Cureus
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Open Access Case Report

Surgical Management of Symptomatic Ascending Aortic Mural Thrombus: A Case Report

B Fortunato Velten [1], Aditya Patukale [1], Kamil Peiris [1], Randhara Alles [1], Fabio Ramponi [1]

1. Cardiothoracic Surgery, Canberra Hospital, Canberra, AUS

Corresponding author: Fabio Ramponi, fabio.ramponi@act.gov.au

Review began 09/19/2026
Review ended 11/04/2026
Published 11/08/2026

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DOI: 10.7759/cureus.119297

Abstract

Ascending aortic mural thrombus (AMT) is a rare but potentially life-threatening source of systemic embolization. We report the case of an 81-year-old woman who presented with acute left upper limb ischemia secondary to embolization from a mobile thrombus involving the ascending aorta and proximal aortic arch. Despite 48 hours of intravenous heparin therapy, repeat imaging demonstrated persistence of the thrombus. The patient underwent thrombectomy with replacement of the ascending aorta and hemiarch. Histopathology demonstrated ulcerated atherosclerotic plaques with associated thrombus. The left upper limb ischemia resolved completely, and the patient was discharged home on postoperative day 8 on oral anticoagulation therapy. At the six-week follow-up visit, she had fully recovered and was living independently. This case highlights the importance of multimodality imaging, operative assessment, and pathological correlation in the management of symptomatic ascending AMT.

Categories: Radiology, Cardiology, Cardiac/Thoracic/Vascular Surgery
Keywords: acute limb ischemia, ascending aorta, hemiarch replacement, mural thrombus, systemic embolization, thrombectomy

Introduction

Ascending aortic mural thrombus (AMT) is an uncommon but clinically important cause of systemic embolization [1,2]. Patients commonly present with cerebral, visceral, or peripheral embolic events, often requiring multimodality imaging for diagnosis [2-4]. Because no evidence-based management guidelines exist, treatment is individualized according to thrombus characteristics, embolic presentation, and operative risk [3,5]. We report a symptomatic ascending AMT successfully managed with surgical thrombectomy and replacement of the ascending aorta and hemiarch.

This case was previously presented as a poster at the 2026 Royal Australasian College of Surgeons (RACS) ACT Annual Scientific Meeting on August 14, 2026.

Case Presentation

A fit and independent 81-year-old woman presented with acute left upper limb ischemia. Her medical history included hypertension, dyslipidemia, obesity, and remote cigarette smoking (20 pack-years; cessation approximately 20 years earlier). No history of atrial fibrillation, malignancy, or known hypercoagulable state, including antiphospholipid syndrome, was documented. Admission electrocardiography demonstrated normal sinus rhythm, with no atrial fibrillation documented during inpatient telemetry monitoring. The admission platelet count was 368 × 10^3/µL and remained within a reported range of 200-500 × 10^3/µL during her hospitalization. Transthoracic echocardiography identified no intracardiac source of thrombus.

Computed tomography angiography (CTA) demonstrated complete occlusion of the left proximal brachial artery and heterogeneous contrast attenuation within the ascending aorta and proximal aortic arch near the origins of the brachiocephalic trunk and left subclavian artery. Additional findings included a bovine aortic arch configuration and mild calcified plaque within the aortic arch (Video *1*). No convincing evidence of acute aortic dissection, severe atherosclerosis, mediastinal mass, or intracardiac thrombus was identified.



How to cite this article
Fortunato Velten B, Patukale A, Peiris K, et al. (November 08, 2026) Surgical Management of Symptomatic Ascending Aortic Mural Thrombus: A Case Report. Cureus 18(11): e119297. DOI 10.7759/cureus.119297

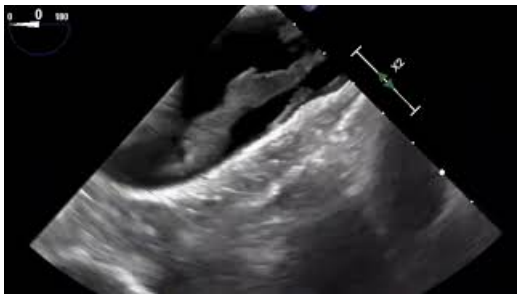
VIDEO 1: Axial and coronal views of computed tomography angiography of the chest showing a filling defect in the proximal aortic arch contacting the anterior and posterior wall, likely luminal thrombus of uncertain origin.

View video here: https://youtu.be/5Kp29MtB4nw

Urgent brachial embolectomy was performed, and intravenous unfractionated heparin was commenced. Histopathological examination of the retrieved embolic material confirmed thrombus. Left upper limb perfusion was restored immediately following embolectomy, with good distal pulses. Transthoracic echocardiography demonstrated normal cardiac function and identified a mobile thrombus involving the ascending aorta and proximal arch. Repeat CTA after 48 hours of anticoagulation demonstrated persistent thrombus.

Given symptomatic embolization, persistence of the thrombus despite anticoagulation, and its location, size, and mobility, surgical intervention was considered. The estimated operative risk was approximately 3% according to both the European System for Cardiac Operative Risk Evaluation II (EuroSCORE II) and the Society of Thoracic Surgeons (STS) Ascending Aorta and Aortic Root Surgery Risk Calculator. Following discussion with the patient and her family, the decision was made to proceed with surgery because of the risk of further embolization and stroke.

Intraoperative transesophageal echocardiography confirmed the thrombus location and mobility (Video *2*). Cardiopulmonary bypass was established via right axillary artery cannulation using an 8-mm Dacron side graft, with venous drainage through a right atrial cannula. Epiaortic ultrasonography localized the origin of the ascending aortic thrombus to the mid ascending aorta. At a core temperature of 26°C, an aortic cross-clamp was applied to the proximal ascending aorta under epiaortic ultrasound guidance, away from the thrombus. Diastolic cardiac arrest was achieved with cardioplegia delivered through the aortic root vent, followed by retrograde administration through a coronary sinus cannula. The left ventricle was vented via the right superior pulmonary vein. The patient was placed in the Trendelenburg position, with topical head cooling using ice packs. Mannitol, dexamethasone, and thiopental were administered. Cardiopulmonary bypass flow was reduced to 10 mL/kg/min. The innominate and left subclavian arteries were clamped, the aortic cross-clamp was removed, and lower-body hypothermic circulatory arrest with bilateral antegrade cerebral perfusion was instituted.



VIDEO 2: Intraoperative transesophageal echocardiogram showing two large and mobile floating masses arising from the ascending aorta and proximal aortic arch.

View video here: https://youtu.be/KEt0k_msTYE

Aortotomy revealed two thrombi arising from ulcerated atherosclerotic plaques within the ascending aorta and mid aortic arch (Figure *1*). The larger thrombus originated from an ulcerated plaque within the ascending aorta, proximal to the aortotomy, whereas the smaller thrombus originated from an ulcerated plaque along the inner curvature of the mid aortic arch. Following thrombectomy, the diseased ascending aorta and hemiarch were replaced with a 30-mm Dacron graft using an open distal technique. Cardiopulmonary bypass time was 220 minutes, aortic cross-clamp time was 72 minutes, and lower-body circulatory arrest with bilateral antegrade cerebral perfusion lasted 41 minutes.

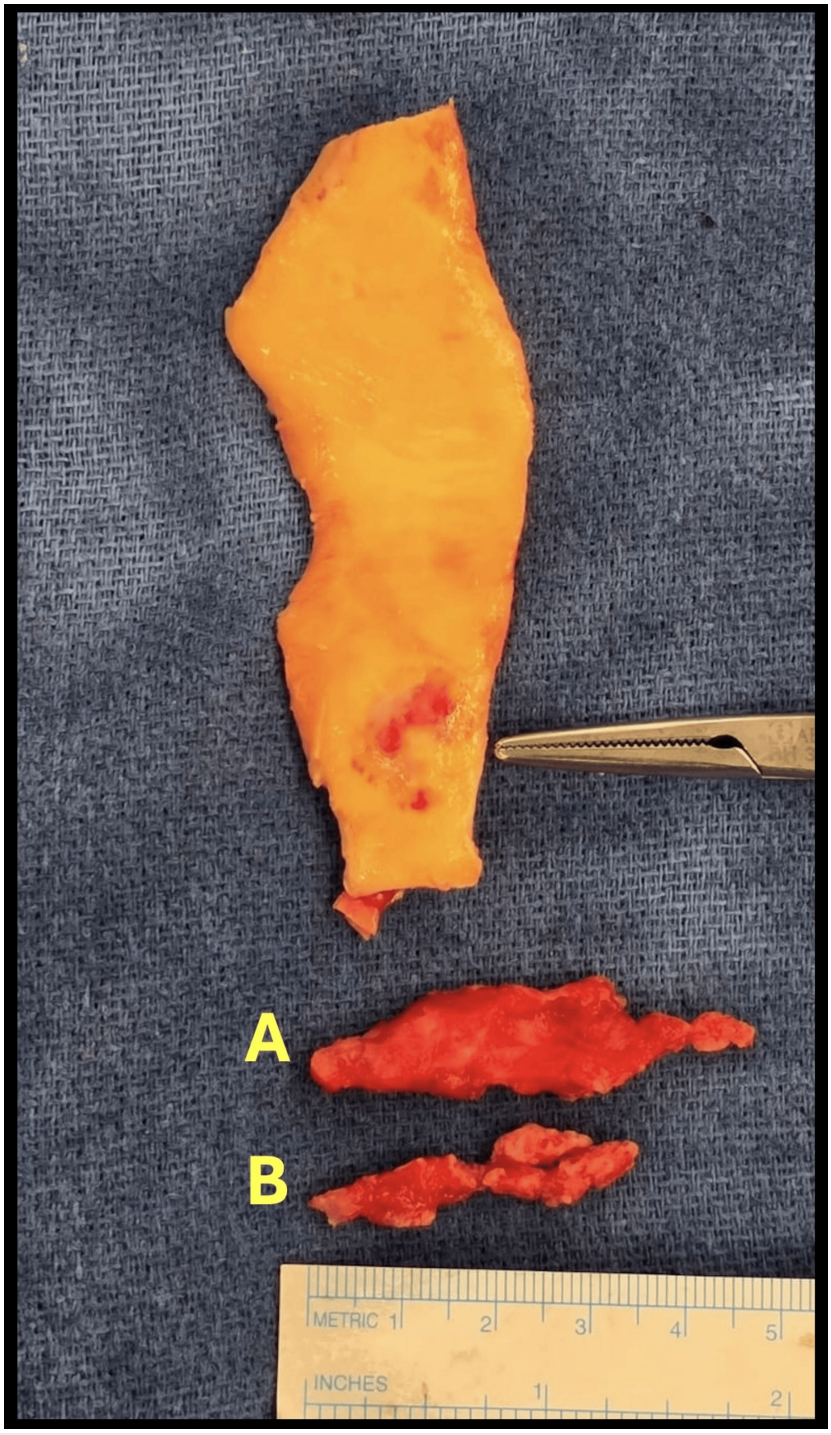


FIGURE 1: A segment of the ascending aorta with evidence of ulcerated atherosclerotic plaque and two large thrombi resected from the ascending aorta (A: 51 × 13 × 8 mm) and proximal aortic arch (B: 36 × 7 × 5 mm).

The postoperative course was uneventful. The patient was extubated on postoperative day 1, neurologically intact and hemodynamically stable. Aspirin was commenced on postoperative day 1, and therapeutic anticoagulation resumed on day 3. She was discharged home on postoperative day 8. At the six-week follow-up, the patient had fully recovered and remained independent. Anticoagulation was discontinued six months after surgery following hematology review.

Histopathology demonstrated two thrombus fragments (51 × 13 × 8 mm and 36 × 7 × 5 mm) associated with ulcerated atherosclerotic plaques and moderate medial degeneration, supporting plaque-associated

thrombosis as the source of systemic embolization. Histological examination with hematoxylin and eosin staining confirmed thrombus without atypical cells or evidence of malignancy in the examined specimens.

Discussion

Ascending AMT is a rare cause of systemic embolization, and management is guided primarily by case reports because evidence-based recommendations are lacking [1,5]. Multimodality imaging was central to the diagnosis and operative planning, with CTA defining the thrombus location, echocardiography confirming mobility, and epiaortic ultrasonography facilitating precise localization for surgical resection. However, CTA did not clearly identify the underlying ulcerated atherosclerotic plaques, which were subsequently confirmed by operative findings and histopathology.

Management remains controversial. Anticoagulation is the first-line therapy in most patients and can represent a successful definitive strategy, particularly in patients at high operative risk, although the chance of recurrent embolization is significant [3,5,6]. Endovascular treatment in the form of percutaneous thrombus aspiration or stent-graft deployment is a possible alternative for selected patients unable to tolerate open surgery [5,7,8].

Nevertheless, wider use of endovascular treatment is limited by the potential for thrombus fragmentation and distal embolization during catheter manipulation and by the anatomical constraints of the ascending aorta, which make stent-graft deployment technically challenging [5,7,8].

Conversely, surgery has generally been considered in patients with persistent thrombus despite anticoagulation, recurrent embolic events, or lesions considered to carry a high risk of further embolization. Large size and high mobility have been proposed as factors that may influence the decision to proceed with surgery [3,5,8]. In patients with primary AMT, surgical thrombectomy has also been proposed for large, pedunculated lesions of the ascending aorta or aortic arch considered to carry a high risk of recurrent embolization [9].

Surgical management ranges from thrombectomy alone to replacement of the involved aortic segment, depending on thrombus characteristics, the condition of the aortic wall, and intraoperative findings [2,5]. Replacement may be preferred when intimal defects, multiple thrombus insertion sites, or other abnormalities of the aortic wall are identified, allowing removal of both the thrombus and its attachment site while potentially reducing the risk of recurrence [1,8,10].

Several thrombus characteristics have been proposed to influence embolic risk, including morphology (sessile versus pedunculated), mobility, size, extent of aortic involvement, and anatomical location, although these factors have not been validated in prospective studies [5]. In our patient, symptomatic systemic embolization, persistence despite anticoagulation, thrombus morphology and mobility, and good preoperative functional status favored definitive surgical management. Axillary cannulation, hypothermic circulatory arrest with selective cerebral perfusion, and complete resection of the involved aortic segment were incorporated into the operative strategy to achieve complete thrombus excision.

Postoperative antithrombotic management remains another area without consensus. Aspirin, warfarin, direct oral anticoagulants, and combined antiplatelet-anticoagulant strategies have all been described following surgical treatment, although the optimal postoperative antithrombotic regimen has not been established [2,3,5,8].

Conclusions

Ascending AMT is a rare but potentially life-threatening source of systemic embolization. In symptomatic patients with persistent thrombus despite anticoagulation, surgical intervention may provide definitive treatment. This case highlights the importance of integrating multimodality pre- and intraoperative imaging, operative findings, and histopathology with careful assessment of operative risk and surgical planning to guide management in patients at risk of further embolization, including stroke.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: B Fortunato Velten

Acquisition, analysis, or interpretation of data: B Fortunato Velten, Fabio Ramponi, Aditya Patukale, Kamil Peiris, Randhara Alles

Drafting of the manuscript: B Fortunato Velten

Critical review of the manuscript for important intellectual content: B Fortunato Velten, Fabio Ramponi, Aditya Patukale, Kamil Peiris, Randhara Alles

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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