

CASE REPORT

INTERMEDIATE

CLINICAL CASE

Incidentally Found Ascending Aortic Thrombus

Presentation and Management



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ABSTRACT

Aortic thrombus can be rare, requiring prompt recognition and management to prevent sequelae. Treatment modalities for aortic thrombus include systemic anticoagulation, endovascular, and/or surgical intervention. We present an incidental finding of an aortic annular mass in a 53-year-old male consistent with an aortic thrombus. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2021;3:1489-1493) © 2021 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

HISTORY OF PRESENTATION

A 53-year-old male presented with primary symptoms of upper abdominal pain, generalized body aches, and intermittent chest pain exacerbated by physical exertion for a duration of 2 months.

MEDICAL HISTORY

His past medical history was significant for schizophrenia and chronic back pain. He denied intravenous drug use and was living in a homeless shelter.

LEARNING OBJECTIVES

- To review patient evaluation for an aortic mass including patient history, pertinent laboratory samples, imaging modalities, and differential diagnosis.
- To understand the utility of a multidisciplinary approach of the management of aortic thrombus.
- To recognize patient factors that may drive individualized treatment plans.

Medications at time of presentation included amitriptyline, buprenorphine, bupropion, and risperidone. The patient's physical examination was benign.

DIFFERENTIAL DIAGNOSIS

Given his abdominal pain, chest pain, and constitutive symptoms, the initial differential diagnosis remained broad. The differential diagnosis included: acute coronary syndrome, infective endocarditis, gastritis, pericarditis, cholecystitis, appendicitis, and pancreatitis. COVID-19 and other viral syndromes were also considered given his presentation.

INVESTIGATIONS

A cardiac work-up was conducted in concert with a work-up for his abdominal symptoms. Cardiac work-up was unremarkable and initial blood laboratory studies were all within normal limits (**Table 1**). The patient tested negative for COVID-19 on admission. Initial computed tomography (CT) of the abdomen and pelvis was notable for an incidental 3.0 cm ×

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

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ABBREVIATIONS AND ACRONYMS

CT = computed tomography

1.7 cm × 0.8 cm mass along the noncoronary cusp of the aortic valve, concerning for a vegetation or thrombus, and mild hepatic steatosis. A subsequent transthoracic echocardiogram was performed 24 hours after admission, showing a large, well-circumscribed mass in the proximal ascending aorta near the noncoronary cusp of the aortic valve (Figure 1B). The mass was mobile and appeared to be attached to the aortic wall near the sinotubular junction. The aortic valve was tri-leaflet with no evidence of aortic stenosis/regurgitation and heart function was normal. Blood cultures drawn on admission were negative and serologic assays for Brucella, Bartonella, and Coxiella were sent to investigate possible culture-negative endocarditis. These serologies returned negative, except for low titer (1:16) positivity for Coxiella. On day 2 of admission, the patient's abdominal symptoms had resolved and no further work-up was pursued in regard to his abdominal symptoms. An initial hypercoagulable work-up was conducted including the following: coagulation studies, antithrombin III level, antiphospholipid antibody panel, protein C and S levels, and a factor V Leiden assay, which were all unremarkable. Given the patient's transthoracic echocardiography findings, the radiology department suggested obtaining a cardiac gated CT angiogram of the chest to further characterize the mass, which was completed on day 2 of admission. There was redemonstration of the aortic mass, however, it had increased in size, measuring 1.0 cm × 1.8 cm × 4.1 cm (Figure 1A). Consultation with cardiac surgery was

TABLE 1 Initial Laboratory Studies

	Value	Units	Reference Values
Sodium	136	mmol/L	135-147
Potassium	4.0	mmol/L	3.5-5.0
Chloride	102	mmol/L	96-106
Bicarbonate	21	mmol/L	22-31
Creatinine	1.0	mg/dL	0.7-1.4
Urea	15	mg/dL	5-25
Glucose	111	mg/dL	70-200
Albumin	4.3	g/dL	3.4-5.4
Total bilirubin	1.0	mg/dL	0.2-1.0
Alanine transaminase	22	U/L	0-37
Aspartate transaminase	37	U/L	0-40
Alkaline phosphatase	49	U/L	40-129
White blood cells	6.76	×10 ³ /μL	3.90-10.60
Hemoglobin	15.6	g/dL	13.5-17.5
Platelets	173	×10 ³ /μL	140-450
International normalized ratio	1.0	N/A	0.8-1.1
Lipase	29	U/L	10-140
D-dimer	<0.27	μg/mL	0.00-0.50

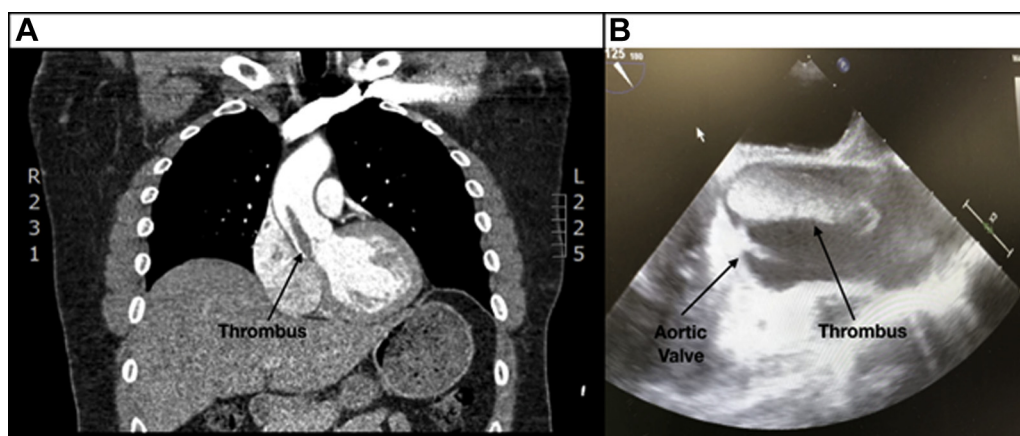
Initial blood laboratory studies on admission, which were unremarkable.

obtained on day 3 of admission to determine if operative management was indicated.

MANAGEMENT

Blood cultures and serologic assays were negative for infective endocarditis, thus empiric antibiotic treatment was withheld. Our working diagnosis became aortic thrombus and a heparin infusion was initiated. Although the patient remained hemodynamically

FIGURE 1 Initial Imaging of Aortic Thrombus



(A) Computed tomography (CT) angiography with coronal reconstruction demonstrating aortic annular mass (arrow). (B) Transthoracic echocardiogram, long-axis view demonstrating large echodensity abutting the aortic valve.

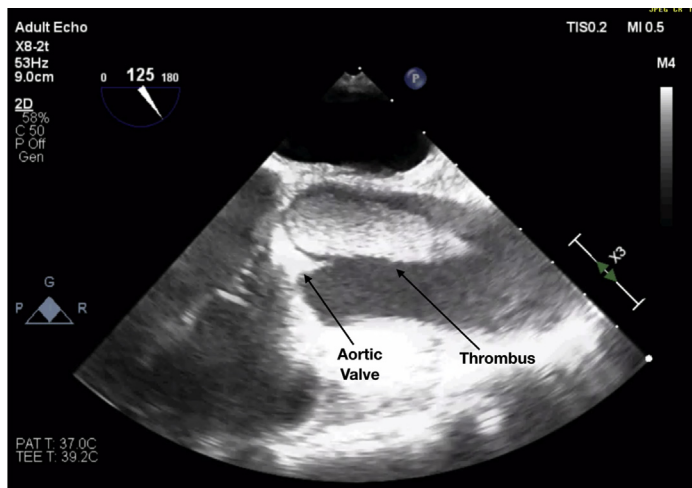
stable and exhibited no evidence of embolic phenomena, given the size, interval growth, and location, surgical excision of the mass was deemed necessary to decrease risk of embolic events.

The patient was taken to the operating room for removal of the aortic mass. Intraoperative transesophageal echocardiogram confirmed previous imaging results (Figure 2). A sternotomy was performed, the patient was heparinized, aortic and venous canulas placed, and the patient was placed on cardiopulmonary bypass. The aorta was cross-clamped and the heart was arrested. The ascending aorta was transected 2 cm above the origin of the right coronary artery. The mass was noted to be adherent to the aortic annulus near the nadir of the noncoronary cusp on a short stalk (Figure 3A). The mass was excised en bloc and sent for permanent and frozen section with cultures (Figure 3B). Frozen section of the mass was consistent with a thrombus. The aortic valve leaflets appeared normal and were not grossly involved by the mass. The aorta was closed and the patient was successfully weaned from cardiopulmonary bypass. Transesophageal echocardiogram confirmed no change in ventricular function from preoperative evaluation and trace central aortic insufficiency (Figure 4). Drainage tubes were placed and the sternum was closed with stainless steel wires.

The diagnosis of the mass on final pathology revealed a thrombus. Hematology was consulted for recommendations on long-term treatment due to concern for underlying hypercoagulable state. Overall, the hypercoagulability work-up was unrevealing, as were further genetic studies for congenital thrombocythemias (JAK2 V617F, CALR Exon 9 analysis, and MPL mutation analysis). Although there was not a clear cause for the aortic thrombus, the hematology team recommended continued therapeutic anticoagulation for an idiopathic hypercoagulable state.

His postoperative hospital course was significant for the development of intermittent atrial fibrillation controlled with amiodarone and thrombocytopenia (platelet count 36,000/mm³). The heparin infusion was stopped and laboratory samples were drawn to evaluate the patient for heparin-induced thrombocytopenia. Laboratory findings were positive for both platelet factor 4 antibodies and a serotonin release assay. An argatroban infusion was initiated and the patient's platelet count eventually normalized. The hematology team recommended warfarin for long-term anticoagulation. However, the patient was unwilling to take warfarin due to the requirement for frequent blood draws, thus, rivaroxaban became the anticoagulation agent of choice. To date, no clear

FIGURE 2 Intraoperative Transesophageal Echocardiography of Thrombus



Intraoperative transesophageal echocardiography confirmed previous imaging findings, revealing large aortic thrombus.

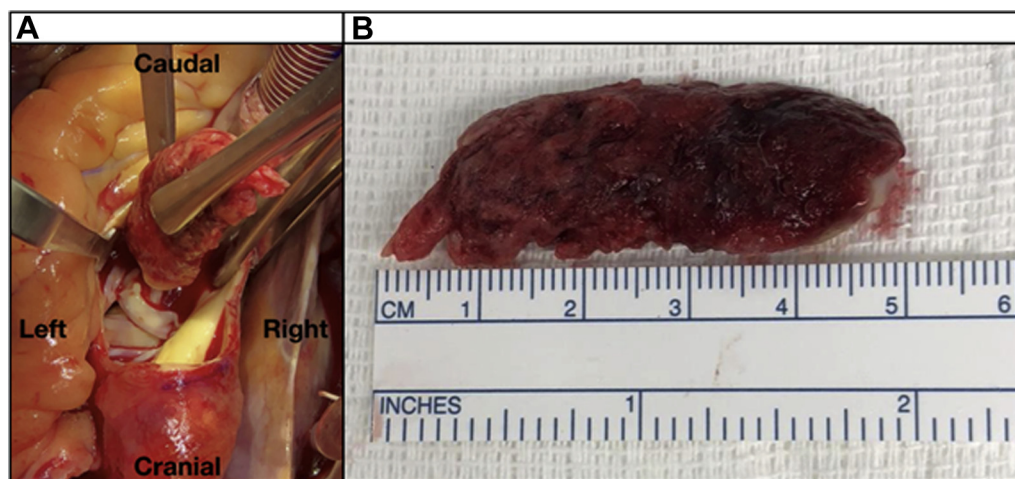
cause has been found for the patient's aortic thrombus.

DISCUSSION

The diagnosis of a thoracic aortic thrombus remains a challenging entity (1). Thrombi have been reported in various locations of the aorta with described corresponding classification schemes (2). In a study series of 78 patients, Bowdish et al (3) reported the majority of acute mural thrombi were seen within the abdominal aorta (64%), followed by the descending thoracic aorta (28%), and the ascending aorta/aortic arch (8%).

Many patients present with a known history of a hypercoagulable/hematologic disorder or medication-induced hypercoagulable state (ie, chemotherapy, estrogen therapy) (4-7). One must also bear in mind acute inflammatory states (ie, pancreatitis), heparin-induced thrombocytopenia, or drug use (ie, cocaine) can also be predisposing factors (7). Clinical findings of aortic thrombus are consistent with embolic sequelae such as leg swelling/pain, shortness of breath, chest pain, or acute focal neurologic deficits. Initial laboratory studies should include, but are not limited to, complete blood counts, coagulation and clotting factors, peripheral blood smears, protein deficiencies, and genetic testing for prothrombin gene mutations (8). Initial imaging should be targeted to the presenting symptom, and may include ultrasound of peripheral vessels, CT angiography, and echocardiography.

FIGURE 3 Intraoperative Images of Thrombus



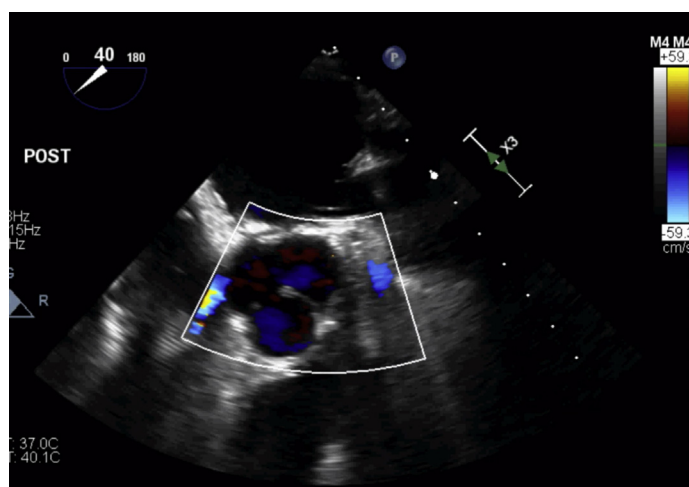
(A) Photograph taken intraoperatively of the thrombus on excision. (B) Excised aortic thrombus measuring 5 cm on its longest axis.

There is little consensus on optimal management of an aortic thrombus. Treatments include medical therapy (ie, anticoagulation therapy) alone or in combination with surgical intervention if an indication exists. Anticoagulation alone without surgical direct thrombectomy has been reported to result in

clot dissolution (3). Unfortunately, embolic events may still occur and, in some cases, can be fatal (1,9). Factors favoring a surgical approach of aortic thrombus management include: patient history, size (>1 cm), location and mobility of the thrombus, or an inability to distinguish thrombus from a mass on imaging (2). Moreover, the characteristics of the thrombus that demonstrate a high risk for an embolic event (size, stalk mobility, and location) favor an invasive approach (2). Sessile thrombi typically have less of a thromboembolic risk and possibly can be managed with anticoagulation alone if the patient is closely followed up with imaging studies (2). One approach suggested in a case series by Pagni et al (1) favored a combination of invasive treatment and medical therapy with oral anticoagulation for a year with aspirin and warfarin postoperatively. In general, postoperative continuation of long-term anticoagulation in those with a compelling family or personal history of thromboembolic events should be used.

Social factors also play an important role in the decision to anticoagulate patients postoperatively. For our patient, the hematology team strongly recommended life-long anticoagulation with warfarin after platelet counts recovered, but due to patient compliance issues, life-long rivaroxaban was ultimately chosen. In addition to anticoagulation, close follow-up of these patients is important, although there is no consensus on the optimal timing or imaging modality. Echocardiography and CT

FIGURE 4 Intraoperative Transesophageal Echocardiography After Thrombus Excision



Intraoperative transesophageal echocardiography immediately after thrombus removal, demonstrating no aortic regurgitation and good leaflet coaptation.

angiography provide excellent views of the aorta and represent reasonable options for interval imaging.

FOLLOW-UP

The patient was discharged to a shelter and seen 6 weeks postoperatively and was doing well. The patient continues on rivaroxaban.

CONCLUSIONS

Patients diagnosed with an aortic mass/thrombus can present with a variety of symptoms. In this case, our patient presented with intermittent chest and vague epigastric pain. A detailed history and physical

examination, in addition to appropriate imaging and laboratory studies, is key. Prompt identification and appropriate management, taking into account patient social factors, can lead to a good patient outcome.

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