

Coincidence of Free-Floating Thrombus in the Aortic Arch, Severe Mitral Stenosis, and Left Atrial Appendage Clot

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ABSTRACT

We describe the surgical management of a free-floating thrombus in the aortic arch in a patient with severe mitral stenosis, a left atrial appendage (LAA) clot, and an iliac artery thrombus. A 60-year-old woman complaining of dyspnea and pain in her right leg was referred to our multidisciplinary clinic. After a brief history was taken, an electrocardiography evaluation showed atrial fibrillation. Color Doppler sonography of the lower limb arteries showed decreased blood flow in distal branches of the internal iliac artery of the right leg. Transthoracic and transesophageal echocardiography evaluations revealed severe mitral stenosis, a large LAA clot, and a large mobile mass ($2 \times 1.5 \times 1.5$ cm) in the distal aortic arch. Additional investigations with computed tomographic angiography revealed that the thrombus extended from the aortic arch to the subclavian artery. Another bulky thrombus in the right iliac artery was also found. Given this complicated medical situation, emergency cardiac surgery was performed, and the clot was removed. The stenotic mitral valve was replaced with a prosthetic valve, The LAA was closed after clot removal, and the bulky thrombus was extracted from the right iliac artery. Transesophageal echocardiographic data were obtained postoperatively, and the patient's course in the intensive care unit was favorable. She was discharged from the hospital in good condition on warfarin, digoxin, aspirin, and metoprolol.

INTRODUCTION

Free-floating thrombus (FFT) in the aortic arch is an uncommon source of embolism that may lead to catastrophic events [Bruno 2001]. The condition is more likely to affect the carotid arteries [Bhatti 2007]; approximately 150 cases have been reported in the scientific literature as of 2010 [Lane 2010]. FFT in the subclavian artery has rarely been addressed, however. If this condition is accompanied by a left

atrial appendage (LAA) clot in a severely stenotic mitral valve, sudden death due to the occlusion of the mitral orifice may occur [Gomez 2005]. An LAA clot can also precipitate other peripheral thromboembolic events [Alkan 1995]. Thrombus in right iliac artery may accompany an FFT in the ascending aorta [Sindhav 1999]. Surgical removal of the FFT, LAA closure after clot removal, mitral valve replacement, and removal of the thrombus in the right iliac artery are usually performed to manage the condition.

CASE REPORT

A 60-year-old woman with dyspnea on exertion and pain in her right, cold leg was referred to our hospital. A physical examination showed stable vital signs (blood pressure, 110/70 mm Hg; respiratory rate, 14 breaths/minute; body temperature, 37°C). The dorsalis pedis pulse on right side was not palpable, however. The cachectic (weight, 38 kg; height, 155 cm) and non-anticoagulated patient had eaten very little because of her dyspnea, which had worsened over the previous 3 months. The dyspnea was moderately severe according to New York Heart Association criteria.



Figure 1. Severe mitral stenosis with a large LAA clot verified by transthoracic and subsequent transesophageal echocardiographic examinations.

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Figure 2. A large mobile mass ($2 \times 1.5 \text{ cm}^2$) was detected in the distal aortic arch.

An electrocardiography evaluation revealed atrial fibrillation with a pulse rate of 120/min. Severe mitral stenosis (mitral valve area, 0.9 cm^2) with a large LAA clot was verified by transthoracic and subsequent transesophageal echocardiographic examinations (Figure 1). We also detected a large mobile mass ($2 \times 1.5 \text{ cm}^2$) in the distal aortic arch (Figure 2). Considering both the patient's medical history of recent hospitalization in a cardiology department and her current condition, we carried out a Doppler sonography evaluation, which revealed a low flow in her right leg. A computed tomography angiogram showed a sausage-shaped thrombus in the aortic arch that extended into the subclavian artery (Figure 3), together with a bulky thrombus in the right iliac artery. Cardiac surgery was performed on an emergency basis via a midline sternotomy, and the major arterial branches in the aortic arch and the subclavian artery were exposed. We inserted a 20F arterial cannula into the distal ascending aorta (proximal aortic arch at the origin of the innominate artery), and for venous drainage of the inferior vena cava and the superior vena cava, we used 26F and 28F cannulas, respectively. We instituted cardiopulmonary bypass at 3200 mL/min as the patient's temperature decreased to 22°C . We gradually decreased the blood flow to 2000 to 2500 mL/min and obtained total circulatory arrest. The heart was clamped, and cold cardioplegia was achieved via the aortic root. We then clamped the major branches from the aortic arch and the descending aorta. The aortic arch was opened, and the FFT was removed. Then, the aortic arch was repaired with Prolene 5-0 sutures after deairing. The patient's temperature was increased to 30°C , cardiopulmonary bypass was restarted, and the left atrium was opened. The clots were removed, the stenotic mitral valve was replaced with a mechanical valve (29 mm; St. Jude Medical, St. Paul, MN, USA) via interrupted 2-0 Prolene sutures, and the LAA was closed with Prolene 4-0 suture. At the same time, the other surgical team incised the right inguinal area. The femoral artery was exposed, and an embolectomy was performed with a 4F and 5F Fogarty



Figure 3. Computed tomography angiogram showing a sausage-shaped thrombus in the aortic arch extending into the subclavian artery.

catheter. The left atrium was closed, and the aorta was declamped. A postoperative transesophageal echocardiographic evaluation revealed no thrombus, and the prosthetic valve showed good function. Anticoagulant therapy was initiated, and the patient was referred to the intensive care unit (ICU) for proper care. Her course in the ICU was uneventful, and she was discharged from the hospital in good condition on warfarin, digoxin, aspirin, and metoprolol.

DISCUSSION

FFT in the ascending aorta may cause thromboembolic events, such as myocardial infarction [Knoess 2007], cerebral infarction [Hino 1999], pulmonary edema [Sari 2008], and other visceral or peripheral embolisms, even during anticoagulant therapy [Aksu 2010]; therefore, emergency surgical removal of an FFT is recommended [Pousios 2009]. The presence of an LAA clot also requires emergency surgery because of its high potential for thrombotic complications [Alkan 1995]. In the presented case, we also surgically removed a bulky thrombus in the right iliac artery to save the patient's limb. Computed tomographic angiography is a more sensitive standard [Hur 2009] that can help not only to confirm transthoracic and transesophageal echocardiographic findings but also to detect thrombus formation in the major arteries of the entire body.

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