Atraumatic aortic rupture as a consequence of penetrating aortic atherosclerotic ulcer rupture

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DESCRIPTION

A woman in her 70s with rheumatoid arthritis presented to the emergency department with progressive dysnoea and sharp chest pain radiating to her back over the preceding day. No recent thoracic trauma was recollected. Examination demonstrated frailty, hypotension with a mean arterial pressure of 50, normal heart sounds and reduced air entry at the right base on auscultation of lung fields. No radial asymmetry or pulsus paradoxus was present.

An ECG demonstrated left bundle-branch block. Twenty-four hour high sensitivity troponin was negative. Serial arterial gas haemoglobin within 30 min demonstrated haemoglobin drop from 10.8 g/dL to 8 g/dL. Chest X-ray demonstrated widened mediastinum, appearing wider than prior imaging a year previously. Emergency echocardiogram revealed a 1 cm pericardial effusion with fibrin deposition extending 1.8 cm anteriorly. No diastolic ventricular collapse or respiratory variation in transmural flow was evident to suggest pericardial tamponade.

CT thoracic aortogram (figures 1 and 2) demonstrated a collection of acute blood measuring up to 5.0 by 3.8 by 6.0 cm inferior to the aortic arch, immediately distal to the subclavian artery origin, exerting mass effect on the pulmonary trunk. Moderate right-sided haemothorax was noted. The great vessels and pericardium were surrounded by complex mediastinal fluid appearing haemorrhagic. A partially opacified fusiform infrarenal abdominal aortic aneurysm was seen, without evidence of acute rupture.

Deterioration into Pulseless Electrical Activity (PEA) arrest occurred on return from the scanner with unsuccessful resuscitation. Postmortem revealed severe atherosclerosis and pseudoaneurysm at an exit point of the aorta suggestive of a ruptured penetrating aortic ulcer (PAU).

Transmural aortic rupture in areas of severely atherosclerotic changes originating from PAUs has been described.¹ This rare phenomenon is usually lethal when it occurs.² Shennan first described PAU of the thoracic aorta in 1934³ with his observations added to by Stanson et al in 1986.⁴ The pathology described by these authors is felt to be a progression of the atherosclerotic process where ulceration penetrates through the internal elastic lamina and extends into the media. Extension of possible haematoma formation along the media can, in some cases, stretch aortic adventitia with resultant saccular pseudoaneurysm formation.⁵ This process can lead to transmural aortic rupture.¹ The postmortem pathological findings in our case were compatible with the probability of such a process. PAUs are most frequently located in the middle and descending thoracic aorta⁶ rarely seen in the ascending aorta, with multiple localisations seen quite frequently.⁷ These ulcers usually remain clinically silent until rupture occurs at which time diagnosis is ordinarily made.⁸ Emergency intervention where PAU is complicated by aneurysm expansion, rupture, embolic symptoms or uncontrollable pain is advocated,¹ whether with surgery or endovascular graft, and can be successful if pathology is identified early and before unstable deterioration.⁹

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Figure 1  CT aortogram; blue arrow denotes site of aortic rupture. Left: coronal plane; right: 3D reconstruction.

Figure 2  CT aortogram; blue arrow denotes site of aortic rupture. Axial plane.
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This case demonstrates that the vital need for awareness of aortic pathology, early use and accurate interpretation of CT aortogram is paramount.
Penetrating aortic ulcer (PAU) can be a consequence of severe atherosclerosis and can evolve to transmural rupture. Awareness of PAU within the spectrum of acute aortic syndromes is paramount.

Contributors ZS wrote manuscript and was involved in the diagnosis and management of the case. He also reviewed the literature and drafted the manuscript. CO-L was also involved in the management of this patient. DM and BL reviewed the draft and provided consultant overview of the case.

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Patient consent Not required.

Learning points

- Aortic rupture without preceding trauma is rare but is usually lethal when it occurs.
- This case demonstrates that the vital need for awareness of aortic pathology, early use and accurate interpretation of CT aortogram is paramount.
- Penetrating aortic ulcer (PAU) can be a consequence of severe atherosclerosis and can evolve to transmural rupture. Awareness of PAU within the spectrum of acute aortic syndromes is paramount.

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REFERENCES