Pericarditis masking a localised thoracic aorta dissection: Making a point for point-of-care ultrasound

Raja Ezman Raja Shariff, Ahmad Farook, Chiao Wen Lim and Sazzli Kasim

Abstract
Early detection of aortic dissection (AD) remains essential due to high mortality rates. We report a case of localised thoracic AD initially misdiagnosed as pericarditis, but subsequently diagnosed through point-of-care ultrasound (POCUS). A 35-year-old gentleman presented with sudden-onset jaw and chest pain. An initial electrocardiogram revealed changes consistent with pericarditis, and high-sensitive troponin levels on admission were not raised. An initial diagnosis of pericarditis was made. However, due to persistent symptoms despite treatment, an urgent POCUS was performed, revealing a prominently dilated aortic root, with evidence of an intimal flap near the coronary cusps. Computed tomography imaging revealed a focal aortic root dissection confined within the sinus of Valsalva, with no involvement of coronary arteries or descending thoracic or abdominal aorta. This case highlights how commonly a misdiagnosis of AD can occur and how concurrent pericarditis can often mask AD. Our report highlights the need for better incorporation of POCUS in the initial assessment of acute chest pain, as studies have shown both high sensitivity and specificity in diagnosing AD, with no additional burden on treatment start-up time and mortality.

Keywords
Aortic dissection, thoracic aorta dissection, point-of-care ultrasound, case report

Introduction
Aortic dissection (AD) remains an important differential to consider in cases presenting with chest pain. Early detection remains essential, as the condition can often be fatal, and yet misdiagnosis remains commonplace within the emergency department.1 We report a unique case of localised thoracic AD misdiagnosed as pericarditis in a young, fit gentleman which was eventually diagnosed with the help of point-of-care ultrasound (POCUS).

Case report
A 35-year-old gentleman presented to our emergency department with sudden-onset jaw pain radiating to his chest. He described the pain as being sharp in nature, made worst by lying flat and relieved by lying forward and lasting for several hours, even at the point of presentation. Prior to this, he denied any similar episodes, and was otherwise well with no reported symptoms suggestive of a recent infection or trauma to the chest. He was an active smoker of five pack years, but he had no co-morbidities. He denied any substance misuse as well. His family history was unremarkable. He was an active army personnel and was normally involved in regular strenuous training regimens as part of his job, although he had not been involved in any within the last week.

His vitals on arrival included a blood pressure of 140/80 mmHg, heart rate of 115 bpm, respiratory rate of 16 per minute, oxygen saturation of 98% on room air and temperature of 36.8°C. Cardiorespiratory examination was unremarkable, with no evidence of a murmur or carotid bruit. There were no phenotypical signs suggestive of connective-tissue diseases peripherally. An initial electrocardiogram revealed diffuse, concave S-T segment elevations in the majority of leads, with S-T segment depression in lead aVR and ‘Spodick’ sign demonstrable (Figure 1). High-sensitive troponin levels on admission
were not raised. Chest radiography was normal, with no evidence of a widened mediastinum.

An initial diagnosis of pericarditis was made, given the findings on clinical examination and investigation. The patient was admitted for further observation, and started on non-steroidal anti-inflammatory medication. However, due to persistent chest pain despite treatment, an urgent POCUS was performed.

POCUS revealed the presence of an expected circumferential pericardial effusion, with the largest measurement being 1.97 cm (Figure 2(e)). However, POCUS additionally
demonstrated a prominently dilated aortic root, with the largest measurement being 5.2 cm at the sinus of Valsalva (SoV), with evidence of an intimal flap near the left and non-coronary cusps (Figure 2(a)-(c)). Further view of the descending thoracic aorta (Figure 2(d)) was unable to demonstrate possible anterograde dissection. A Doppler study also revealed severe aortic regurgitation, evident in apical five-chamber colour flow imaging and continuous wave Doppler (Figure 3(a) and (b)), apical three-chamber continuous wave Doppler (Figure 3(c)) and suprasternal view pulsed-wave Doppler, revealing reversed holo-diastolic flow in the descending aorta (Figure 3(d)). In view of these findings, computed tomography imaging of the aorta and of the coronary arteries was performed. A focal aortic root dissection confined within the SoV with no obvious involvement of left and right coronary artery was demonstrated on both imaging, with no involvement of the descending thoracic or abdominal aorta seen (Figure 4). A cardiothoracic consult was obtained, and the patient subsequently underwent an urgent Bentall procedure, and remains well postoperatively.

Discussion

AD is a life-threatening disorder, and outcomes are often fatal, with mortality rates of up to 54%. This highlights the important need for early diagnosis, and yet misdiagnosis can occur in up to 39% of cases presenting to the emergency department.

The incidence of concurrent pericarditis complicating AD remains unknown, and clinicians can often be misled. Our patient was a young, fit adult who had presented with ‘textbook-like’ symptoms suggestive of acute pericarditis. Furthermore, a suggestive electrocardiogram followed by other unremarkable peripheral investigations had swayed the initial diagnosis towards pericarditis. Our report makes a case for better incorporation of POCUS, as studies have shown both high sensitivity (86.4%) and specificity (100%) in diagnosing AD, with no additional burden on treatment start-up time, in-hospital mortality and three-month mortality after discharge. Furthermore, POCUS provides a possible means to circumvent issues with misdiagnosis which can lead to future medico-legal issues.

Conclusion

POCUS remains an essential tool in the evaluation of patients with acute chest pain. As illustrated in our case, it allowed for early detection of a potentially lethal condition like AD which would have been otherwise missed, supporting the need to incorporate this tool in our everyday clinical practice. Learning points from our case include: initial acute chest pain assessment should include ruling our major causes, including AD; POCUS provides a means of diagnosing AD at point of admission early, and allows for early life-saving surgical management; and although uncommon, pericarditis can complicate AD, and

Figure 3. Transthoracic echocardiogram demonstrating severe aortic regurgitation, evident in (a) and (b) apical five-chamber colour flow imaging and continuous wave Doppler; (c) apical three-chamber continuous wave Doppler and (d) suprasternal view pulsed-wave Doppler, revealing reversed holo-diastolic flow in the descending aorta.
this should be considered when faced with patients presenting with suggestive electrocardiography findings.

Acknowledgements
The authors would like to acknowledge Universiti Teknologi MARA (UiTM) for supporting the submission of the following article.

Authors’ contributions
R.E.F.R.S.: data collection and analysis, drafting of manuscript. F.A.: data collection and analysis, drafting of manuscript. L.C.W.: data collection and analysis, drafting of manuscript. S.S.: drafting or manuscript, revision of manuscript.

Availability of data and materials
The data that support the findings of this study are available from UiTM Sungai Buloh, but restrictions apply to the availability of these data, which were used under license for the current study and so are not publicly available. Data are, however, available from the authors upon reasonable request and with permission of UiTM Sungai Buloh.

Conflict of interest
The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Ethical approval
Approved by the Universiti Teknologi MARA (UiTM) Ethics Committee. The manuscript does not report on any animal data or tissue.

Figure 4. Computed tomography imaging of the coronary arteries moving from cranial to caudal (a)–(d), demonstrating a focal aortic root dissection confined within the sinus of Valsalva with no obvious involvement of the left and right coronary artery.

Funding
The authors received no financial support for the research, authorship and/or publication of this article.

Informed consent
Written informed consent was obtained from the patients for their anonymised information to be published in this article.

ORCID iD
Raja Ezman Raja Shariff https://orcid.org/0000-0002-5167-5863

References
1. Pourafkari L, Tajil A, Ghaffari S, et al. The frequency of initial misdiagnosis of acute aortic dissection in the emergency department and its impact on outcome. Intern Emerg Med 2017; 12: 1185–1195.
2. Gilon D, Mehta RH, Oh JK, et al. Characteristics and in-hospital outcomes of patients with cardiac tamponade complicating type A acute aortic dissection. Am J Cardiol 2009; 103: 1029–1031.
3. Hirata K, Shimotakahara JI, Nakayama I, et al. Acute aortic dissection masquerading as acute pericarditis: a case series. Intern Med 2020; 59: 2009–2013.
4. Wang Y, Yu H, Cao Y, et al. Early screening for aortic dissection with point-of-care ultrasound by emergency physicians: a prospective pilot study. J Ultrasound Med 2020; 39: 1309–1315.