

Complications of Pulmonary Cement Embolism Following Kyphoplasty

Han-Luen Huang^{1,*}, Chaou-Shune Lin²

¹Department of Cardiology, Hsinchu Cathay General Hospital, Hsinchu, Taiwan

²Department of Emergency Medicine, Hsinchu Cathay General Hospital, Hsinchu, Taiwan

Case Presentation

A 67-year-old female with a past medical history of hypertension and kyphoplasty of the 3rd lumbar spine (L3) operated at a different hospital five months ago, presented to our emergency department for chest tightness and dyspnea on exertion for ten days. Initial vital signs included a temperature of 36.6°C, blood pressure of 99/68 mmHg, heart rate of 70 beats per minute, respiratory rate of 20 breaths per minute, and oxygen saturation of 99%. Physical examination revealed that the patient was alert and no other remarkable findings. Laboratory findings, including electrocardiography, complete blood count, cardiac troponin I, liver function, lactic acid, and arterial blood gas, were within normal limits except a significant elevation on the D-dimer level (841 ng/mL).

The chest x-ray (CXR) revealed no evidence of pneumonia patch or lung edema, but an unusual radiopaque material within the right pulmonary trunk and branches was seen (Fig. 1). Chest computed tomography (CT) was ordered for suspicion of pulmonary embolism, and the test result confirmed the diagnosis. Abdominal CT was subsequently performed, showing a compression fracture of L3 with radiopaque material that lied within the inferior vena cava adjacent to the bone cement of L3 (Fig. 2). Both the transthoracic echocardiogram and pulmonary function testing were normal. These findings confirmed the diagnosis of kyphoplasty-related cement embolism.

While in the emergency department, the patient

received normal saline intravenous injection and a conservative treatment to alleviate the symptom. Over the next several hours, the blood pressure returned to normal level. The patient was admitted for further intervention and was discharged three days later without further complications. For follow-up, the patient received two CXR examinations five and 23 months later, and both reports showed a reduced amount of cement in the right pulmonary trunk (Fig. 3).

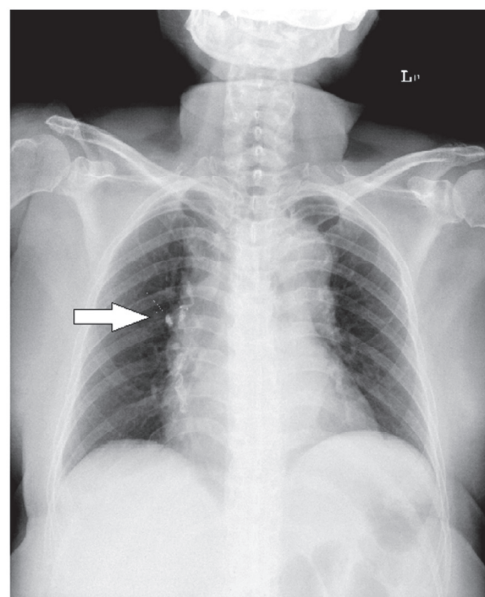


Fig. 1. Anteroposterior view of chest x-ray (CXR) revealed multiple radiopaque materials within the right pulmonary trunk.

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*Corresponding author: Han-Luen Huang, MD, Department of Cardiology, Hsinchu Cathay General Hospital, No. 678, Sec. 2, Zhonghua Rd., East Dist., Hsinchu City 300, Taiwan. E-mail: hhl@cgh.org.tw

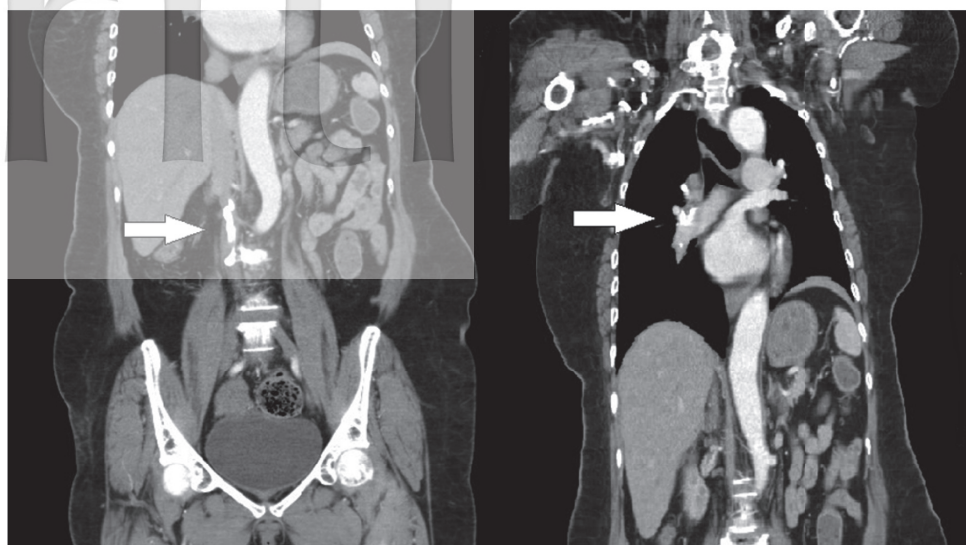


Fig. 2. Abdominal and chest computed tomography (CT) images show the presence of cement emboli in the third lumbar spine, inferior vena cava, and right pulmonary trunk.

Discussion

Kyphoplasty is a minimally invasive surgical procedure developed to stop pain, stabilize bone, and restore vertebral body height caused by compression fracture. This procedure involves insertion of a balloon tamp into the vertebrae followed by injection of polymethyl methacrylate in order to realign the vertebral body.^{1,2} Although the procedure is relatively safe, complications can occur as a result of refractures of already stabilized vertebrae to fractures of neighbor-

ing vertebrae, persisting pain, and several types of injuries caused by cement leakage.^{2,3}

Incidence of this rare cement pulmonary embolism (CPE) ranges from 1% to 4.6%.^{3,4} CPE is difficult to diagnose because the majority of patients are asymptomatic^{3,4}, although symptomatic CPE, such as dyspnea, tachypnea, tachycardia, cyanosis, chest pain, cough, hemoptysis, dizziness or sweating, also occurs during clinical presentation.⁴ Well's criteria is a way often used to objectify risk of venous pulmo-

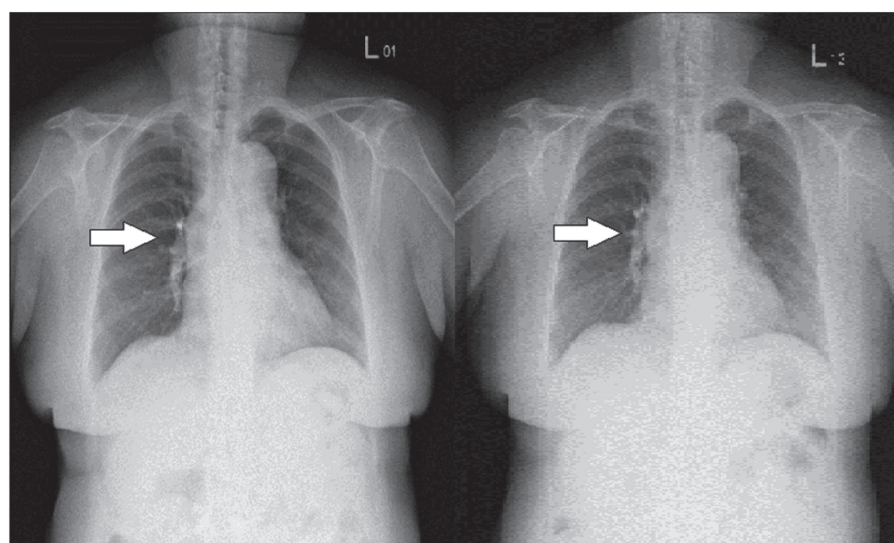


Fig. 3. The chest x-ray (CXR) images show posterioranterior view of reduced amount of cement emboli five and 23 months after discharge, respectively.

nary embolism (VPE). But the majority cases of CPE were asymptomatic and they would be classified into low risk group. Normal D-dimer has a strong negative predictive value to exclude the diagnosis of VPE. But a high D-dimer could only arise the suspicion of VPE. In this case report, the key to the recognition of CPE was through the surgical history of kyphoplasty and unique findings of the CXR images. Hence, we recommend a postoperative CXR as a regular screening tool to evaluate for cement intravascular embolization and both chest CT (with contrast) and review of surgical history are required for the diagnosis of CPE.

There is no clear treatment strategy for CPE. Literatures have suggested that patients with symptomatic CPE can be treated with anticoagulant for six months while asymptomatic patients can be monitored closely for any signs of deterioration either clinically or radiographically.¹

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