

lesson of the month (2)

Delayed pericardial effusions: life-threatening complication presenting up to 100 days after chest trauma

Stab wounds are often managed conservatively with simple wound assessment and closure. However, even apparently minor thoracic wounds can cause delayed pericardial effusions presenting as life-threatening tamponade sometimes days, weeks or months later. Patients suffering stab wounds to the chest should receive echocardiographic follow-up to exclude delayed pericardial effusions.

Lesson

A 21-year-old man was stabbed once with a three inch blade to the right of the xiphoid process. In the emergency department he was intoxicated with alcohol and combative but clinically well. Blood pressure was 107/77 mmHg and an initial tachycardia of 145 beats per minute resolved with analgesia. The wound was not bleeding and on external examination was found to be 2 cm wide and 2 cm deep. A chest radiograph excluded pneumothorax and demonstrated a normal cardiac silhouette. The wound was sutured and after overnight observation the patient was discharged.

The patient presented again 107 days later with a one-week history of dyspnoea, reduction in exercise tolerance and a dry cough unresponsive to antibiotics. He had been fully active working as a security officer throughout the intervening period. Clinical examination revealed sinus tachycardia (107 bpm) and normal blood pressure (125/83 mmHg). Venous pressure was raised but heart sounds were normal. There was no peripheral oedema. The results of the electrocardiogram are shown in Fig 1. A chest radiograph demonstrated an enlarged globular shaped cardiac silhouette (Fig 2).

Urgent echocardiography confirmed a global pericardial effusion of 6.4 cm around a 'swinging heart' (Fig 3). Left ventricular function was hyperdynamic. The right atrium was collapsed but the right ventricle appeared normal. Urgent pericardiocentesis revealed a haemorrhagic effusion with a haemoglobin content of

6.5 g/l. The patient's symptoms improved rapidly following drainage. Over 1.5 litres of haemorrhagic effusion were drained in a 36-hour period. He was transferred to a cardiothoracic surgical centre where a cardiac computed tomography scan confirmed a residual loculated effusion.

Median sternotomy was performed for surgical exploration of the pericardial space. The pericardium was thickened and, upon opening, a further 450 mls of serous fluid was drained. No obvious trauma or scarring of the right ventricle was seen. The patient has ongoing follow-up and remains well.

Discussion

Acute pericardial effusion and cardiac tamponade can follow penetrating cardiac trauma and immediate drainage, followed by surgical exploration and repair, is required. Delayed pericardial effusions following thoracic trauma are much less common but can present unexpectedly, are potentially fatal and are preventable.

Pericardial effusions typically present with dyspnoea. Large effusions may compress local structures causing dysphagia, cough, hoarseness and hiccoughs. Chest radiographs may demonstrate an enlarged 'globular shaped heart'. Electrocardiography may demonstrate beat to beat variation in the amplitude of the QRS, termed electrical alternans. This manifestation is due to pendular swinging movements of the heart within the effusion. Ultimately, the diagnosis is made using echocardiography.

Delayed pericardial effusions have been reported following both penetrating and blunt trauma to the heart, chest, epigastrium and back.¹ Surprisingly, wounds can be remote to the heart. Delays of a few months have been described.^{1–5} All, some or none of the classical features of a pericardial effusion may be present in these patients.²

The cause of delayed effusions remains unclear. Direct but minor trauma to the heart with initial wound occlusion by thrombus and subsequent leakage of blood and exudate may explain some cases.² Sealed-off lacerations have been found on surgical exploration while others report lacerated coronary arteries with thrombus in situ.^{3,4} In children and infants blunt trauma to the chest or abdomen has resulted in unexplained haemopericardium.⁶ In older patients, incidental anticoagulant use may contribute.

An alternative explanation in some cases may involve an inflammatory or autoimmune process against the myocardium or pericardium, with a subsequent effusive pericarditis.³ This process is similar to a post-cardiotomy syndrome and the classical Dressler's syndrome that follow myocardial infarction.³ In a series of 24 patients, Harris *et al* felt that an autoimmune post-cardiotomy type syndrome was the main cause of delayed

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Fig 1. The electrocardiogram shows low voltage complexes (<1.0 mV in chest leads) with beat to beat variation in the QRS amplitude known as electrical alternans.

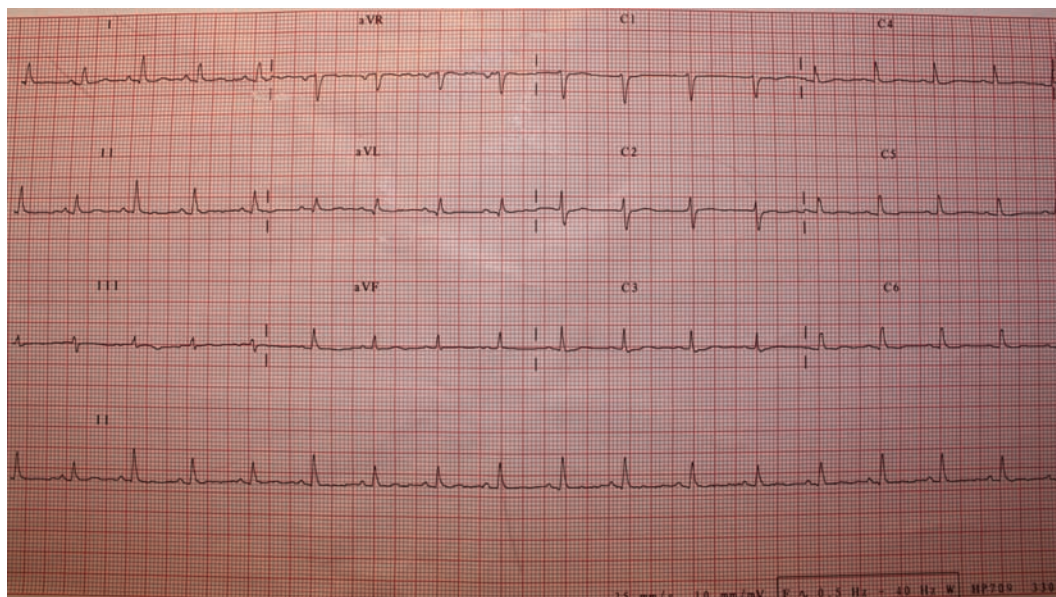


Fig 2. The PA chest radiograph prior to pericardiocentesis showed an enlarged globular shaped cardiac silhouette.

pericardial effusions – none were found to have cardiac lacerations.² This mechanism is likely to have played a role in the patient presented here. While the blade did not strike the heart, it may have caused an antigenic exposure sufficient to result in an autoimmune response.

In cardiac tamponade, the intrapericardial pressure exceeds intracavity pressure with subsequent cardiac chamber compression and impaired diastolic filling. This leads to circulatory collapse in the form of pulseless electrical activity (PEA). Pericardiocentesis should be performed immediately. A point to note is that in cardiac arrest secondary to tamponade, chest

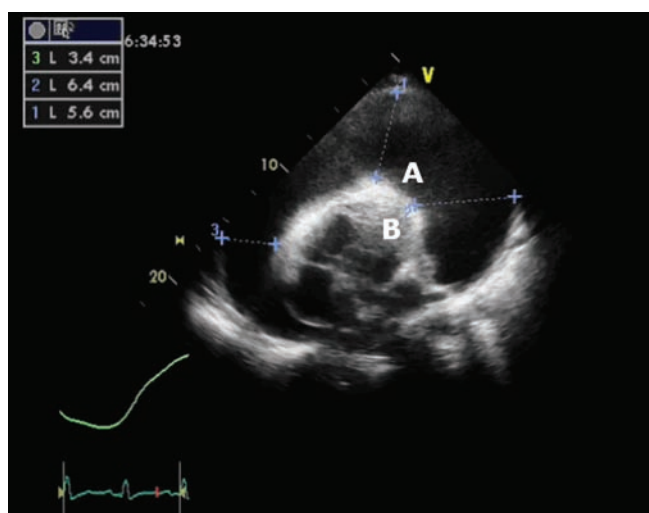


Fig 3. An apical four-chamber echocardiographic view demonstrating a significant pericardial effusion (A), measuring 6.4 cm in depth. The heart was seen 'swinging' in the centre (B).

compressions are futile as no cardiac output can be achieved until the effusion is drained.

Pericardiocentesis via the subxiphoid approach, guided by echocardiography, is a safe procedure and life saving.⁷ The injection of contrast through the 'seeker' needle may help to alleviate fears of ventricular puncture when the fluid aspirated is haemorrhagic in appearance.⁷ Fluid should be aspirated and an indwelling drainage catheter left in situ on free flow for at least 24 hours. There is no consensus on how long the drain should remain in situ or how quickly to remove the fluid, however, longer drainage may reduce the need for surgical exploration.⁷

Cardiothoracic surgical opinion should be sought as effusions may be loculated or contain thrombus in which case incomplete drainage will lead to rapid reaccumulation. The risk of subsequent pericardial constriction from haemorrhage in the pericardial space should be considered.

A very high suspicion of pericardial effusion and tamponade is required in all patients suffering penetrating trauma. Campbell *et al* described a case series of 1,198 penetrating cardiac trauma cases, 697 of which were stabbings.⁸ Of these, only 66 patients reached the hospital alive and 202 patients (18%) died of tamponade who could have been saved had prompt pericardiocentesis or thoracotomy been performed.⁸ Seven patients were identified as having cardiac injury missed on surgical exploration, emphasising the need for vigilance even when using an operative strategy.⁸

With knife crime a continuing trend, delayed cardiac effusions and tamponade should be considered and routine arrangements for follow-up echocardiography and review should be made for all stab victims.

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