Asymptomatic Bone Cement Pulmonary Embolism after Percutaneous Vertebroplasty: A Case Report

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Pulmonary embolism is a rare complication after percutaneous vertebroplasty for compression fracture. Embolization is related to cement leakage outside the treated vertebral body into the adjacent venous system. We report on a case of pulmonary embolism with bone cement in the right pulmonary artery in a 75-year-old female who had undergone percutaneous vertebroplasty 2 months before. Her simple X-ray of the spine captured polymethyl metacrylate leakage from the vertebral body, which indicated the pathophysiology of this event.

Key Words: Asymptomatic diseases, Bone cements, Percutaneous vertebroplasty, Pulmonary embolism

Introduction

Pulmonary embolism is a relatively common cardiac disease, and usually associated with thrombosis in deep vein of low extremities. However, not only thrombus but foreign body can rarely cause pulmonary embolism. Polymethyl methacrylate (PMMA) bone cement used for percutaneous vertebroplasty can be leaked from vertebral body into venous system, and migrate into pulmonary artery. Although cement leakage is relatively common, pulmonary embolism is a rare complication1. In this report, we present a case of asymptomatic PMMA pulmonary embolism with X-ray of spine showed cement leaking from vertebral body.

Case Report

A 75-year-old female presented to our hospital with abnormal finding of simple chest X-ray. Her medical history revealed chronic kidney disease with polycystic kidney disease, old cerebrovascular accident, and hypertension which were controlled with medications.

The chest radiography showed a dense calcified material in the right lower lung field (Fig. 1). She took the chest radiography in the private clinic where she visited for fever and myalgia the right lobar and segmental pulmonary arterial systems. The symptoms were related to upper respiratory infection and improved without special treatment. She told us that she received percutaneous vertebroplasty two months earlier for compression fracture of L5 and S1. She had no symptoms such as chest pain or dyspnea after vertebroplasty and at her presentation. In laboratory tests, C-reactive protein was 3 mg/dl, within normal range. Her electrocardiography was normal sinus rhythm with ventricular rate 84.

Lumbar x-ray showed cement leakage from 5th vertebral body right side (Fig. 2), and subsequent chest computed tomography showed a cement pulmonary embolism in the right lobar and segmental pulmonary arterial systems (Fig. 3).

Her echocardiography revealed an ejection fraction of 61.7% and mild tricuspid regurgitation with right ventricular systolic pressure of 19 mmHg, which was considered normal. We recommended close monitoring for any signs and symptoms related to embolism.

Serial cardiac and pulmonary assessments were carried out one week later, and there was no interval change of signs or symptoms.

Discussion

In this asymptomatic pulmonary embolism case with PMMA, simple lateral X-ray of lumbar spine captured...
PMMA leaking from vertebral body, which is helpful to understand the pathophysiology of pulmonary PMMA embolism.

Percutaneous vertebroplasty commonly used as a treatment for painful vertebral compression fracture and bone metastasis is an interventional radiologic procedure that involves injection of PMMA bone cement into a cervical, thoracic, or lumbar vertebral body lesion for relief of pain and the strengthening of bone. Although it is a relatively safe procedure, complications have been reported, and among those, PMMA pulmonary embolism can occur as a sequel of extravertebral leakage of cement into the venous system. The low frequency of pulmonary PMMA embolism is confirmed in other observational studies with frequencies of 0%-4.8%. That is probably because PMMA rapidly polymerizes, which prevents it from reaching the vena cava. However, PMMA extrusion can happen, and there is also a potential risk of cement migration.

Multiple factors can contribute to cement extrusion.

Fig. 1. (A) Normal chest x-ray one month before percutaneous vertebroplasty. (B) Chest x-ray two months after percutaneous vertebroplasty. Polymethyl metacrylate (PMMA) embolism is recognized in right lower lung field.

Fig. 2. Cement leakage from the third lumbar vertebra via segmental vein into the inferior vena cava. Cement fragment (pointed out by arrow) attached to vertebra.
The volume of PMMA injected is known to be related to cement leakage complications and it is recommended to inject less than 5 mL per vertebral body\(^6\). In our case, 4.5 mL of PMMA was injected. The number of pedicles accessed and cement injection pressure can also contribute to cement leakage.

Clinical presentation of PMMA pulmonary embolism varies widely from an incidental radiographic finding to a life-threatening condition. Symptomatic cement embolisms can be recognized by their clinical signs and symptoms such as dyspnea, tachypnea, tachycardia, cyanosis, chest pain, coughing, hemoptysis, dizziness, or sweating, whereas it is more difficult to recognize when asymptomatic\(^7\). Around 100 cases of PMMA pulmonary embolism following vertebroplasty were reported in the literature with the majority being asymptomatic\(^8\).

There is no clear consensus in the treatment of cement embolism. Some authors recommended no treatment but monitoring those patients as long as they remain asymptomatic\(^9\). Other authors recommended that they should be treated with anticoagulation therapy for 6 months whether symptomatic or not\(^7\).

In our case, the patient was remained asymptomatic, so conservative management was done, which was enough for the patient. This case is interesting because patient’s simple X-ray of spine captured Polymethyl methacrylate leaking from vertebral body, which taught us the pathophysiology of this event.

**REFERENCES**

