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Case Report

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Surgical management of free-floating thrombus within the common carotid artery

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ABSTRACT

Free-floating thrombus (FFT) of the carotid artery is an exceptional medical condition with a currently unclarified pathophysiology. Approximately 150 cases have been described and published in the literature throughout the world so far. Thus, no definite management strategies have been established yet. In this paper, a symptomatic case of an FFT inside the common carotid artery (CCA) presented with a history of slurred speech, and right sided hemiplegia was reported. After the diagnosis of a mobile thrombus within the origin of the left CCA, the patient was placed on anticoagulation. As the medical therapy failed, carotid thromboendarterectomy was performed.

KEY WORDS: Carotid artery, floating thrombus, hemiplegia

INTRODUCTION

The presence of a free-floating thrombus (FFT) in the carotid artery is a rare and acute emergency usually diagnosed after a neurologic cerebral event [1]. The clinical severity may range from completely asymptomatic to a subversive stroke. The exact incidence of FFT is thus unknown [2]. According to the review by Bhatti *et al*. in 2007, only 145 cases of FFT within the carotid circulation existed in 44 previously reported publications [3]. Although current knowledge is limited, and etiology remains unclear, the most common pathology seems to be the complication of an atherosclerotic plaque or intracardiac thrombi [1,2]. However, several overlapping medical conditions with different clinical involvements have also been reported to be responsible [2,3]. The lack of fully identified etiology makes the optimal management of this disease still controversial [3,4]. Therefore, it remains unclear whether the medical or surgical option is superior [2]. Moreover, FFTs show significant mobility due to weak connections with an impaired arterial endothelium [5]. Thus, they have a high risk of distal cerebral migration and stroke with an intact antegrade flow [4].

In this report, we present the surgical treatment of a patient with a symptomatic common carotid artery (CCA) FFT with a standard longitudinal carotid endarterectomy (CEA) technique.

CASE REPORT

A 52-year-old woman presented to the emergency department with the complaint of slurred speech, right sided weakness, and blurred vision. The initially transient symptoms were started nearly 2 weeks ago and progressed for the last 2 days. Her past medical history was not significant except the presence of hypercholesterolemia and hypertension for the last ten years. Neurologic examination revealed mild right hemiparesis involving the right face, arm, and leg. The carotid duplex ultrasound (DUS) scan demonstrated a 45-55% stenosis of the left CCA caused by an intraluminal process compatible with thrombus [Figure 1a]. The thrombus was demonstrating mobility, suggestive of FFT. Its diameter was 14.5 mm × 2.3 mm, and it stuck to a nonstenotic atheromatous plaque at the origin of the CCA. Left internal carotid artery (ICA) and external carotid artery (ECA) were normal presenting no sign

of thrombi. DUS examination also showed no abnormality in contralateral CCA, ICA or ECA. A brain computed tomography (CT) scan demonstrated a 70 mm × 45 mm subacute embolic or ischemic infarction in the territory of the middle cerebral artery of the left hemisphere [Figure 2]. Biochemical tests were normal except a slightly increased low-density lipoproteinlevel that is 142 mg/dL. Hematological studies including prothrombin time, partial thromboplastin time, platelet count, antithrombin III, protein C/S, anti-nucleotide antibody and anticardiolipin antibody, plasma homocysteine, and folate levels were also within the normal range. Electrocardiography revealed no arrhythmia. An echocardiography was performed to exclude a cardioembolic etiology. However, trans-thoracic and trans-esophageal echocardiography demonstrated that there were no intracardiac thrombi, atrial septal defect (ASD) or patent foramen ovale (PFO).

Initial treatment was planned to include a short course of anticoagulation and reassessment of the thrombus resolution after 10 days with DUS. Medical treatment was launched with Enoxaparin (Aventis SA, Strasbourg, France) and Clopidogrel (Bristol-Myers Squibb Company, Princeton, NJ) with a dose of 20000 IU/day and 75 mg/day respectively.

Despite therapeutic anticoagulation, daily follow-up with DUS imaging confirmed no regression in FFT. Because, there was no change in the lesion compared with the initial exam, surgical intervention was decided on the 5th day. Clopidogrel and Enoxaparin were stopped, and intravenous unfractionated heparin (UFH) was started instead. Preoperative or postoperative hemorrhagic complications thus could be controlled easily by avoiding the long-lasting effect of Clopidogrel. In addition, UFH has the capability to be reversed by the antagonist protamine when needed. On the 3rd day after stopping the Enoxaparin and Clopidogrel, the patient was taken to the operation. Under general anesthesia, the standard longitudinal CEA technique was performed. Left carotid thromboendarterectomy findings were consistent with a nonstenosing atherosclerotic plaque and associated appendage of FFT [Figure 3]. A carotid shunt was not used for cerebral protection. The incision was rapidly closed with a patchplasty.

Postoperative recovery period was uneventful but right sided weakness persisted. Symptoms of speech and vision were regressed. DUS examination showed no residual lesion [Figure 1b]. Considering the operative disruption of the arterial endothelial integrity, oral anticoagulation treatment was instituted with warfarin (Bristol-Myers Squibb Company, Princeton, NJ) and acetylsalicylic acid (Bayer, Leverkusen, Germany) to prevent the formation of recurrent thrombosis. The patient was discharged postoperative 7th day with a scheduled follow-up.

The patient was admitted to the outpatient clinic for the folow-up after 3rd month of operation. She was in erect position with an indentifiable slight paresia on her right side. However, she was able to walk with the help of a walking stick without the need of an accompanying person. Her speech and mimics were normal with a slight slurring while she becomes nervous. The

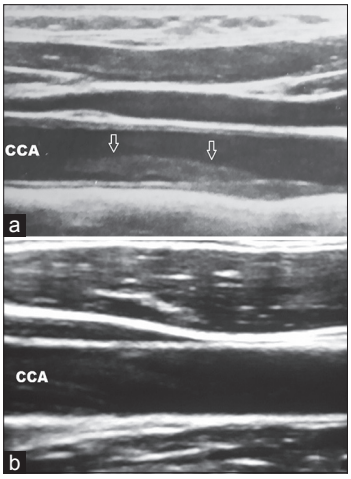

Figure 1: Duplex ultrasound examination revealing: (a) Free-floating thrombus in the left common carotid artery (b) No residual lesion after the thromboendarterectomy (Postoperative 7th day)

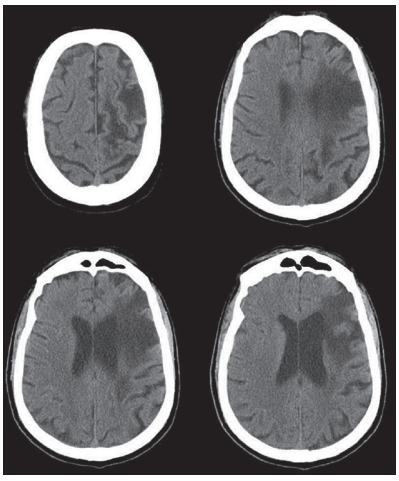

Figure 2: Cranial computed tomography scan revealing a left-sided cerebral infarct

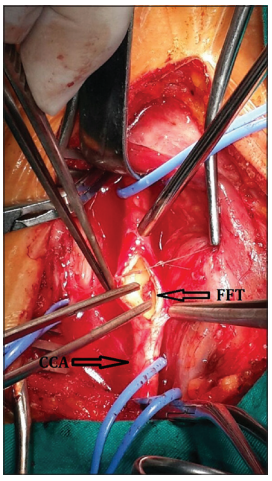

Figure 3: Surgical technique (CCA: Common carotid artery, FFT: Free-floating thrombus)

blood International normalized ratio (INR) level was 2.4 with a 5 mg/day warfarin dose. She was recommended to maintain the

same warfarin dosage by evaluating the INR levels bi-monthly until completing the treatment to 6 months postoperatively.

DISCUSSION

Intraluminal FFT was initially described by an Austrian pathologist Hans Chiari in a postmortem study, as the probable source of stroke in 1905 [6]. Gunning *et al*. presented first clinical study about the intramural thrombi of the carotid artery and the subsequent cerebral thromboembolism in his manuscript in 1964 [7]. Clinical ante-mortem and pathological postmortem outcomes were heavily discussed from that time. However, the real incidence and pathophysiology of the FFT still remained obscure [3].

Although there are multiple causes for FFT, carotid aneurysms, small dissections, atherosclerosis and plaque rupture are considered to be the most frequent etiologic factors [2,8]. Plaque ulcerations and intra-plaque hemorrhage and hypercoagulable states also contribute the formation of FFT [4]. In addition, cases were reported in young stroke patients without any identifiable arterial diseases or cardiogenic source of brain embolism [2,3]. It should also be remembered that these paradoxical cerebral emboli may be secondary to deep venous thrombosis related to a right to left shunt through the existing PFO or ASD [2].

Considering the diagnostic tools, DUS, digital subtraction angiography, magnetic resonance angiography, and CT may be used [4]. However, DUS seems to be a dynamic and efficient way of both diagnosis and follow-up.

FFT was observed in the carotid artery in nearly 4% of patients with acute ischemic stroke. It is more frequently reported in men than women with a ratio of almost 2:1 [9,10]. Neurologic symptoms are present in 90% of the cases [2]. According to the literature, although the ICA is the most commonly affected (75%), CCA was involved in this presented case [11]. Because of its rareness, optimal treatment for FFT within the carotid artery is still controversial. Medical or urgent surgery is still being discussed [3,12]. In our case, although the patient was treated with enoxaparin and clopidogrel, anticoagulation regime was not successful. This inefficient medical treatment was demonstrated by a control DUS that showed there was no regression regarding the mobile thrombus.

Endovascular treatment should also be considered in addition to the medical treatment and the surgical approach. Parodi *et al*. successfully treated an ICA thrombus using a reversal flow technique followed by a stent employment [1].

CONCLUSION

CEA and thrombectomy operations may be taken into consideration after elongated and unresponsive medical treatment in FFT patients. The lack of a guideline for the management of carotid FFT, the timing of surgery, is not well defined. The efficient anticoagulation therapy may often dissolve the thrombus. However, in cases with inefficient medical treatment, the appropriate surgical treatment with an optimum timing may reduce the additional neurologic complications and stabilizes the existing neurologic deficits. The surgery and anesthesia also carry the risk of some further neurological complications. Thus, the decision of switching to surgery should be established meticulously. On the other hand, elongated unsuccessful medical management should not delay the correct decision for surgery.

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