Photo Clinic

Pay Heed and Proceed: Acute Ascending Aortic Dissection Presenting as Acute Left Main Coronary Artery Occlusion

Sriram Veeraraghavan, MD, DM[1*], Bharath Raj Kidambi, MD, DM[2], Vasundhara Ponnaganti, MD[1]

[1]*Department of Cardiology, SRM Medical College and Research Centre, Potheri, Chengalpattu, Tamilnadu, India.*
[2]*Department of Cardiology, Al-Dhannah hospital, Aldhannah, Abu Dhabi, UAE.*

Received 04 June 2024; Accepted 02 August 2024

Acute aortic dissection (AAD) is the most fatal aortic condition and is frequently overlooked during initial clinical presentations. Aortic dissection associated with acute coronary syndrome (ACS) is relatively rare but can pose diagnostic challenges and prove highly fatal. Retrograde extension of AAD may result in partial or complete occlusion of coronary vessels. Documented cases exist involving aortic dissection presenting as ST-segment-elevation myocardial infarction, with the right coronary artery being most commonly affected.

A middle-aged woman with no comorbidities presented to the emergency department with sudden onset substernal chest discomfort radiating to her back and breathlessness for the past 5 hours. She had a tall and thin build and appeared anxious, diaphoretic, and orthopneic. Her vitals revealed tachycardia with a heart rate of 124 beats per minute and a systolic blood pressure of 80 mm Hg.

Auscultation revealed a soft early diastolic murmur with fine crepitations at the lung bases. The chest X-ray indicated acute pulmonary edema and a widened mediastinum. The 12-lead ECG (Figure 1. A) demonstrated sinus rhythm with ST depression in leads II, III, aVF, and V_3–V_6 and ST elevation in leads aVR and I, indicating ACS involving the left main coronary artery (LMCA). Emergency endotracheal intubation was performed, and inotropes were initiated as stabilizing measures. The duty cardiologist was notified, and the catheterization laboratory was activated in anticipation of emergency coronary intervention. Concurrently, a point-of-care 2D transthoracic echocardiography was conducted, revealing severe left ventricular dysfunction (left ventricular ejection fraction =30%) with global left ventricular hypokinesia, a tricuspid aortic valve, and severe acute aortic regurgitation. Upon meticulous examination, an oscillating flap-like structure was identified in the ascending aorta (Figure 1. B-F). AAD was suspected, and an emergency multidetector computed tomography (CT) aortogram validated the diagnosis of Stanford type A AAD with a curvilinear dissection flap extending from the ascending aorta, involving the aortic arch and reaching the right common femoral artery. The intimal flap occluded the LMCA, leading to hypoperfusion in the supplied territory and causing severe left ventricular dysfunction (Figure 2 A-E) (Video 1). The attending cardiothoracic and vascular surgeon was promptly notified, and the patient was transferred for emergency surgery.

J Teh Univ Heart Ctr 2024;19(4):302-305

This paper should be cited as: Veeraraghavan S, Kidambi BR, Ponnaganti V. Pay Heed and Proceed: Acute Ascending Aortic Dissection Presenting as Acute Left Main Coronary Artery Occlusion. J Teh Univ Heart Ctr 2024;19(4):302-305.

Keywords: *Aortic dissection; Coronary compromise; Left main coronary; Artery; CT aortogram*

[*]**Corresponding Author:** ***Sriram Veeraraghavan,*** *Professor of Cardiology, SRM Medical College Hospital and Research Centre, SRM Nagar, Potheri, Chengalpattu, TN, India. 603203. Tel: +91 8105970705. E-mail: srivats.007.2003@gmail.com.*

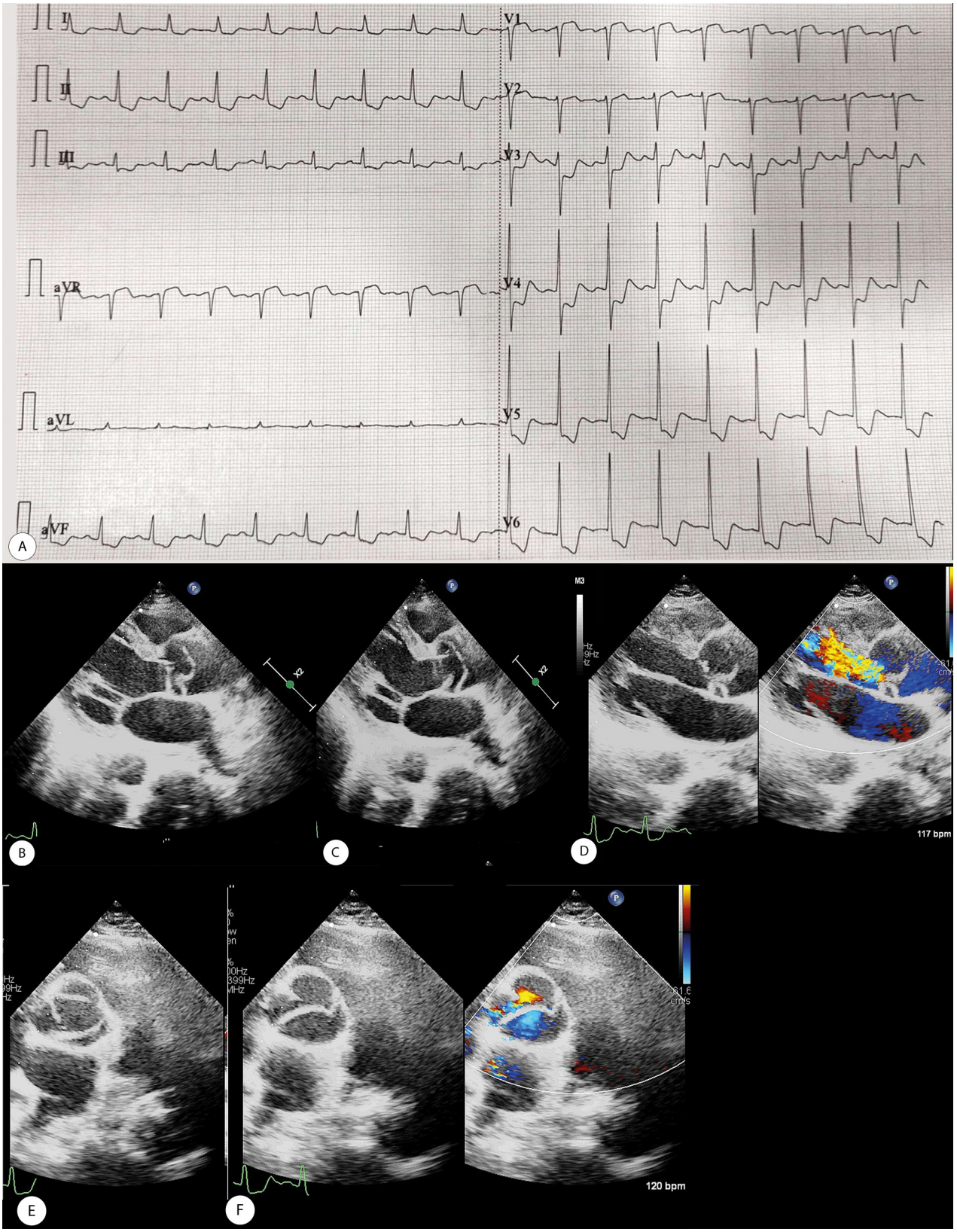

Figure 1. A) The patient's 12-lead ECG shows sinus rhythm and ST depression in leads II, III, and aVF and V3–V6, ST elevation in leads aVR and I, suggesting acute coronary syndrome involving the left main coronary artery.
B–D) The patient's 2D transthoracic echocardiogram in the parasternal long-axis view shows a curvilinear dissection flap in the ascending aorta, causing acute severe aortic regurgitation on color flow Doppler.
E and F) The parasternal short-axis view shows a tricuspid aortic valve with an aortic dissection flap interfering with leaflet closure.

Unfortunately, the patient succumbed to cardiopulmonary arrest during the procedure.

AAD is the most common fatal aortic condition. With an immediate mortality rate as high as 1%–2% per hour in the initial hours, early diagnosis and treatment are crucial for survival.[1] The dissection can propagate either antegrade or retrograde, involving side branches and resulting in complications such as malperfusion syndrome due to dynamic or static obstruction (extending from coronary to iliac arteries), tamponade, or aortic insufficiency.[2]

Approximately 0.5% of patients presenting to the emergency department with chest or back pain suffer from aortic dissection.[3] Acute myocardial infarction resulting from hypoperfusion of the coronary artery is exceedingly rare in AAD but potentially fatal. Among AAD patients, the incidence of acute myocardial infarction is 1%–2% due to hematoma or intimal flap compromising the coronary ostium.[3] AAD is misdiagnosed in the emergency department in up to 40% of cases, attributable to its clinical and epidemiological overlap with acute myocardial infarction.[4]

Stanford type A AAD involving coronary ostia exhibits a significantly higher mortality rate compared to dissections without coronary compromise.[5] Aortic dissection with occlusion of the left main coronary trunk is far more lethal and necessitates extremely urgent surgical intervention for patient survival. Even meticulously documented history and clinical examination may fail to diagnose AAD. Hence, point-of-care diagnostic noninvasive imaging tests should be conducted to screen for this lethal disease, which frequently mimics acute myocardial infarction.

CT aortography offers comprehensive anatomical details of the aorta, including branch vessel involvement, and

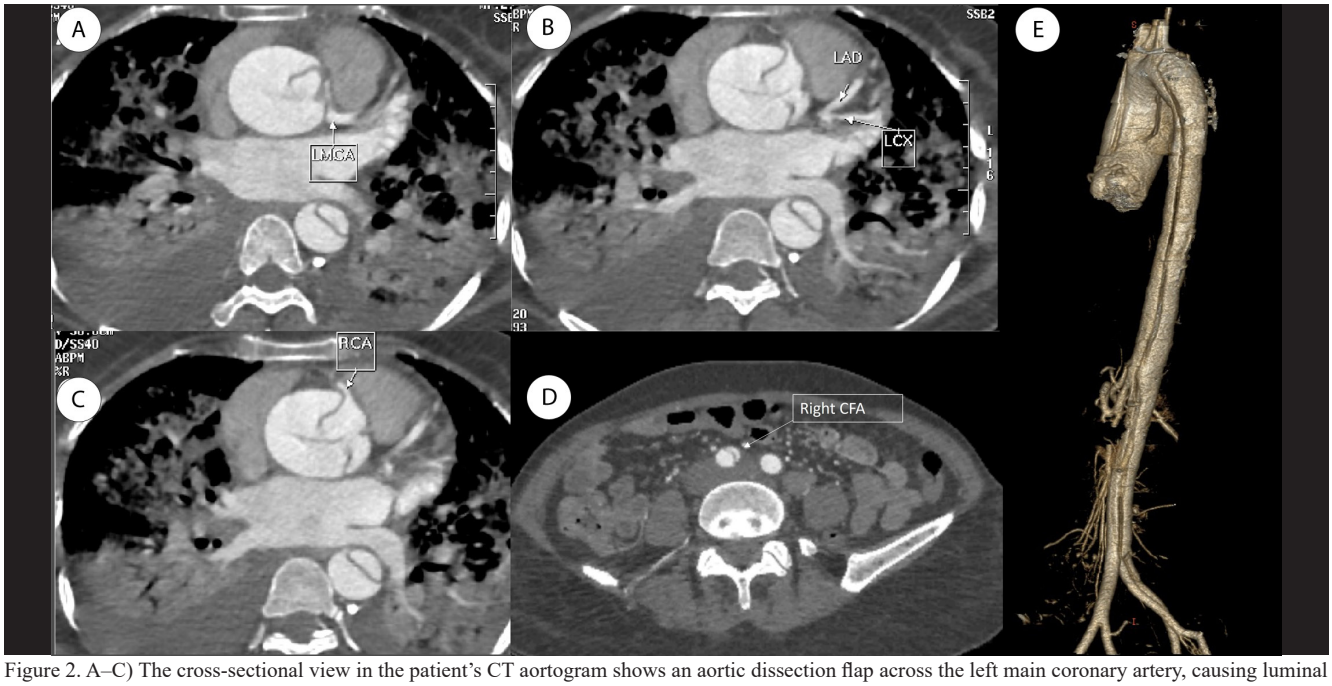

Figure 2. A–C) The cross-sectional view in the patient's CT aortogram shows an aortic dissection flap across the left main coronary artery, causing luminal compromise. However, the right coronary artery is spared.
D) The patient's CT aortogram reveals the dissection flap extending to the right CFA.
E) The 3D reconstruction of the patient's CT aortogram reveals the full extent of the dissection from the ascending aorta to the right CFA.
CT, Computed tomography; CFA, Common femoral artery

Table 1. Key considerations for diagnosing and managing acute aortic dissection (AAD)

Key Considerations	Description
Diagnosis Challenge	The diagnosis of AAD is challenging, as the classic tearing or ripping type of pain is observed in only 50% of cases.
Clinical Vigilance	Shock in patients with aortic dissection should prompt physicians to examine aortic regurgitation, aortic rupture, cardiac tamponade, and left ventricular systolic dysfunc-tion or coronary compromise, primarily the left coronary artery.
Importance of Imaging	Differentiating acute myocardial infarction and AAD based on clinical pointers has low sensitivity and specificity; thus, a reliable diagnosis necessitates a combination of more than one imaging modality, including transthoracic echocardiography, transesophageal echocardiography, computed tomography, and magnetic resonance imaging.
Avoiding Hazardous Treatments	Potentially hazardous treatments like thrombolysis, loading of antiplatelets, and, in some cases, cardiac catheterization can be avoided if a correct diagnosis of AAD is made.
Urgent Intervention for Coronary Compromise	AAD with compromise of the left main artery, though rare, is highly fatal if not diag-nosed or treated promptly.

enables visualization of the ostium and proximal sections of both coronary arteries. It exhibits a sensitivity of 83%–100% and a specificity of 90%–100% for AAD.[6]

In conclusion, drawing from the critical insights of this case report, we highlight the following key considerations that clinicians should heed when managing AAD (Table 1).

References

1. Hagan PG, Nienaber CA, Isselbacher EM, Bruckman D, Karavite DJ, Russman PL, Evangelista A, Fattori R, Suzuki T, Oh JK, Moore AG, Malouf JF, Pape LA, Gaca C, Sechtem U, Lenferink S, Deutsch HJ, Diedrichs H, Marcos y Robles J, Llovet A, Gilon D, Das SK, Armstrong WF, Deeb GM, Eagle KA. The International Registry of Acute Aortic Dissection (IRAD): new insights into an old disease. JAMA 2000;283:897-903.
2. von Kodolitsch Y, Schwartz AG, Nienaber CA. Clinical prediction of acute aortic dissection. Arch Intern Med 2000;160:2977-2982.
3. Hansen MS, Nogareda GJ, Hutchison SJ. Frequency of and inappropriate treatment of misdiagnosis of acute aortic dissection. Am J Cardiol 2007;99:852-856.
4. Tsai TT, Nienaber CA, Eagle KA. Acute aortic syndromes. Circulation 2005;112:3802-3813.
5. Moore AG, Eagle KA, Bruckman D, Moon BS, Malouf JF, Fattori R, Evangelista A, Isselbacher EM, Suzuki T, Nienaber CA, Gilon D, Oh JK. Choice of computed tomography, transesophageal echocardiography, magnetic resonance imaging, and aortography in acute aortic dissection: International Registry of Acute Aortic Dissection (IRAD). Am J Cardiol 2002;89:1235-1238.