

# Aortic Mural Thrombus in Association with Occult Aortic Dissection



Andrew O. Zurick, MD, and Chand Ramaiah, MD, *Nashville, Tennessee*

## INTRODUCTION

Sessile and pedunculated masses within the ascending aorta or aortic arch are rare and most commonly are detected at autopsy.<sup>1</sup> Rarely, aortic tumors that involve the intima can grow into the vessel lumen.<sup>2</sup> Aortic mural thrombus remains an infrequently encountered finding in a normal or minimally atherosclerotic aorta.<sup>3</sup> Previous small case series have reported on thoracic aortic mural thrombi being a rare but important cause of peripheral emboli.<sup>4,5</sup> More commonly, aortic mural thrombus is seen in association with acute aortic syndrome, aneurysmal disease, or severe atherosclerosis.<sup>6</sup>

## CASE PRESENTATION

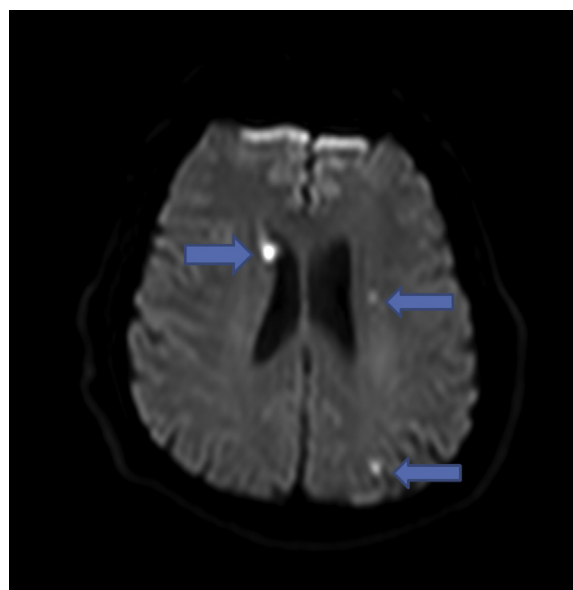
A 43-year-old Caucasian male with a past medical history of dyslipidemia, alcohol abuse, and long-standing tobacco use was initially admitted to our hospital due to an acute change in vision in his left eye. Initially, this was described as a white spot in the left visual field, but it slowly evolved to a generalized haziness throughout the left visual field. No other focal neurologic changes were detected around this time. No new headaches were reported. His initial physical examination noted normal mental status with normal speech. Cranial nerves II-XII were all checked and intact with some description of hazy vision in the left visual field. He had 5/5 strength in upper and lower extremities and no sensory deficits. Cardiovascular examination noted a normal rate and rhythm without auscultated murmurs, rubs, or gallops. No carotid bruits were appreciated. Initial brain magnetic resonance imaging noted multiple foci of diffusion in the right caudate nucleus, left posterior frontal lobe, and left temporal lobe, all likely consistent with ischemia (Figure 1). No intracranial hemorrhage was detected. Carotid arterial duplex Doppler examination noted no hemodynamically significant stenosis in either left or right internal carotid arteries. Both vertebral arteries noted antegrade flow.

Initial transthoracic echocardiogram showed normal left ventricular size and function with a calculated left ventricular ejection fraction of 58% by Simpson's method. No intracardiac masses were noted. Agitated saline contrast study with and without Valsalva maneuver showed no evidence of intracardiac shunt. Subsequent transesophageal echocardiogram (TEE) showed no evidence of left atrial appendage thrombus; however, a large, 5 cm, mobile echodensity in the aortic arch was seen suspicious for thrombus, severe atheroma,

or possible malignancy (Videos 1-3 and Figure 2). No evidence of acute aortic syndrome was seen on TEE. A nonelectrocardiogram (ECG)-gated computed tomography angiography (CTA) was urgently performed to further characterize this mass. This study noted a large, pedunculated but mostly free-floating, likely nonocclusive thrombus in the aortic arch (Figures 3 and 4). No evidence of aortic aneurysm, dissection, or intramural hematoma was noted. Due to the size of the mass, location, and recent likely embolic cerebrovascular events, the decision was made with cardiothoracic surgery to take the patient for urgent operative repair. The patient underwent ascending aortic graft replacement using a 30-mm Hemashield graft with cardiopulmonary bypass and circulatory arrest. No evidence of aortic dissection was noted in the operating room. Subsequent histopathology noted an aortic wall with cystic degeneration and subacute to chronic aortic dissection with associated thrombus material and atherosclerosis with calcification and hemorrhage but no malignancy (Figure 5). The patient had an uneventful recovery and was discharged to home on postoperative day four. Subsequent hypercoagulable work-up showed no evidence of factor V Leiden or prothrombin mutations and normal protein C and protein S activity.

## DISCUSSION

Aortic mural thrombus in a normal or minimally atherosclerotic aorta remains an uncommon finding and, when detected, should raise suspicion for subacute or chronic aortic dissection. A thorough



**Figure 1** Brain magnetic resonance imaging showing multiple foci of diffusion (arrows) in the right caudate nucleus, left posterior frontal lobe, and left temporal lobe, all likely consistent with ischemia.

From St. Thomas Heart, Nashville, Tennessee.

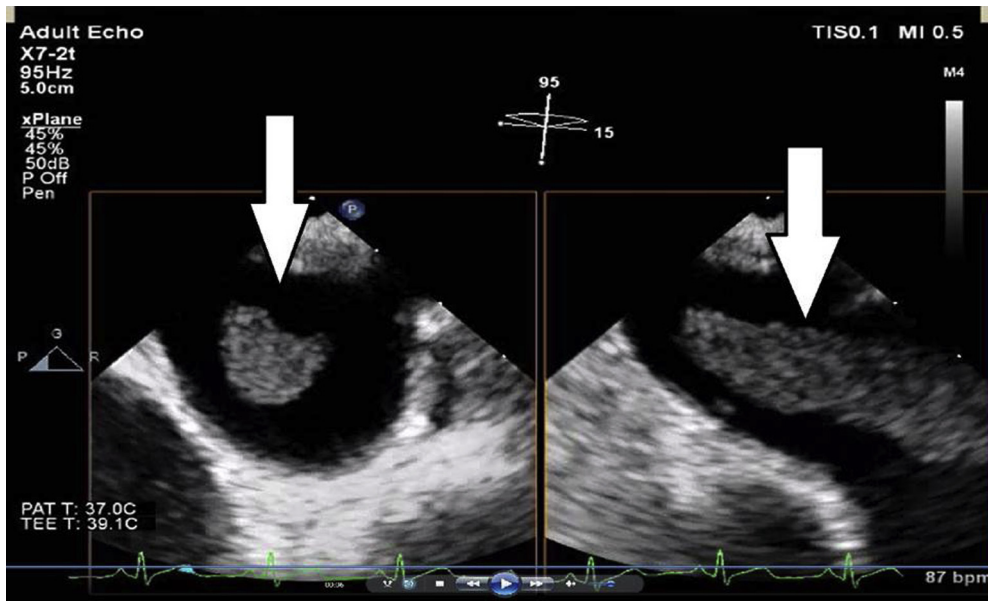
Keywords: Aortic mural thrombus, Aortic dissection, Transesophageal echocardiography

Conflicts of Interest: Dr. Andrew O. Zurick is on the Speakers Bureau for Lantheus Medical Imaging. Dr. Chand Ramaiah had no actual or potential conflicts of interest relative to this document.

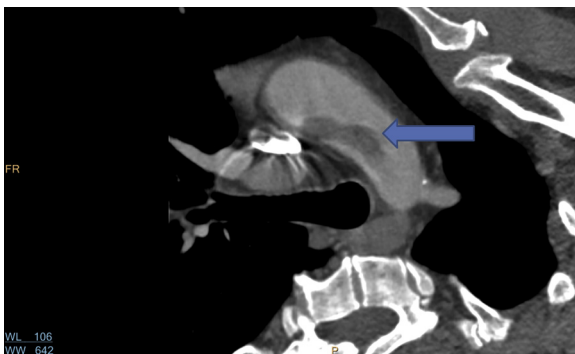
Copyright 2017 by the American Society of Echocardiography. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

2468-6441

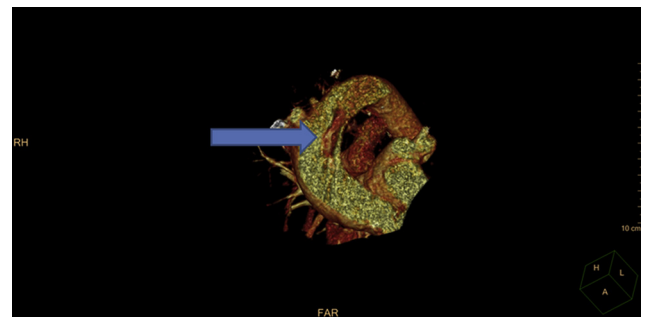
<http://dx.doi.org/10.1016/j.case.2017.01.001>



**Figure 2** TEE still image using X-plane showing echodensity within the transverse aortic arch (arrows).



**Figure 3** Nongated, thoracic CTA, multiplanar reconstruction image showing the aortic arch with a large filling defect consistent with thrombus material (arrow).



**Figure 4** Volume-rendered, three-dimensional image of a nongated, thoracic CTA showing a large intraluminal aortic mass (arrow).

imaging evaluation with TEE, CTA, or thoracic magnetic resonance angiography (MRA) is vital to establish this diagnosis. Prior meta-analysis has noted comparable diagnostic accuracy for TEE, CTA, and MRA for the diagnosis of thoracic aortic dissection.<sup>7</sup> Institutional availability and hemodynamic stability should determine the patient-specific test of choice. TEE can be performed rapidly in emergency situations and in patients with hemodynamic instability. Unfortunately, the distal ascending aorta and often portions of the aortic arch cannot be adequately visualized on TEE due to interference from the trachea and left main stem bronchus.<sup>8</sup> Modern multidetector, helical, ECG-gated CTA is probably the most widely used imaging modality for the assessment of aortic dissection, with sensitivity near 100% and specificity of 98%. CTA is more commonly associated with false-positive “pseudodissection” due to aortic motion artifact,<sup>7</sup> which can occur when images are not ECG-gated.

The well-known Stanford and DeBakey classification systems for aortic dissection are based on the location of a visualized intimal tear. Other classification systems for aortic dissection have been reported and are based on the mechanism and morphology of the

dissection.<sup>9</sup> Svensson *et al.* describe an important variant of aortic dissection in which an intimal tear is present, but without an intimal flap or hematoma visualized on imaging testing.<sup>9</sup> Physicians need to remember that modern imaging techniques may not fully exclude some subtle forms of aortic dissection, despite reports of extremely high test sensitivity, ranging from 98% to 100%, for detecting classic aortic dissection.<sup>10</sup> Previous series have noted that aortic dissection can be occasionally missed with modern diagnostic imaging modalities (TEE, CTA, and MRA), if there is not extensive separation of the intimal layer or if there is only mild wall thickening with hematoma and clot occluding the tear site.<sup>9</sup> The need for timely and accurate diagnosis for type A aortic dissection is essential because prognosis is very poor without early surgical intervention, with mortality rates exceeding 50%.<sup>11</sup>

Surgery should be considered as primary treatment for patients presenting with aortic mural thrombus. A prior meta-analysis has shown similar mortality rates among patients with aortic mural thrombus treated with systemic anticoagulation versus surgery but significantly increased rates of recurrent peripheral arterial embolization among patients treated with systemic anticoagulation.<sup>3</sup>



**Figure 5** Surgical-pathology specimen showing aortic thrombus. Histopathology subsequently noted an aortic wall with cystic degeneration and subacute to chronic aortic dissection with associated thrombus material and atherosclerosis with calcification and hemorrhage but no malignancy.

#### SUPPLEMENTARY DATA

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.case.2017.01.001>.

#### REFERENCES

- Baldini U, Chiamonti F, Minzioni G, Galli M. A hanging mass in the ascending aorta diagnosed by transthoracic echocardiogram in a totally asymptomatic subject. *J Am Soc Echocardiogr* 2009;22:1197.e5-7.
- Iorgulescu DG, White AL. Leiomyosarcoma of the thoracic aorta. *Aust N Z J Surg* 1999;67:537-40.
- Fayad ZY, Semaan E, Fahoum B, Briggs M, Tortolani A, D'Ayala M. Aortic mural thrombus in the normal or minimally atherosclerotic aorta. *Ann Vasc Surg* 2013;27:282-90.
- Morris ME, Galinanes EL, Nichols WK, Ross CB, Chauvupun J. Thoracic mural thrombi: a case series and literature review. *Ann Vasc Surg* 2011;e17-21.
- Verma H, Meda N, Vora S, George RK, Tripathi RK. Contemporary management of primary aortic mural thrombus. *J Vasc Surg* 2014;60:1524-34.
- Daniel PC, Mónica GB, Jorge MM, Vilacosta I. Surgical approach for a symptomatic aortic arch thrombus [published online September 27, 2016]. *Interact Cardiovasc Thorac Surg* 2016; <http://dx.doi.org/10.1093/icvts/ivw275>.
- Shiga T, Wajima Z, Apfel CC, Inoue T, Ohe Y. Diagnostic accuracy of transesophageal echocardiography, helical computed tomography, and magnetic resonance imaging for suspected thoracic aortic dissection. *Arch Intern Med* 2006;166:1350-6.
- Borner N, Erbel R, Braun B, Henkel B, Meyer J, Rumpelt J. Diagnosis of aortic dissection by transesophageal echocardiography. *Am J Cardiol* 1984;54:1157-8.
- Svensson LG, Labib SB, Eisenhauer AC, Butterly JR. Intimal tear without hematoma. An important variant of aortic dissection that can elude current imaging techniques. *Circulation* 1999;99:1331-6.
- Manuchehry A, Fontana GP, Gurudevan S, Marchevsky AM, Siegel RJ. Missed diagnosis of limited ascending aortic dissection by multiple imaging modalities leading to fatal cardiac tamponade and aortic rupture. *Echocardiography* 2011;28:E187-90.
- Hagan PG, Nienaber CA, Isselbacher EM, Bruckman D, Karavite DJ, Russman PL, et al. The International Registry of Acute Aortic Dissection (IRAD): new insights into an old disease. *JAMA* 2000;283:897-903.