

# Late onset of pulmonary cement embolism after a regular vertebroplasty. A clinical documentation

## Case Report

Roger Fei, Falkenstern-Ge\*,  
Kim Husemann, Martin Kohlhäufel

*Division of Pulmonology, Klinik Schillerhoehe, Center for Pulmonology and Thoracic Surgery,  
Teaching Hospital of the University of Tuebingen, Solitude Str. 18, 70839 Stuttgart- Gerlingen, Germany*

Received 28 April 2013; Accepted 11 July 2013

**Abstract:** Vertebroplasty is a new minimal- invasive procedure for the treatment of painful vertebral fractures. The risk of a pulmonary embolism ranges from 3.5 to 23% for osteoporotic fractures. However, data about the incidence and treatment strategies of pulmonary cement embolisms (PCE) are limited. We report a case of a patient with symptomatic pulmonary cement embolism after the vertebroplasty. The diagnosis was confirmed by means of CT- scan. In cases of asymptomatic patients with peripheral PCE we recommend no treatment besides clinical follow-up. In our case of symptomatic embolisms, we recommend to proceed according to the guidelines regarding the treatment of thrombotic pulmonary embolisms, which includes initial heparinization and a following 6-month coumarin therapy.

**Keywords:** *Vertebroplasty • Kyphoplasty • Complication • Cement leakage • PCE (Pulmonary cement embolism) • Polymethylmethacrylate (PMMA)*

© Versita Sp. z o.o.

## 1. Introduction

A 69-year-old woman with spinal cord compression caused by an osteoporotic vertebral fracture of eleventh and twelfth vertebra underwent therapeutic laminectomy of the eleventh and twelfth vertebra and vertebroplasty of the twelfth vertebra. After the operation, the patient was not short of breath, and was in sufficient clinical condition.

Five months later, the patient was hypoxemic and complained about increasing dyspnea and decreasing clinical condition. She was then referred to our center for further diagnostic and treatments. The patient was presented with severe dyspnea and arterial pO<sub>2</sub> was 50 mmHg even with oxygen supplementation by nasal cannula with a flow of 3-4 L. The spirometry showed an obstructive pattern (FVC of 47%, and FEV<sub>1</sub> of 1.1 L 32% predicted).

Transthoracic echocardiography indicated that the

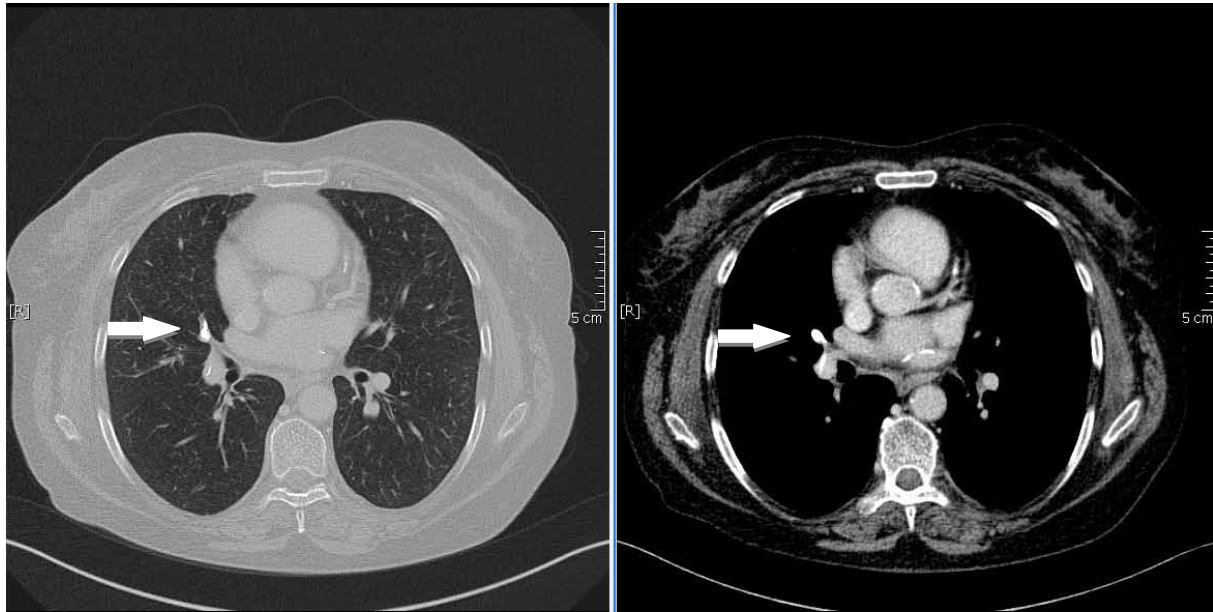
mean pulmonary arterial pressure was 40 mm Hg (reference range, 10 to 22 mm Hg).

Contrast enhanced tomography- scan and native CT- scan were also performed, it revealed a cement embolus in a peripheral right middle lobe pulmonary artery (Figure 1 and Figure 2).

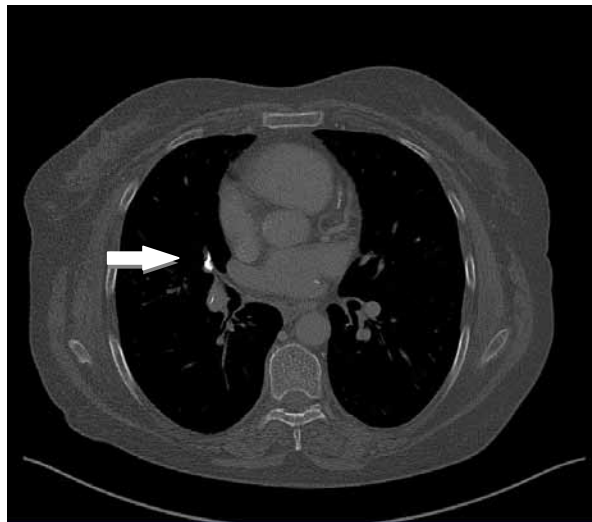
After the detailed clarification and informing of the patient, she was treated with conservative antiobstructive therapy and anticoagulants coumarins, which was to be extended for 6 months.

The follow- up evaluation was performed after 3 months of conservative antiobstructive therapy and anticoagulants coumarins. The patient was presented with improved clinical conditions. Her arterial pO<sub>2</sub> was 62 mmHg without oxygen supplementation. The spirometry showed an improved but still obstructive pattern (FVC of 67%, and FEV<sub>1</sub> of 1.8 L 42% predicted). The anti-obstructive therapy with coumarins will be extended for another 3 months.

\* E-mail: Roger-Fei.Falkenstern-Ge@rbk.de



**Figure 1.** Contrast enhanced CT scan showed cement embolus in a peripheral right middle lobe pulmonary artery.



**Figure 2.** Native chest CT scan demonstrates a cement embolus in a peripheral right middle lobe pulmonary artery.

## 2. Discussion

The highest percentage of 23% of pulmonary cement embolism was found after vertebroplasty in osteoporotic fractures [1].

Embolism of injected cement to the pulmonary arteries is a known potential complication of vertebroplasty. Although most patients are asymptomatic, serious illness and even death may result. Transvertebral cement leakages into surrounding tissues as well as leakages into paravertebral veins are common complications after percutaneous vertebroplasty and kyphoplasty [2]. The

leakages are mostly caused by the injection of polymethylmethacrylate (PMMA) that is still too liquid or by applying too much pressure while injecting the material. In the majority of cases, cement leakage does not cause any problems and is usually detected during a follow up regular radiographic control. Those types of cement leakages seem to be harmless complications after percutaneous vertebroplasty and kyphoplasty and require no further therapy [3]. The risk for cement embolism ranges between 3.5 and 23% based on the type of imaging. In cases of symptomatic or central embolisms, however, treatment includes initial heparinization and a following 6-month coumarin therapy should be proceeded. A continuous anticoagulation therapy after the initial 6 months of treatment does not seem to be indicated and due to the associated bleeding complications in the prevalent older population it is actually contraindicated [4]. Even after review of the literature, it is not possible to derive a clear treatment strategy for the treatment of pulmonary cement embolisms. Besides surgical removal, treatment options include administration of heparin i.v. or s.c., observation of the clinical spontaneous progress or coumarin treatment for 3–6 months after the occurrence of the embolism [4].

Cement leakage is the most frequent complication arising after percutaneous vertebroplasty and kyphoplasty [5,6]. The leakages range from asymptomatic damages of the surrounding tissue to nerve irritation through compression of nerve roots and pulmonary cement embolisms (PCE) [7,8].

Based on clinical appearance there are two main groups of lung embolisms, asymptomatic and a symp-

tomatic cement embolism. Symptomatic cement embolisms can be recognized by their clinical signs and symptoms such as dyspnea/tachypnea, tachycardia, cyanosis, chest pain, coughing, hemoptysis, dizziness and sweating whereas it is more difficult to recognize asymptomatic cement embolisms [9-11].

Few authors reported surgical embolectomy that resulted in the patient's death after a pulmonary cement embolism [12].

Our patient was to be treated with coumarins consecutively for 6 months due to symptomatic pulmonary

cement embolism. Based on the review of the current literature, such clinical documentations remain seldom. Further qualified studies should take this complication in account.

## Acknowledgments

The author(s) indicated no potential conflicts of interest. We do not have any financial supports of any firms or pharmacies. We are all independent clinical physicians.

## References

- [1] Kim YJ, Lee JW, Park KW, et al. Pulmonary cement embolism after percutaneous vertebroplasty in osteoporotic vertebral compression fractures: incidence, characteristics, and risk factors. *Radiology*. 2009;251:250–259
- [2] Hodler J, Peck D, Gilula LA. Midterm outcome after vertebroplasty: predictive value of technical and patient-related factors. *Radiology*. 2003;227:662–668
- [3] Caudana R, Renzi BL, Ventura L, Aitini E, Rozzanigo U, Barai G. CT-guided percutaneous vertebroplasty: personal experience in the treatment of osteoporotic fractures and dorsolumbar metastases. *Radiol Med (Torino)* 2008;113:114–133
- [4] Krueger A, Bliemel C, Zettl R and Ruchholtz S. Management of pulmonary cement embolism after percutaneous vertebroplasty and kyphoplasty: a systematic review of the literature *Eur Spine J*. 2009 September; 18(9): 1257–1265
- [5] Mousavi P, Roth S, Finkelstein J, Cheung G, Whyne C. Volumetric quantification of cement leakage following percutaneous vertebroplasty in metastatic and osteoporotic vertebrae. *J Neurosurg*. 2003;99:56–59
- [6] Phillips FM, Todd WF, Lieberman I, Campbell-Hupp M. An in vivo comparison of the potential for extra-vertebral cement leak after vertebroplasty and kyphoplasty. *Spine*. 2002;27:2173–2178
- [7] Laredo JD, Hamze B. Complications of percutaneous vertebroplasty and their prevention. *Semin Ultrasound CT MR*. 2005;26:65–80
- [8] Ratliff J, Nguyen T, Heiss J. Root and spinal cord compression from methylmethacrylate vertebroplasty. *Spine*. 2001;26:E300–E302
- [9] Bernhard J, Heini PF, Villiger PM. Asymptomatic diffuse pulmonary embolism caused by acrylic cement: an unusual complication of percutaneous vertebroplasty. *Ann Rheum Dis*. 2003;62:85–86
- [10] Padovani B, Kasriel O, Brunner P, Peretti-Viton P. Pulmonary embolism caused by acrylic cement: a rare complication of percutaneous vertebroplasty. *AJNR Am J Neuroradiol*. 1999;20:375–377
- [11] Tozzi P, Abdelmoumene Y, Corno AF, Gersbach PA, Hoogewoud HM, Segesser LK. Management of pulmonary embolism during acrylic vertebroplasty. *Ann Thorac Surg*. 2002;74:1706–1708
- [12] Yoo KY, Jeong SW, Yoon W, Lee J. Acute respiratory distress syndrome associated with pulmonary cement embolism following percutaneous vertebroplasty with polymethylmethacrylate. *Spine*. 2004;29:E294–E297