

RUSH to the rescue in undifferentiated hypotension

Introduction

This article reports a case of a 60-year-old man with an atypical presentation of pericardial tamponade. Diagnosis was made possible using point of care ultrasound which led to an immediate pericardiocentesis. This case highlights the role of the RUSH (rapid ultrasound for shock and hypotension) ultrasound protocol in diagnosing and managing undifferentiated shock.

Discussion

The patient was well throughout his stay in the emergency department and then deteriorated quickly despite adequate treatment. The clinical findings were not suggestive of a pericardial tamponade as the jugular venous pressure was not raised and the neck veins were not distended. If a focussed bedside ultrasound using the RUSH protocol had not been done, the pericardial tamponade would have been easily missed and possibly picked up at a later stage, i.e. in cardiac arrest. In addition, the patient could have potentially been given more fluid boluses to treat the more common diagnosis – septic shock, thus leading to fluid overload.

The RUSH protocol is a clinically validated tool (Keikha et al, 2018) and has a systematic approach compared to other ultrasound protocols for hypotensive patients. Despite its significance in identifying time-critical pathologies, the Resuscitation Council (UK) still classifies bedside ultrasound as a modality ‘to consider’ during periarrest scenario rather than being mandatory. It is important that this skill is taught to life support providers and highlighted as a crucial skill.

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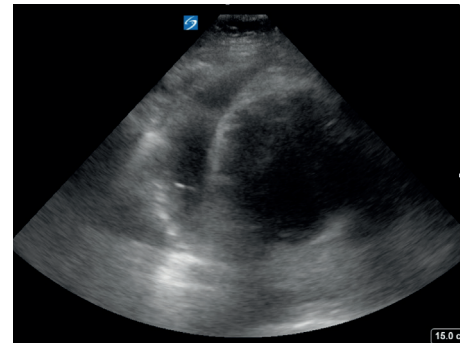
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Ultrasound-guided pericardiocentesis is the gold standard (Park et al, 2018) compared to the subxiphoid ‘blind approach’ because of its safety profile and the ability of the operator to visualize the needle in real time. Combined with the parasternal approach, the procedure involves minimal risk (Osman et al, 2018). The agitated saline method can be used to confirm pericardial catheter placement at the bedside (Ainsworth and Salehian, 2011). **BJHM**

Ainsworth CD, Salehian O. Echo-guided pericardiocentesis. *Circulation*. 2011 Feb;123(4):e210–e211. <https://doi.org/10.1161/>

Figure 1. Pericardial catheter placement situated in the pericardial sac confirmed by ultrasound.



CASE REPORT

A 60-year-old tetraplegic man with previous C5/C6 spinal injury presented to the emergency department with a prolonged history of shortness of breath, weight loss and abdominal distension. He was treated for suspected pneumonia with sepsis and was given intravenous antibiotics and fluid boluses (sodium chloride 0.9%). Blood results showed low sodium levels, raised levels of inflammatory markers and low albumin levels. The electrocardiogram showed no acute changes.

The patient's condition progressively deteriorated and he became hypotensive (blood pressure 60/40 mmHg). He was moved to the resuscitation department and reassessed clinically. The cause of the hypotension was thought to be septic shock, but a bedside ultrasound was performed using the RUSH (rapid ultrasound in shock and hypotension) protocol (Perera et al, 2010) to look for other causes. The patient was given an adequate amount of fluids, confirmed with views of the inferior vena cava. As part of the protocol, cardiac views were performed, and it was noted that there was a large pericardial effusion with tamponade (right ventricular diastolic collapse). There was also a large amount of pleural effusion. The size of the abdominal aorta was normal.

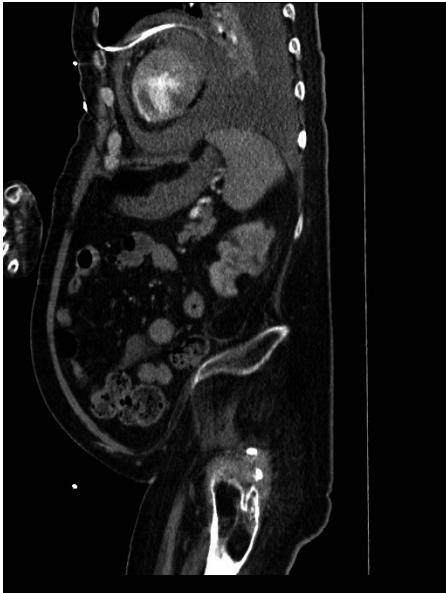
While the ultrasound was being done, the patient became unresponsive (peri-arrest) and a decision was made to perform an emergency pericardiocentesis. The procedure was initially done using a 18 G cannula by an ultrasound-

guided parasternal in-plane approach (Osman et al, 2018) using the high frequency ultrasound probe at the area of maximal fluid depth (5th intercostal space). The needle was visualized throughout the procedure. About 50 ml of serous fluid was aspirated before the cannula unfortunately kinked.

The patient's blood pressure improved for a short duration before becoming unresponsive again. A pericardial catheter was then inserted using an ultrasound-guided Seldinger technique. Catheter placement was confirmed using the agitated saline method at the bedside (Figure 1) (Tsang et al, 1998). About 500 ml of serous fluid was aspirated and the patient's blood pressure normalized. Colleagues from the attending specialist team queried that the catheter might be in the pleural cavity as the aspirated volume was unusually large for a pericardial tamponade. The patient then had a computed tomography scan of the chest (Figure 2) and this confirmed the placement of the catheter in the pericardial sac. The patient was admitted to the coronary care unit and an additional 500 ml of serous fluid was drained. The catheter was removed within 24 hours. A repeat echocardiography by the cardiologist showed a small amount of residual pericardial fluid.

The patient succumbed to his illness 5 days after admission. The coroner's inquest report stated that the cause of death was a combination of decompensated heart failure, chest infection and decreased nutritional status.

Figure 2. Pericardial catheter placement in the pericardial sac confirmed on computed tomography.



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LEARNING POINTS

- The RUSH (rapid ultrasound for shock and hypotension) point of care ultrasound protocol provides a methodical assessment of ‘the pump’ (cardiac status), ‘the tanks’ (intravascular volume status) and ‘the pipes’ (the circulatory system) to provide more insight into patients presenting with a diagnostic uncertainty.
- The ultrasound-guided parasternal in-plane approach is a safe method which allows real-time visualization of the needle tip during pericardiocentesis.
- As emergency departments in the UK move toward goal-directed targets, structured ultrasound protocols may be beneficial as a screening tool to identify patients with life-threatening pathologies. This service can be provided immediately on assessment by senior clinicians.

Images in Medicine

A lump in the groin

Figure 1. Large inguinal mass.



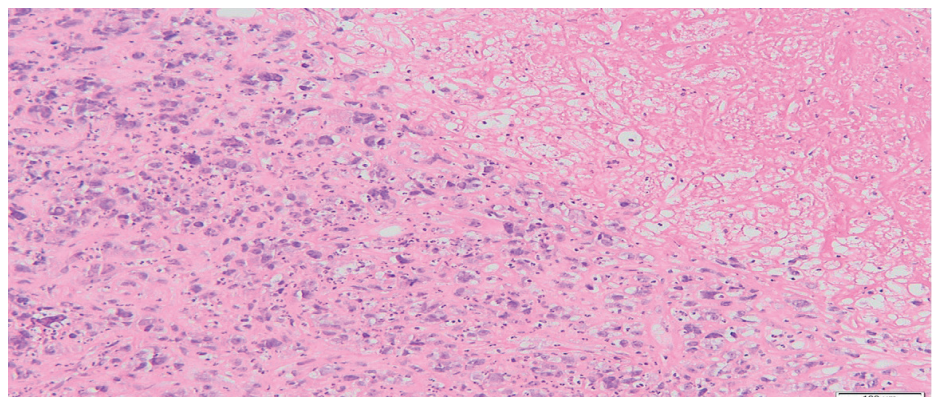
A 78-year-old man presented with a large, painless lump in the right groin. The patient had noticed a pea-sized lump 12 months’ previously but noted a rapid increase in size in the past month. Positive examination findings included a large, erythematous, hard, right inguinal mass (*Figure 1*). Examination of the lower extremities, back, perineum, penis and scrotum was unremarkable.

Further imaging with ultrasound,

computed tomography and magnetic resonance imaging confirmed an isolated neoplastic-appearing inguinal lymph node, with no focal osseous lesions in the visualized skeleton, no pulmonary nodules or masses, and normal appearance of the liver, spleen, pancreas and kidneys.

Ultrasound-guided biopsy and subsequent histology (*Figure 2*) revealed a diagnosis of a high grade undifferentiated pleomorphic sarcoma; there are no cases reported of this being confined to a lymph node. **BJHM**

Figure 2. Histology illustrating poorly differentiated tumour with large giant anaplastic nuclei and tumour necrosis.



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