patient is fine at 1 year follow-up.

**Key words:** Ischemic stroke, Carotid artery stenosis, Free floating thrombus, Open carotid thrombectomy

Carotid artery occlusion is an important and common cause of ischemic stroke. Atherosclerotic carotid narrowing due to plaque deposition is a common cause of carotid occlusion<sup>2)</sup>. However, the cause of carotid artery occlusion may sometimes be different. Free floating thrombus (FFT) in the carotid artery is one cause, though it is relatively rare. FFT is relatively more common in males and in a younger age group. Most of the patients present as an emergency with neurological signs and symptoms. FFT often occurs as a complication of atherosclerotic plaque, and is often due to plaque rupture. Studies have shown that the incidence of FFT is <1% of total endarterectomy cases<sup>3)</sup>. Buchan et al detected an incidence rate of 1.45% (29 of 2,000). Here we present a case of ischemic stroke caused by FFT in the internal carotid artery (IC). We place an emphasis on simple ways of diagnosing and treating this condition in developing countries like Nepal.

### CASE REPORT

A 40 year-old male patient presented at the emergency room with left hemiparesis. He was immediately admitted to the intensive care unit

and conventional treatment and investigation were started. Computerized tomography (CT) and magnetic resonance imaging (MRI) showed watershed infarction in the right parieto-occipital area (Fig. 1). A Carotid Doppler (CD) study was performed using a general electronics (GE) machine. The common carotid artery and its distal segment were evaluated using high

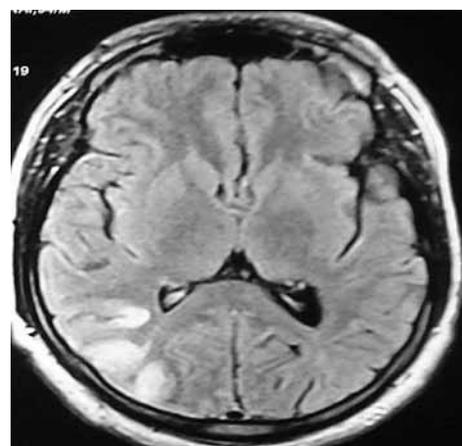
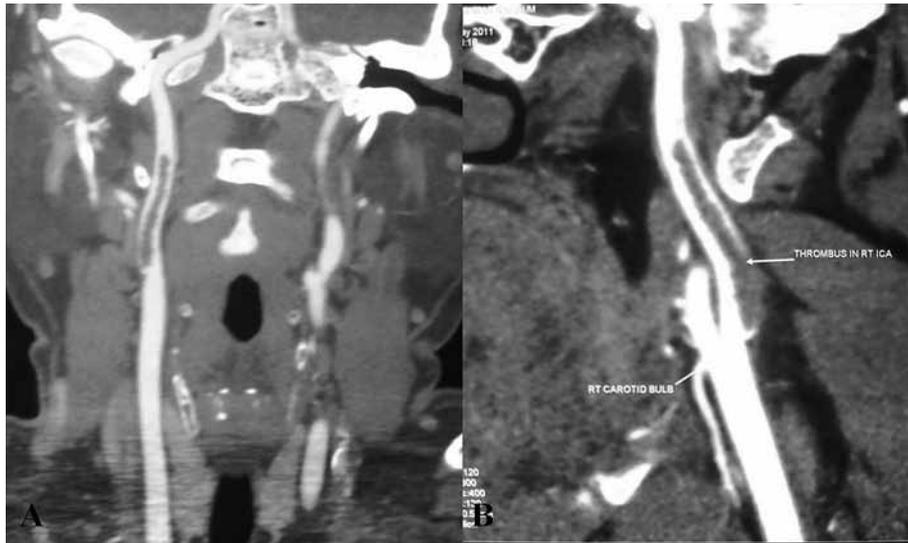
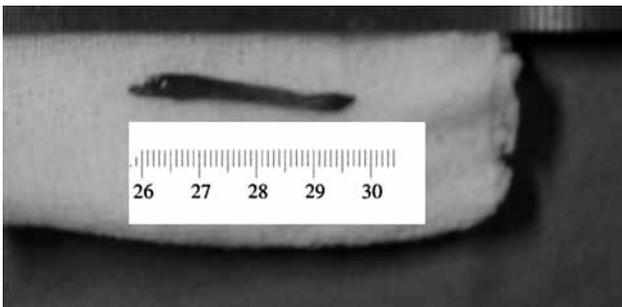


Fig. 1. MRI, FLAIR image showing watershed infarction in the right parieto-occipital area



**Fig. 2.** CT angiography of right carotid artery showing the FFT extending from the carotid bifurcation distally: A) antero-posterior view, B) Lateral view



**Fig. 3.** The intact FFT after retrieval, measuring about 4 cm

resolution B mode duplex ultrasonography and spectral and color Doppler study with a 7.5 MHz linear probe. It showed complete carotid artery occlusion on the right side, which was confirmed by CT angiography of the neck and cerebral vessels (Fig. 2). CT angiography showed a filling defect of the right IC at the bifurcation of the common carotid artery extending several centimeters distally. This raised suspicion of the presence of FFT.

Carotid endarterectomy (CEA) was planned. Early surgery was performed, on the third day of the stroke, to prevent further embolization of the thrombus which could be more dangerous. A conventional skin incision was made. The IC was opened after clamping the major arteries, namely, the common carotid (CC), external carotid (EC) and IC. A soft pinkish thrombus floating freely inside the lumen was observed. There was no free flow of blood from the IC when the clamp was slowly released. The distal end of the thrombus could not be visualized. Since it was difficult to retrieve the clot, a 2 French fogarty catheter was inserted into the IC beyond the distal end of the clot. The size of the clot was measured during

angiography. The balloon was inflated and pulled out slowly, which retrieved the whole of the clot, and there was a free flow of blood (Fig. 3). There was no atherosclerotic plaque and thus conventional CEA was not performed. Post-operatively the patient was put on warfarin with regular INR monitoring. Follow-up CD 3 months after surgery showed a normal right IC. At 1 year follow-up, the patient was fine with a normal physical and mental status.

## DISCUSSION

Carotid artery evaluation, which is not yet a routine practice in developing countries, should be performed in all cases of ischemic stroke. FFT is a possibility in any case of carotid artery stenosis and carotid artery occlusion, though it is not that common. Until a few years ago, there were only 145 reported cases of FFT<sup>1)</sup>. Our case is the first reported case of FFT in Nepal, where routine CEA is performed in only very few centers. Proper surgical management is essential to avoid complications.

Cases with suspected carotid artery occlusion, as shown by CD study, should be further evaluated with cerebral angiography to confirm the presence of FFT. However, sometimes FFT can be very clearly identified by CD itself when it may not be evident by angiography<sup>3)</sup>. FFT can be defined as a mass of thrombus attached to the IC wall in the proximal portion and floating freely in the distal portion, as evidenced by the circumferential blood flow<sup>1, 5)</sup>.

In our case, CD revealed carotid occlusion but provided no further information about the nature of the plaque. CT angiography of the neck vessels was performed, which confirmed FFT. A filling

defect in the IC, a mass originating from the proximal IC and apparently anchored within it, elongated morphology and circumferential contrast flow around the distal part of the mass all pointed to FFT.

FFT has been reported to be more common in younger males, which correlates with our case. In terms of location, our case also correlated with others as the most common location, as reported earlier, is the IC<sup>1)</sup>. Though the usual association of FFT with conditions of hypercoagulability has been mentioned in reports, our case showed no association with hypercoagulability, nor was there any history of trauma.

Treatment of FFT is its retrieval as soon as possible to prevent its dislodgment and further embolization, followed by medical treatment with antiplatelet and anticoagulant<sup>1,5-7)</sup>. We followed the same treatment plan and performed open thrombectomy on the third day, followed by warfarin therapy. We do not possess the shunt system that is used during CEA. Instead, we used a fogarty catheter which we commonly use during endoscopic surgery of the brain. Among different techniques of retrieving the thrombus, use of a fogarty catheter has been reported<sup>9)</sup>. We used the same technique. By employing a 2 F catheter, we could retrieve the whole thrombus very easily and there was a free retrograde flow of blood from the IC. Medical treatment alone with anticoagulation and antiplatelet agents has also been reported<sup>9)</sup>. However, with the development of surgical tools and techniques in recent years, surgical intervention is becoming the treatment of choice. Endovascular retrieval instead of open surgery has also been mentioned<sup>8)</sup>. Neuro-endovascular intervention has not yet been started in Nepal. We performed early open surgery with removal of the whole thrombus.

### CONCLUSION

FFT is one of the possible causes of IC occlusion, though rare. It can be simply diagnosed with CD study and confirmed by typical appearance in CT angiography. Open surgery and thrombus retrieval with a fogarty catheter is a simple and effective technique.

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