

Symptomatic cardiopulmonary cement embolism following vertebroplasty

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DESCRIPTION

An 86-year-old woman with history of bronchial asthma and debilitating back pain from multiple vertebral compression fractures underwent polymethylmethacrylate (PMMA) cement-augmented vertebroplasty at T4, T5, T6, T7, T11 and T12 vertebral levels. This was performed as an ambulatory hospital procedure. Prior to the procedure, the patient had no cardiorespiratory symptoms, and examination noted respiratory rate of 14 breaths/min and clear lungs on auscultation.

Postprocedure in the recovery room, she started experiencing worsening shortness of breath. On examination, her respiratory rate was 44 breaths/min, and oxygen saturation was 86% on room air. Mild bilateral wheezing with adequate air entry was noted on auscultation, and breathing was significantly laboured. Bronchial asthma exacerbation was considered, but respiratory distress and hypoxaemia were perceived to be out of proportion to auscultation findings. In addition, the patient had poor response to bronchodilators.

A non-contrast CT scan of the chest showed cement emboli in the paravertebral veins (not shown), tubular strands of cement in the superior vena cava extending into the right atrium and right ventricle (figure 1A; arrows) and cement in the right and left pulmonary arteries (figure 1B; arrows). A transthoracic echocardiogram showed cement traversing the tricuspid valve into the right ventricle (video 1).

She was managed with supplemental oxygen and heparin drip and initially required non-invasive positive pressure ventilation for stabilisation. She improved and was slowly weaned off oxygen. After 7 days of hospital stay, she was discharged on apixaban. At a 3-month follow-up visit, she was asymptomatic, and pulse oximetry was 98% on room air.

Cardiopulmonary embolisation of PMMA (also known as cement embolism) may occur as a



Video 1 Transthoracic echocardiogram showing cement embolus in right ventricle.

complication of percutaneous vertebral augmentation procedures, including vertebroplasty and kyphoplasty. Reported incidence rates are 0.9% for vertebroplasty and 0.4% for kyphoplasty.¹ The pathophysiology involves the iatrogenic intravasation of PMMA into the thoracic venous system via the valveless vertebral venous plexus.² The majority of affected patients are asymptomatic.³ Associated symptoms may include dyspnoea, tachypnoea, palpitations and chest pain.⁴ Fatalities have also been reported.⁴⁻⁶

On a non-contrast chest CT, radio-opaque cement emboli may be easily demonstrated in any part of the thoracic venous system, the right heart or in the pulmonary arteries. Tubular or branching high-density cement emboli may also be seen on chest X-ray along the lines of pulmonary vessels.⁷ In our patient, initial chest X-ray report did not identify the subtle scattered strands of cement emboli, but these were later noted on retrospective review.

Treatment modalities proposed for cement embolism depend on the clinical severity. Asymptomatic cases may be observed and active treatment has been suggested for symptomatic cases including anticoagulation, endovascular retrieval or open heart surgery for extraction of emboli.⁸⁻¹⁰

No randomised trials have evaluated any treatment modalities partly because symptomatic cases remain uncommon.

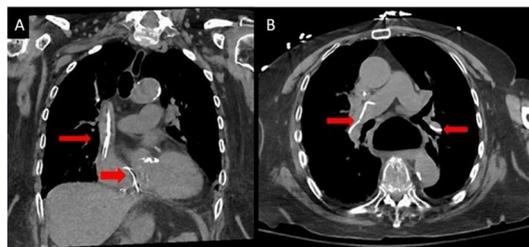


Figure 1 (A; arrows) Non-contrast coronal chest CT showing cement emboli in superior vena cava, right atrium and right ventricle. (B; arrows) Non-contrast axial chest CT showing cement emboli in right and left pulmonary arteries.

Learning points

- ▶ Cardiopulmonary cement embolism is a potentially life-threatening complication of vertebroplasty and kyphoplasty.
- ▶ A non-contrast CT of the chest is a very useful diagnostic tool and appear to be superior to chest X-ray in this regard.
- ▶ Treatment modalities require further research to optimise patient outcomes



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Increased access to vertebral augmentation procedures for osteoporotic vertebral compression fractures is anticipated for an ageing global population. Cement embolism should remain high on the differentials for respiratory distress following vertebroplasty or kyphoplasty to minimise delays in diagnosis and appropriate treatment.

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