

Case Report

A Complex Atheromatous Plaque of the Thoracic Aorta: The Role of Transesophageal Echocardiography

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ABSTRACT

Large mobile protruding aortic arch atheromas are strongly associated with strokes and other vascular events. Transesophageal echocardiography is the imaging modality of choice for diagnosis and risk stratification. The optimal therapy is unclear.

A case of a large mobile aortic atheromatous plaque with recurrent systemic embolization in a 47-year-old female

is reported. This finding led to a surgical resection of the diseased part of the aorta and graft replacement without complications. The case illustrates the utility of transesophageal echocardiography in defining the complexity of the atheromas. Surgery in selected patients is a reasonable option.

KEYWORDS: aorta, atherosclerosis, echocardiography, embolism, plaque

INTRODUCTION

Atherosclerosis of the aorta is a common disease that may present in unusual ways. We report a case of a large protruding mobile atheromatous plaque of the descending thoracic aorta with recurrent systemic embolization, and discuss the appropriate management.

Case report

A 47-year-old female presented to our institution in 1998 with nausea, vomiting, diarrhea and abdominal pain, for a few days prior to admission. She had diabetes mellitus and hypertension since five years. She was a heavy smoker (60 pack years). She also had a transient ischemic attack in 1997 with normal transthoracic echocardiogram and carotid doppler. A month prior to admission, she developed painful bluish discoloration of the right big toe, with spontaneous resolution. Her symptoms on presentation were vague abdominal pain, nausea, vomiting, and watery diarrhea, without fever, chills or rigors. Physical examination was normal apart from severe left costo-vertebral angle tenderness.

The laboratory data showed a leucocytosis at $22.5 \times 10^9/l$, thrombocytosis at $1240 \times 10^9/l$, normal renal function, and a septic work up was negative. An abdominal ultrasound was normal. A

computerized tomography (CT) scan of the abdomen revealed multiple hypodense lesions involving the spleen and both kidneys, particularly the left one, consistent with multiple infarcts. A work up for vasculitis was negative.

Two-dimensional transthoracic echocardiogram (TTE) was normal. CT angiogram of the chest and abdomen showed focal bulge at the proximal portion of the descending aorta, suspicious of focal dissection with intimal flap. Magnetic resonance angiography (MRA) was done which showed irregularity in the thoracic aorta, suggesting focal dissection or mobile atherosclerotic plaque.

A transesophageal echocardiogram (TEE) was performed. This showed a large mobile pedunculated mass measuring 1.5 x 3 cm at the descending thoracic aorta, just after the arch distal to the subclavian artery, consistent with atherosclerotic plaque (Fig. 1).

The patient was urgently operated upon with resection of the diseased part through a left postero-lateral thoracotomy approach, with clamping of proximal descending thoracic aorta between the left subclavian and left carotid artery. Distally, the thoracic aorta was occluded few centimeters above the diaphragm. A segment of 5 to 7 cm of atheromatous aorta containing a pedunculated atheroma with a white thrombus

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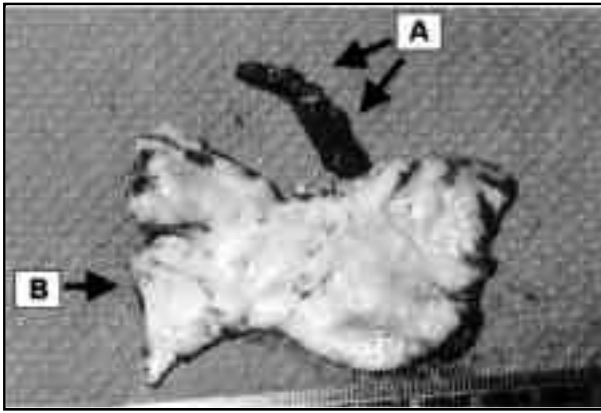


Fig. 1: Transesophageal echocardiography of the descending thoracic aorta showing the large pedunculated atheroma

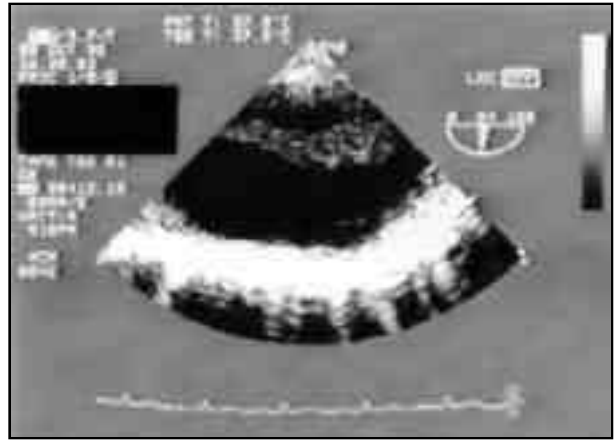
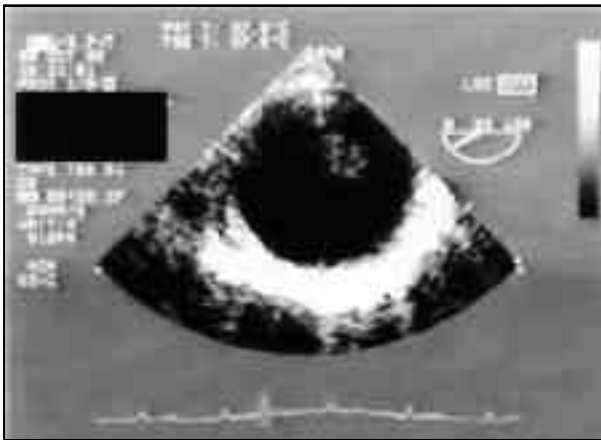


Fig. 2: Macroscopic picture of the large atheromatous plaque after resection.

A: Significant thrombotic material on the atheromatous plaque



B: Resected part of the aorta with fatty streaks and ulcers

was resected. The aorta was reconstructed with a tubular Dacron graft 20 mm in diameter. The aortic occlusion time was 22 minutes. We inserted two chest tubes in the left pleura and the chest wall was closed in the usual way. The macroscopic and microscopic examinations were consistent with atheromatous plaque of the aorta with significant thrombotic material (Fig. 2).

The patient had an uneventful postoperative course and was subsequently discharged from hospital. Four years later, the patient is doing well apart from intermittent claudication treated medically.

DISCUSSION

Atherosclerosis of the aorta can be extensive and form large complex plaques. These atherosclerotic plaques may embolize and be life threatening in rare cases. Moderate or severe atherosclerosis of the thoracic aorta can be detected by transesophageal echocardiography (TEE) in approximately 15-20% of patients 50 years and in 33% of patients 80 years^[1]. Atheromas are graded I to V. Grade I is minimal intimal thickening, Grade II is extensive intimal thickening, Grade III is sessile atheroma, Grade IV is protruding atheroma

and Grade V is mobile atheroma^[2]. Grade IV and V carry a risk of peripheral embolization that is almost fourfold the risk of Grade I lesions. Furthermore, in patients undergoing coronary artery bypass surgery; these lesions have been associated with increased stroke and mortality^[3]. Atherosclerotic plaques 4 mm thick in the aortic arch are significant predictors of recurrent brain infarction and other vascular events^[4]. Complex atheromas carry higher risk of strokes than non-complex atheromas. The risk of ischemic stroke in elderly patients with arch atheromas is more strongly related to the complexity of the lesion than to its size^[5].

Atherosclerotic lesions of the thoracic aorta may ulcerate and penetrate the internal elastic lamina of the aortic wall. This can result in the formation of intramural hematoma, aneurysms, aortic dissection or rupture. Penetrating atherosclerotic ulcers occur most commonly in the descending thoracic aorta. Among patients with penetrating atherosclerotic ulcers who are not treated surgically, the majority have progressive aortic enlargement, with formation of saccular or fusiform pseudoaneurysms and intraluminal thrombus^[6].

Different imaging modalities have been used to assess atherosclerosis of the thoracic aorta. Transesophageal echocardiography is one of the better available imaging tools to clearly define the plaques. It is superior to transthoracic echocardiogram in visualizing the plaque's size, site, and complexity *i.e.*, ulceration or mobile components^[7]. It is also useful to assess the flow dynamics, and the aortic intima. The combination of aortic spontaneous echocardiographic contrast and any complex atherosclerosis has the highest risk of embolization^[8]. MRA has been used to examine atherosclerotic disease in the thoracic aorta. MRA had been compared to TEE in the evaluation of the thoracic aorta atherosclerosis. Both techniques are

complementary but TEE can identify more high-risk plaques^[9].

The optimal management of patients with protruding mobile Grade IV-V aortic atheroma is still unclear. Anticoagulation appears to be a reasonable treatment for patients whose atheromas have a mobile component, because these components have been shown to be thrombotic material^[10] and have been reported to resolve with anticoagulation^[11]. In a study by Dressler *et al*^[12], warfarin was found to be effective in preventing strokes in patients presenting with systemic emboli and mobile aortic atheroma on TEE. They suggested that anticoagulation is beneficial in the presence of a mobile component of the atheroma irrespective of its dimension. On the other hand, systemic anticoagulation is not free of risk. In addition to the potential hemorrhagic complication of anticoagulation, bleeding into atherosclerotic plaques with plaque rupture and cholesterol embolization has been reported^[13]. Successful thrombolysis has also been reported^[14], but it is theoretically possible that thrombolytic agents may selectively lyse the stalk of pedunculated lesions and embolize the lesion in the systemic circulation.

Aortic endarterectomy had been successfully performed in selected patients. Surgical removal of the aortic arch atheromas may be considered in patients with recurrent systemic embolization. Gandjbakhch *et al* suggested surgery under three conditions. First, when the atheroma is large, exuberant and stenotic; second, when the atheroma has been complicated by systemic embolism and finally, when there is a potential embolic risk, especially neurological, during open-heart surgery^[15].

CONCLUSION

Thoracic aortic atherosclerosis is a common cause of cerebral and peripheral embolization. Protruding atheroma, intimal ulceration, and superimposed mobile components are the most important predictors of embolization of an atheromatous plaque.

Transesophageal echocardiography appears to be the imaging modality of choice for the diagnosis. Early diagnosis and treatment of atheromatous plaques may prevent life-threatening embolic complications. The optimal therapy remains to be determined. However, surgery is a reasonable alternative, but because of the increased risks, it should be reserved for patients with large, exuberant, obstructive plaques with high risk of

embolization. The role of anticoagulation and other strategies to regress atheromatous plaque such as aggressive lipid lowering and anti-platelet therapy is unknown and needs to be evaluated prospectively.

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