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CASE REPORT

A case of acute aortic dissection in emergency department: lessons learned

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ABSTRACT

Background: Early diagnosis of acute aortic dissection (AAD) can be a challenge for emergency physicians because of its unspecific and variable presentation. For this reason, it is frequently referred to as "the great imitator," as it can mimic so many other conditions, including acute coronary syndrome and stroke.

Case Presentation: A case of middle-aged male was reported who was presented to the Emergency Department (ED) with a complaint of dizziness. His vitals showed a difference in the blood pressure (BP) of both arms and an absent pulse in the right arm. A computerized tomographic (CT) angiography of the aorta showed a Stanford type A aortic dissection. AAD is a challenging diagnosis to make in the ED and has a high mortality rate, especially if there is a delay in diagnosis and definitive management. The patient was in stable condition and then was transferred to another healthcare facility for further care and intervention.

Conclusion: There are no blood tests yet that can accurately rule in or rule out AAD. At the same time, bedside transthoracic echocardiography can be used as an adjunct test in unstable patients. CT angiography remains a pragmatic reference standard for the diagnosis of AAD.

Keywords: Case report, aortic, dissection, ED, AAD.

Introduction

Acute aortic dissection (AAD) can be lethal without early recognition and correct treatment. Although chest pain is the most commonly reported symptom [1], in approximately 6.4% of cases, this can present without any pain [2]. This condition carries a high mortality rate of 1%-2% per hour in Stanford type A AAD, making its timely recognition and management critical [1].

Case Presentation

A middle-aged male was presented to the emergency department (ED) with complaints of feeling dizzy and lightheaded, the onset of which was sudden on the day of ED attendance. A few hours prior to his attendance at the ED, the patient went to his occupational health clinic, where he complained of epigastric pain. This was also associated with some neck pain. Both had been resolved by the time he attended the ED.

There was no associated chest pain, back pain, or shortness of breath. In addition, the patient denied any past medical history or family history of chronic diseases, including no history of coronary artery disease, hypertension, or any genetic disorders. On arrival to the ED, the patient appeared comfortable with vital signs documenting a heart rate of 73 beats per minute, a respiratory rate of 18 per minute, and a blood pressure (BP) of 104/51 mm Hg in the left arm.

The systemic examination was within normal limits. However, there was a BP difference in both arms. The blood pressure in the left arm was recorded at 104/51 mmHg, and the right arm was 50/30 mmHg. No radial artery pulse was palpable on the right side, and the right femoral artery pulse was weak compared to the other side. A 12-lead electrocardiogram (ECG) showed a normal sinus rhythm with 1:1 conduction at a rate of 72 beats per minute with T-wave inversion in the precordial leads (Figure 1).

Laboratory tests were unremarkable except for an elevated d-dimer >20.0 mcg/ml (normal D-Dimer range <= 0.50 mcg/ml). The patients' troponin-T level was 12.05 ng/L. As part of their assessment, a chest X-ray was obtained, which showed a widened mediastinum and loss of the aortic knuckle (Figure 2).

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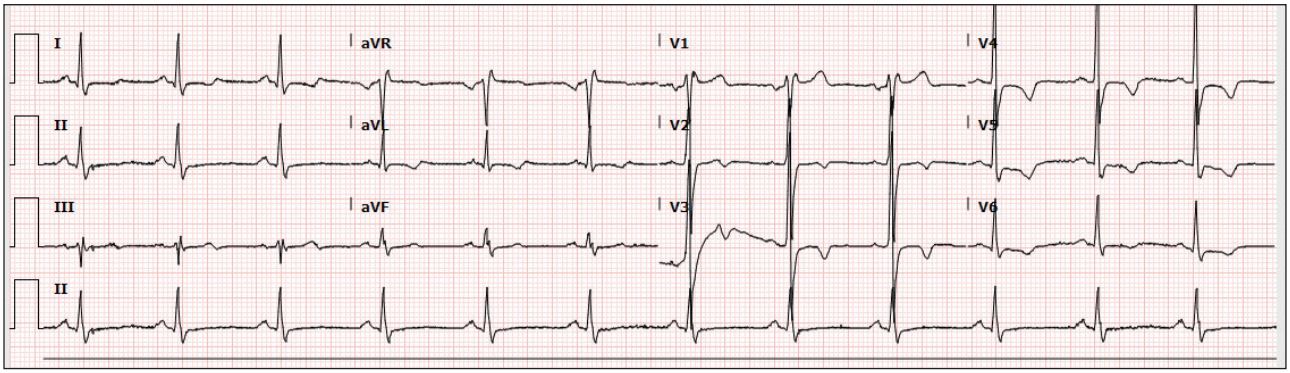

Figure 1. *Normal sinus rhythm with 1:1 conduction at a rate of 72 beats per minute with T-wave inversion in the precordial leads.*

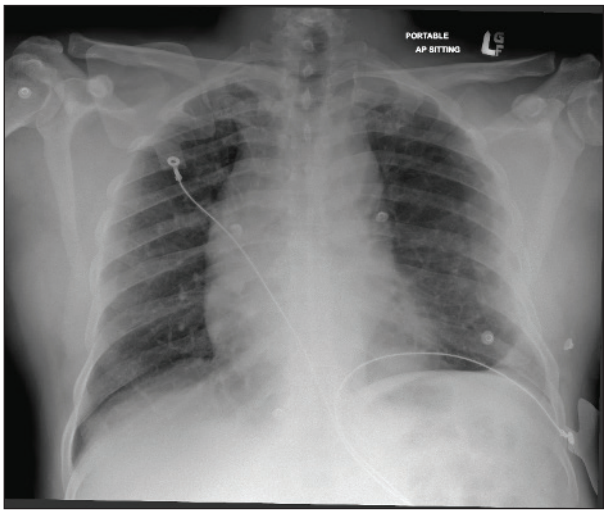

Figure 2. *Portable chest X-ray of the patient showing widened mediastinum.*

The differentials at this stage were AAD and possibly acute coronary syndrome, although the former diagnosis was far more likely. CT angiography of the aorta was performed, which showed a Stanford type A aortic dissection (Figure 3).

The dissection flap originated from the aortic root and extended distally up to the right common iliac bifurcation. The dissection flap also involved the superior mesenteric artery (SMA) and both renal arteries. The patient's condition was stable until he was moved to another hospital for more care and treatment.

Discussion

Depending on the differential diagnosis (DD), many patients who complain of chest pain might require extensive investigations. These investigations can include procedures such as electrocardiography (ECG), blood workup (troponin, d-dimer), and chest X-ray (CXR).

If the history and physical exam show red flags for AAD, further investigations should be performed, such as computed tomography (CT) or transthoracic/transoesophageal echocardiography [1,3,4].

For a blood workup, a study was conducted by Nazerian to evaluate the effectiveness of using the aortic

Figure 3. *CT angiography showing Sandford type A aortic dissection.*

dissection detection risk score (ADD-RS) plus d-dimer as a diagnostic test to rule out acute aortic syndrome. The results showed that a positive d-dimer test has a sensitivity of 96.7% and a specificity of 64% for the diagnosis of acute aortic syndrome. It was suggested that ADD-RS = 0 with negative d-dimer can be used as a rule-out method with a failure rate of 0.3% with a sensitivity of 99.6% and a negative predictive value of 99.7% [5].

It is a common practice to do an ECG for patients who complain of chest pain or epigastric pain. In the assessment of AAD, abnormal ECG findings are common and can mimic acute coronary syndrome [6]. This can be due to underlying comorbidities such as hypertension, and these changes were found in 38% of patients [6].

The most common ECG changes were T wave inversion, Q wave in any lead, ST depression, and left ventricular hypertrophy [6]. However, further evaluation should be done if there is suspicion of AAD [2,7].

As for imaging modalities, CXR is associated with the following diagnostic features, including widened mediastinum (52%), tortuous aorta (27%), and cardiomegaly (17%) [6,8]. The other method is to use echocardiography, which can be done bedside and can provide an immediate impression, especially for unstable patients who are not suitable for a CT scan. Transthoracic echo (TTE) has a sensitivity of 93%-96% [1,9]. TTE has a specificity of 87%-96% for detecting type A aortic dissection and a specificity of 60%-83% for detecting type B aortic dissection [10].

Although there are several imaging modalities that can be used for the diagnosis of AAD, such as cardiac MRI, transesophageal echocardiography, and CT. Among all of them, CT is the most commonly used imaging study, and it is available in most hospitals, especially in the ED [1].

The treatment approach for AAD consists of two important parts, including medical and surgical. For medical treatment, it should not delay definite surgical intervention, but it should aim to control pain and prevent further deterioration [1].

Beta blockers (BBs) are the drug of choice for controlling BP and heart rate (HR), and the aim is to maintain a BP range of 100-120 mmHg and an HR of 60 beats per minute [1]. If there are contraindications for the use of BB, then calcium channel blockers are used, such as verapamil and diltiazem. In the presence of hypotension, intravenous fluids should be given, and surgical treatment should be provided if there is pericardial tamponade [1]. However, vasopressors can carry a risk of aortic rupture [1].

Regarding the surgical approach, it is the only effective treatment option for type A AAD and has value in treating the cause and preventing complications [1]. It can carry a risk of mortality that is estimated at 20%, but those who survive the surgery have a 90% chance of three-year survival [10].

Conclusion

There are no blood tests yet that can accurately rule in or rule out AAD. At the same time, bedside transthoracic echocardiography can be used as an adjunct test in unstable patients. CT angiography remains a pragmatic reference standard for the diagnosis of AAD. Currently, no blood test is available to effectively rule in or rule out AAD.

List of Abbreviations

AAD	Acute aortic dissection
BP	Blood pressure
CT	Computerized tomographic
CXR	Chest X-ray
ECG	Electrocardiography
SMA	Superior mesenteric artery
TTE	Transthoracic echo

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication

Informed consent was obtained from the participant.

Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.

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