

Pulmonary Cement Embolism Following Vertebroplasty: A Rare Case Report.

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ABSTRACT

Introduction: Pulmonary cement embolism refers to embolization of polymethyl methacrylate (PMMA) into the pulmonary vessels. PMMA is rapidly settling acrylic cement that is often used in vertebroplasty. During vertebroplasty the frequency of leakage of bone cement is relatively high. The leaked cement usually reaches pulmonary vessels through perivertebral veins and may cause Pulmonary cement embolism. The patient may remain asymptomatic or may develop chest pain and breathlessness, and rarely it may present as acute respiratory distress syndrome. We present here a case of 53 year old male who developed pulmonary cement embolism immediately after vertebroplasty. **Case Report:** A 53 year old male who has undergone vertebroplasty for developed breathlessness and falling saturation in immediate postoperative period. The auscultation of the chest revealed bilateral fine crepts. Considering the possibility of pulmonary embolism a CT chest was done which showed high density (3000 HU) linear branching opacities throughout the lung fields s/o cement embolism. Patient was given broad spectrum antibiotics, subcutaneous enoxaparin, oxygen inhalation and symptomatic treatment. The patient responded well to the treatment and was eventually discharged with an advice for followup. **Conclusion:** Pulmonary cement embolism is a rare complication of vertebroplasty surgery. During vertebroplasty polymethyl methacrylate (PMMA) may leak into perivertebral veins from where it reaches pulmonary vessels causing pulmonary cement embolism. It is important for a pulmonologist to be aware of this entity so as to be able to manage the patients appropriately.

Keywords: Pulmonary Cement Embolism, polymethyl methacrylate, Chest CT, Management.

INTRODUCTION

Percutaneous vertebroplasty is fast becoming a safe and effective minimally invasive procedure for the treatment of painful vertebral body compression fractures secondary to various pathologies including metastatic disease, Paget disease, multiple myeloma, and painful hemangiomas.^[1] Initially this was primarily being used for spinal hemangiomas but with time its use has been evolved and now it is being used in diverse conditions. Vertebroplasty increases patient mobility and prevents further vertebral collapse. It involves percutaneous injection of cement, polymethyl methacrylate (PMMA), into the vertebral bodies.^[2] Less frequently it can also be used for reinforcement of pathologically weak

vertebrae prior to surgical stabilization. Percutaneous vertebroplasty is increasing becoming popular because of its excellent pain relief potential and low morbidity and in at specialized centers it can be done in outpatient setting. It is being used increasingly in patients who otherwise could not undergo spinal surgeries for various reasons. There are no major contraindications to percutaneous vertebroplasty however it is technically demanding procedure and experienced hands are required for optimum results.^[3]

The complications seen following percutaneous vertebroplasty may include radicular neuritis, compromise of a nerve root and adjacent level fracture. One of the important complications which need to be kept in mind while doing percutaneous vertebroplasty is pulmonary cement embolism. Though extravertebral leakage of the cement material (PMMA) into the epidural space and the perivertebral tissue occurs in more than 70% of the patients most of the patients are asymptomatic and such a leak can only be diagnosed on the basis of advanced imaging studies like HRCT or CT

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angiography. The leaked cement material (PMMA) reaches pulmonary vasculature through perivertebral veins and may cause pulmonary cement embolism. The severity of such pulmonary cement embolism may vary depending upon the amount of cement leaked into perivertebral veins and signs and symptoms may vary from mild breathlessness to potentially fatal respiratory distress syndrome.^[4] It must be emphasized that venous leak of PMMA is more frequently seen in vertebroplasty done for highly vascular lesions like vertebral angiomas, metastasis of papillary carcinoma of thyroid or metastasis of renal cell carcinoma and in these patients if any unexplained breathlessness develops after vertebroplasty then CT angiography or CT chest should be done to exclude the possibility of pulmonary cement embolism. Treatment of pulmonary cement embolization depends on patient's symptoms. Asymptomatic patients only require monitoring. For extensive cement emboli anticoagulation may be needed. Single large embolus may need surgical embolectomy. Associated respiratory distress may need oxygen inhalation and if signs of impending respiratory failure are present then patient may need assisted ventilation.^[5]

We present here a case of pulmonary cement embolism in a 53 year old male who had undergone vertebroplasty for compression fracture due to severe osteoporosis. The patient developed breathlessness and falling SPO2 levels in immediate post-operative period. The patient was successfully treated by anticoagulation (subcutaneous enoxaparin), broad spectrum antibiotics and oxygen inhalation. This case emphasizes the importance of knowing this rare complication of vertebroplasty and make an early diagnosis so as to be able effectively treat this condition.

CASE REPORT

A 53 year old male patient who had been diagnosed with compression fracture of L4 vertebra secondary to severe osteoporosis had undergone percutaneous vertebroplasty. The patient developed breathlessness and chest pain 3-4 hours after vertebroplasty. In view of breathlessness and chest pain his preoperative investigations like CBC, ECG and 2D ECHO were reviewed and were found to be normal. His pulse rate was found to be 142/min (tachycardia), respiratory rate was 32/min (tachypnea). SPO2 monitoring showed dropping saturation levels from 96 to 88 %. A Repeat ECG and ECHO was done which was normal. Since there was no other explainable cause of breathlessness a possibility of pulmonary cement embolism was considered and CT chest was advised. HRCT chest showed presence of high density linear branching opacities in right upper lobe, anterior segmental pulmonary vessels and in

sub segmental and peripheral branches of the apical, anterior and posterior segment of right upper lobe, apicoposterior and singular segments of left upper lobe, right middle lobe and peripheral segments of bilateral lower lobes. The HU of the hyperdensities was found to be 3000 confirming the diagnosis of cement embolisation.

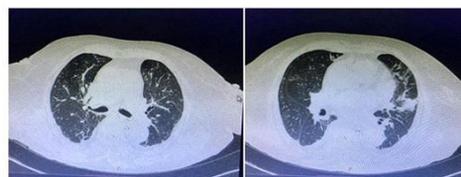


Figure 1: HRCT (Lung window) showing deposition of high density (HU= 3000) confirming the diagnosis of pulmonary cement embolism.

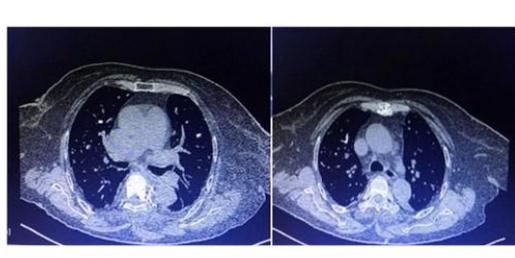


Figure 2: CT angiography showing filling defects in proximal and distal sub segmental pulmonary vasculature suggestive of pulmonary embolism.

Patient was started on broad spectrum antibiotics and therapeutic anticoagulation (Inj enoxaparin subcutaneously twice daily). In addition to anticoagulation and antibiotics patient also was given oxygen inhalation and analgesics for chest pain. He was later discharged with oral anticoagulation (warfarin) and was advised to come for follow up after 3 weeks. On his first follow up after 3 weeks, his chest pain had completely subsided.

DISCUSSION

Injection of PMMA under fluoroscopic guidance for vertebroplasty for conditions such as a compression fracture, metastasis and hemangiomas have become fairly common in today's orthopedic and neurosurgery practice. Though in experienced hands it is found to be relatively safe, simple and routinely performed procedure for the management of compression fractures it is not totally complication free and minor or major complication may occur following vertebroplasty. Minor complications include infections, pain, spinal cord or nerve root compression, febrile reaction and dyspnea. Major complications though rare may occur in some patients and include severe spinal cord compression causing paraplegia, stroke

secondary to cerebral embolism, renal artery embolism and acute respiratory distress syndrome. All these major complications carry significant morbidity and mortality and may prove fatal if not treated properly.^[6]

The incidence of local cement leakage following vertebroplasty is reported to be very high and vary in between 75-90%. The frequency of leakage in prevertebral veins is somewhat less (25%). Some of these patients, in whom there is leakage of cement material into prevertebral veins, develop pulmonary cement embolism. The risk of pulmonary cement embolism increases with liquid consistency of PMMA and vertebroplasty for highly vascular secondaries or for malignant diseases where already there is local cortical destruction of vertebral bodies. In all these cases the cement which gets leaked into prevertebral veins reaches pulmonary vessels via azygous veins, and inferior vena cava.^[7]

In many of the patients in whom there is small amount of cement which has leaked into prevertebral veins there are no signs and symptoms and cement embolism is usually detected following imaging of the chest for some other reasons whereas the patients in whom there is large amount of cement which has leaked into prevertebral veins there can be dyspnea, tachypnea, respiratory distress and falling saturation ultimately leading to respiratory failure.^[8] Many of the authors are of the opinion that a pre-vertebroplasty venogram should be done to predict the severity of cement leak whereas some others have recommended injection of sclerosing agents into vertebral body before going for vertebroplasty so as to ensure closure of venous channels and prevent massive cement embolism.^[9]

The management of severe cement embolism causing respiratory distress or falling saturation may involve oxygen supplementation, broad spectrum antibiotics (To prevent secondary infection) and anticoagulation (subcutaneous enoxaparin followed by oral warfarin) and in severe cases assisted ventilation may be required.^[10]

CONCLUSION

Pulmonary cement embolisation is a rare but known cause of percutaneous vertebroplasty. Though in most of the cases there are minor emboli reaching pulmonary vasculature and the patient is usually asymptomatic in some cases massive embolisation causing severe respiratory distress. It is important from the perspective of a pulmonologist to be aware of this entity so as to diagnose and properly treat this potentially fatal complication.

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