Diagnosis of bone cement implantation syndrome using point of care ultrasound examination

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ABSTRACT

Once regarded as a rare complication, the potentially fatal bone cement implantation syndrome (BCIS) has been increasingly reported. BCIS can present as transient desaturation, hypotension, cardiac dysrhythmias, and cardiovascular collapse. Diagnosis of BCIS is often clinical and confirmed with computed tomography (CT) imaging postoperatively. However, point of care ultrasound (POCUS) examination could be a helpful and timely tool to clinch the diagnosis in a sudden cardiovascular collapse. We present a case of Grade 3 BCIS where POCUS examination revealed a massive clot in the right atrium, which supports the diagnosis.

Keywords: Clot, pulmonary artery, right atrium, saddle pulmonary embolism, transthoracic echocardiography

CASE REPORT

An octogenarian female suffered a right neck of femur fracture 5 months earlier and had undergone proximal femoral nail antirotation (PFNA) fixation with cement. Transthoracic echocardiography (TTE) is routinely used by some centers to evaluate cardiac function perioperatively.² As a noninvasive imaging tool, the intraoperative use of TTE has helped with the diagnosis and management of BCIS-related hypotension.³⁻⁴ The combination of echocardiographic findings that may support the diagnosis of BCIS include acute right ventricular (RV) dilation, regional RV dysfunction consisting of akinesia of mid free wall segment with normal motion at apex (McConnell’s sign), septal wall motion abnormality, compressed left ventricle, and inferior vena cava dilatation.⁵⁻⁻⁶

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atrium [Figure 1], the clinical impression was that the patient most likely had BCIS and the acute cardiovascular event was likely due to right ventricular outflow tract obstruction from pulmonary embolism.

As the patient was hemodynamically unstable, a joint decision was made to terminate the surgery. Her right lateral thigh wound was covered with Ganggee dressing. Plans were made to transfer her to the surgical intensive care unit for ventilatory and hemodynamic stabilization, before undergoing CT imaging of her thorax to evaluate for embolism. Just before proceeding for her CT scan, her heart rate and blood pressure were 126 bpm and 129/80 mmHg, respectively, on adrenaline 0.2 µg/kg/min.

CT scan of the thorax revealed the following: (i) a circumscribed 26.3 mm hypodense mass within the distended right atrial cavity [Figure 2a and c]; (ii) acute saddle pulmonary embolism extending from the pulmonary trunk (main pulmonary artery) into both left and right pulmonary arteries [Figure 2b]; (iii) presence of clot in the right atrium and clots in main pulmonary artery [Figure 2c], and right heart strain as evidenced by dilatation of the right ventricle (right ventricular chamber size: left ventricular chamber size >1) with straightening of the interventricular septum [Figure 2d]; and (iv) clots in the distal lobar‑segmental branches, predominantly in the lower lobes.

The patient was expediently reviewed by a multidisciplinary team involving cardiologist, cardiothoracic surgeon, interventional radiologist, and intensivist. Surgical thrombolysis and thrombectomy were considered. However, the procedures were deemed not ideal due to the size and location of mass. Furthermore, patient had developed coagulopathy, likely disseminated intravascular...
of POCUS had expedited the arrangement for CT scan for cardiac function in cardiac arrest. Point of care ultrasound examination is a timely and important tool for appropriate management of the patient. Early diagnosis of underlying cause would be of paramount importance for appropriate management of the patient. Fluid and inotrope management. We can then use the information to guide fluid and inotrope management.

On the other hand, having an early diagnosis could also lead to earlier prognostication. Should the potential treatment options be limited or futile, the information may have been used to guide the extent of resuscitation and care.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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