Emergency bedside ultrasound in a case of chest pain and collapse

Introduction

Bedside ultrasound allows life-saving imaging at the point of care, bringing a paradigm shift to the conventional physical examination and diagnostic skills.

Focused echocardiographic evaluation in resuscitation management can improve the outcomes of cardiopulmonary resuscitation by allowing the identification and treatment of reversible causes or complicating factors.

Discussion

Emergency ultrasound (bedside, point-of-care, focused, clinical and physician performed) is a life-saving tool in shocked patients. Time-dependent scenarios occur during pre-resuscitation care, during cardiopulmonary resuscitation, and in post resuscitation care (Soar et al, 2005).

Typically, emergency ultrasound is a goal-directed focused ultrasound examination that answers brief and important clinical questions in an organ system or for a clinical symptom or sign involving multiple organ systems (*Table 1*). Bedside ultrasound in the current case significantly altered the diagnosis and management and prevented the administration of an anticoagulant (low molecular weight heparin) that would have worsened the haemopericardium and the tamponade.

The FEEL (Focused Echocardiography Evaluation in Life Support) study (Breitkreutz et al, 2010) demonstrated that cardiac ultrasound changed management in 89% of cardiac arrest patients and 66% of peri-arrest patients. Among other things differential diagnosis of pulseless electrical activity is best elucidated with echocardiography – these diagnoses cannot be made with standard physical examination or the electrocardiogram (Breitkreutz et al, 2007).

It is suggested that peri-resuscitation echocardiography should become a core competency for emergency and admitting physicians. Applications include trauma, intrauterine pregnancy, abdominal aortic

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Figure 1. Subcostal view from bedside peri-arrest echocardiogram showing significant pericardial effusion with fibrin strands (arrow). There is associated right ventricular collapse during diastole.

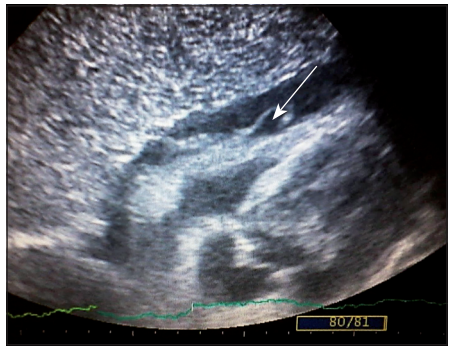
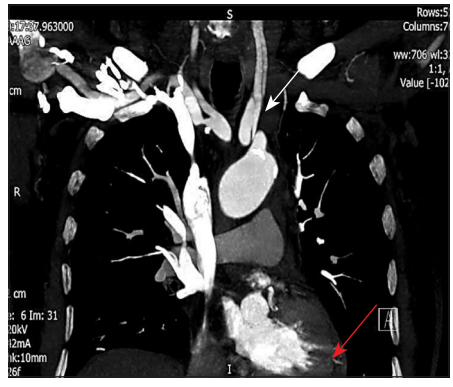


Figure 2. Computed tomographic aortogram showing proximal aortic dissection extending into the left common carotid (white arrow) and haemorrhagic pericardial effusion (red arrow).



Case Report

A 74-year-old man was brought to the emergency department by ambulance with an episode of central severe chest pain lasting a few minutes followed by collapse. He was hypotensive with blood pressure 78/44 mmHg and tachycardia of 118 beats per minute on initial assessment with the ambulance. His condition slowly improved in the emergency department and his blood pressure responded to fluids. His past medical history consisted of hypertension, high cholesterol and previous mini stroke, and significant medications included aspirin, simvastatin and ramipril.

By the time the emergency department registrar saw the patient the chest pain had completely settled and the patient was fully alert. A provisional diagnosis of pulmonary embolism was made, a computed tomographic pulmonary angiogram was ordered and he was prescribed a treatment dose of heparin.

Incidentally, the medical registrar saw the patient before the treatment dose of heparin could be given and considering the age, sudden collapse and vascular risk factors decided to do a FAST (focussed abdominal sonography in trauma) scan to evaluate the aorta and heart before anticoagulation and computed tomographic pulmonary angiogram.

Using the portable ultrasound machine in the emergency department the subcostal echocardiographic view showed a global and significant pericardial effusion (*Figure 1*) with floating fibrin strands. There was associated inspiratory right ventricular collapse (see video on www.magonlinelibrary.com/toc/hmed/current). The abdominal aorta measured 4.4 cm and there was no free fluid in the abdomen. Based on these findings a diagnosis of acute aortic dissection with tamponading haemorrhagic pericardial effusion was established. A computed tomographic aortogram was performed rather than a computed tomographic pulmonary angiogram and no heparin was given.

The computed tomographic aortogram (*Figure 2*) confirmed the haemorrhagic pericardial effusion and proximal aortic dissection extending up to the left common carotid artery. The patient was urgently transferred to a regional cardiothoracic centre after stabilization. Pericardiocentesis was not carried out as the blood pressure was haemodynamically stable and it was thought that relieving the tamponade acutely would promote further bleeding. The patient subsequently underwent an emergency aortic repair but unfortunately did not survive the procedure.

aneurysm, cardiac, biliary, urinary tract, deep vein thrombosis, soft tissue or musculoskeletal, thoracic, ocular and procedural guidance (American Institute of Ultrasound in Medicine, 2008). BJHM

Table 1. Functional clinical categories of emergency ultrasound

Resuscitative: during peri-arrest situations
Diagnostic: an aid to initial clinical assessment
Symptom or sign-based: triggered by a patient's presenting symptoms
Procedure guidance: to help guide a procedure
Therapeutic and monitoring: for physiological monitoring

From American College of Emergency Physicians (2001)

American College of Emergency Physicians (2001) ACEP Emergency Ultrasound Guidelines. *Ann Emerg Med* **38**: 470–81
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LEARNING POINTS

- Hypotension as a result of pericardial effusion is preload responsive, while pulmonary embolism is preload sensitive.
- Emergency bedside ultrasound is intended to be used rapidly at the point of care as an adjunct to clinical examination in the critically ill or peri-arrest patient to guide critical decision-making.
- With patients presenting with chest pain, focused cardiac ultrasound can help to evaluate potentially life-threatening situations like pericardial effusion, pulmonary embolism and aortic dissection.
- Ultrasound increases diagnostic certainty and shortens time to definitive therapy. It can also decrease complications from blind procedures that carry an inherent level of complications.

Nicorandil-associated skin necrosis around a stoma site

An 89-year-old woman underwent a Hartman's procedure for an obstructed diverticular stricture. A year later, she presented with severely painful ulcerated skin around the end of the colostomy, not responding to stoma care management (*Figure 1*). Surgeons discussed whether to re-site the stoma, or to try and repair the stomal hernia using a porcine collagen mesh. It was then noticed that she had recently started taking oral nicorandil for ischaemic heart disease.

Nicorandil is a vasodilatory drug indicated for the prophylaxis and treatment of stable angina. Common side effects include flushing, palpitation, weakness, headache, mouth ulcers, nausea and vomiting (Joint Formulary Committee, 2012), but peri-anal, ileal and peri-stomal ulceration have been reported as side effects (Abdelrazeq et al, 2006; Donaldson et al, 2009).

After stopping nicorandil, her ulcers healed significantly within 6 weeks (*Figure 2*). Awareness of this association can help treat such painful, non-healing parastomal ulcers, and avoid unnecessary and costly investigations and treatments. BJHM

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Figure 1. Severely ulcerated skin around colostomy.

Figure 2. Ulcers healing after stopping nicorandil.