

A Rare Presentation of Pulmonary Embolism: Cement Embolism after Vertebroplasty

Nadir Görülen bir Pulmoner Emboli Sunumu: Vertebroplastiden sonra Sement Embolisi

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Abstract

Vertebroplasty is a minimally invasive method for the treatment of painful vertebrae fractures. Cement embolism, as a rare complication of this method, is usually asymptomatic and does not require treatment. Anticoagulant therapy or surgical embolectomy is recommended when symptomatic. We present here a case of pulmonary cement embolism who presented with chest pain and shortness of breath 5 days after vertebroplasty for a thoracic vertebrae fracture, and who had undergone anticoagulant treatment.

Key words: Vertebroplasty, cement embolism, pulmonary embolism.

Özet

Vertebroplasti ağrılı vertebra kırıklarının tedavisinde kullanılan minimal invaziv bir yöntemdir. Bu yöntemin nadir bir komplikasyonu olan sement embolisi genellikle asemptomatik seyreder ve tedavi gerektirmez. Semptomatik olduğu durumlarda ise antikoagulan tedavi veya cerrahi embolektomi uygulanması önerilmektedir. Travmaya sekonder torakal 12 vertebra fraktürü için vertebroplasti uygulandıktan 5 gün sonra göğüs ağrısı ve nefes darlığı ile başvuran ve antikoagulan tedavi verdiğimiz semente bağlı pulmoner emboli olgusunu sunmak istedik.

Anahtar Sözcükler: Vertebroplasti, sement embolisi, pulmoner emboli.

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Vertebroplasty is the process of placing polymethylmethacrylate (PMMA) percutaneously into the vertebral corpus with radiological imaging for the treatment of fractures of the spine following trauma or numerous diseases (osteoporosis, cancer metastases, etc.) (1). Recurrence in the repaired vertebrae, damage to the adjacent vertebrae, persistent pain and injuries due to cement leakage are complications that have been associated with this procedure (2). Cement leakage is the most common complication after percutaneous vertebroplasty (3). This leakage can range from asymptomatic damage to the surrounding tissue to nerve irritation, and can reach the pulmonary artery via the azygos-hemiazygos system and the paravertebral plexus, leading to a pulmonary embolism (4,5). In many cases, it is thought that these embolisms may not have been detected. Chest radiographies are not routine after percutaneous vertebroplasty due to the associated radiation exposure, and so asymptomatic cases may be overlooked. The present case had a pulmonary cement embolism, becoming symptomatic 3 days after vertebroplasty for a traumatic thoracic vertebrae fracture.

CASE

A 41-year-old man applied to our clinic with chest pain and shortness of breath 3 days after a percutaneous vertebroplasty that was performed for the fracture of the thoracic 12th (Th 12) vertebra caused by a traffic accident. A physical examination produced no pathological findings. The patient was normotensive, and room air oxygen saturation (SaO₂) was 98%. Left lung lower zone branching radio-opacity was detected in a postero-anterior (PA) chest radiography (Figure 1). The patient's hematological, biochemical and cardiac laboratory parameters were within normal ranges. No electrocardiographic abnormality was noted. A thorax CT-angiography was performed after a cement embolism was suspected. The Th 12 vertebrae had a compression fracture in the corpus and a hyperdense view of cement approximately 2.2 cm in diameter (Figure 2). In the right paravertebral space, the linear hyperdense line in the hemiazygos vein was noteworthy at the distance between the Th 11, Th 12 and L 1 vertebrae corpus (compatible with cement embolism) (Figure 3a and b). In addition, high density areas were observed in both lung parenchyma in right middle lobe and upper lobe in the left lung, and subsegmental branches in the lower lobe medial area (cement embolism). There were no pathological findings or pleural effusions in the lung parenchyma (Figure 4). The patient

was symptomatic for pulmonary embolism, but was hemodynamically stable. Echocardiography (Echo) revealed an ejection fraction of 60% and a mean pulmonary arterial pressure of 25mmHg. The removal of the cement embolus was not considered, since the patient was hemodynamically stable. The echo was normal and there was no sign of cement in the main pulmonary arteries. The patient was started on treatment with subcutaneous anticoagulant therapy and his respiratory symptoms recovered quickly. After 3 months of treatment, anticoagulant therapy was ended. Since then, the patient has been under control and has no complaints. Verbal informed consent was obtained from the patient prior to this case report.

DISCUSSION

In this case report we presented a cement embolism after vertebroplasty as a rare presentation of a pulmonary embolism. Early diagnosis of such cases is important, along with appropriate treatment.

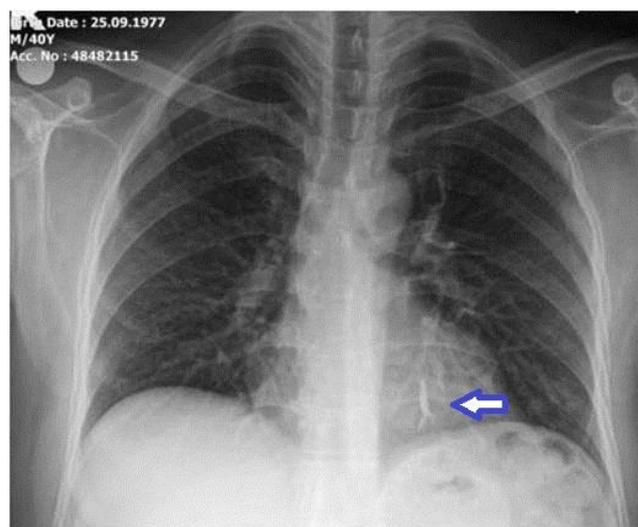


Figure 1: Chest x-ray shows branching radioopacity due to dens cement material in the left lung

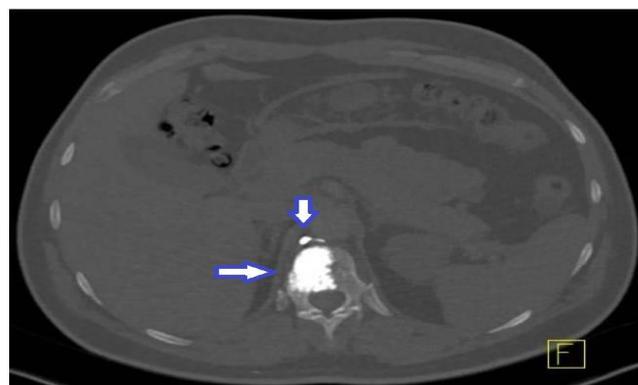


Figure 2: In the axial section of the bone window, the dens cement material in the right half of the vertebral corpus

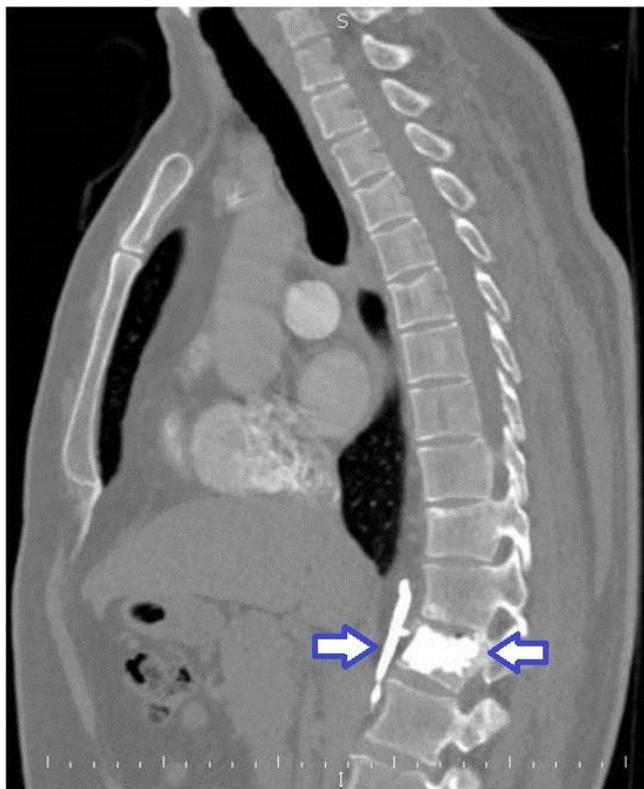


Figure 3a: In the sagittal reformat image, dens cement material in the right half of the vertebral corpus, dens cement embolism in the azygos vein and the dens fistula trait extending to the azygos vein in the midline at the anterior of the vertebral corpus

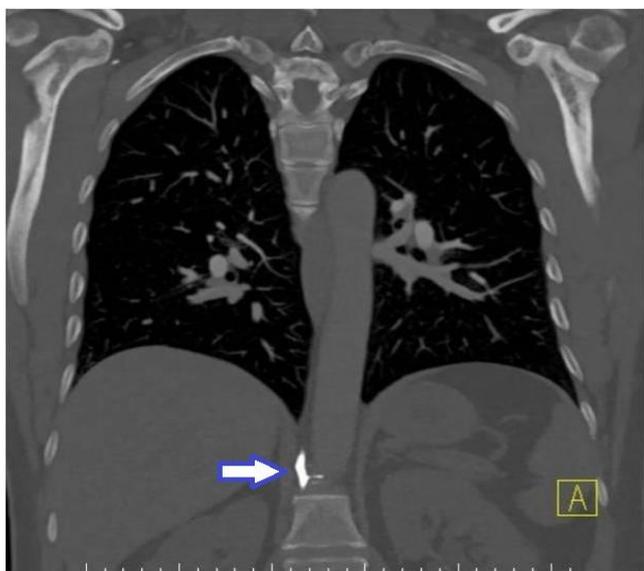


Figure 3b: In the coronal reformat image, the cement material and fistula are observed in the azygos vein

Percutaneous vertebroplasty has been widely used for the operative treatment of vertebral fractures over the past 30 years, having gained popularity as a method bringing immediate pain relief (6,7). Transvertebral cement leakages into the surrounding tissues and into the paravertebral veins are common complications after percutaneous

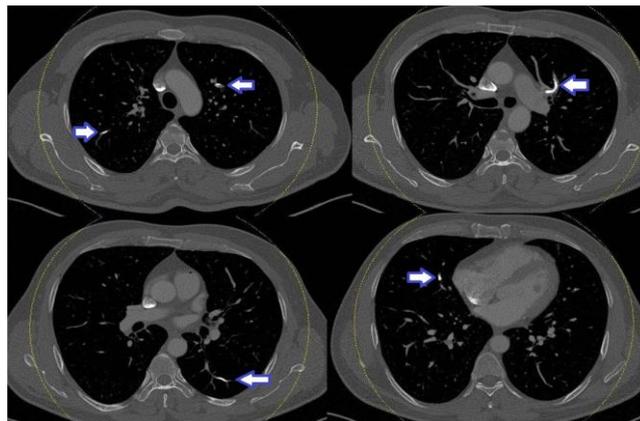


Figure 4: Linear hyperdensities of cement embolism in segmental and subsegmental branches are observed in the thorax CT images in the bone window

vertebroplasty. Cement leakage does not cause any problems, and is usually detected during radiographic control. Characteristic radiological findings are multiple tubular or branching radio opacities. Unenhanced CT scans are characterized by nodules or tubular hyperdense intraluminal materials. In most cases, axial CT sections are sufficient for diagnosis, although 3D volume rendering images and 2D multiplanar reformat images are useful for the viewing of anatomical details (8,9). These types of cement leakages seem to be harmless complications that require no further therapy. The risk of pulmonary embolisms is 3.5–23%. There are two main groups of pulmonary cement embolisms, based on clinical appearance: asymptomatic and symptomatic, and so some authors recommend a standardized thoracic radiographic control within the first 24 hours of the procedure. Clinical symptoms may be dyspnea/tachypnea, tachycardia, chest pain, cyanosis, coughing, hemoptysis and hypoxia. Treatment is not recommended for asymptomatic patients with peripheral embolisms, but it is recommended for all symptomatic cases and central embolisms, even if they are asymptomatic (10). Anticoagulation lasting 3–6 months is recommended for all symptomatic cases (5,11). Continuous anticoagulation therapy after 6 months is not advised due to the possibility of complications. Some authors (12) suggest the surgical removal of cement thrombi in symptomatic patients with central embolisms. Yoo et al. (13) reported a case with a pulmonary cement embolism that was hemodynamically unstable and that was coupled with acute respiratory distress syndrome. The patient in this case underwent a surgical embolectomy. Rothermich et al. (14), on the other hand, reported on a case in which a 29-year-old man whose right lower lung lobe had infarcted owing to massive cement embolization, who was

subjected to an open pulmonary wedge resection and embolectomy. The patient recovered from the embolectomy, but suffered chronic, persistent respiratory symptoms after surgery. The patient in the present study was discharged from hospital without a control chest X-ray 24 hours after the percutaneous vertebroplasty procedure in the absence of any respiratory symptoms. The patient subsequently developed chest pain and shortness of breath 3 days after the vertebroplasty procedure. A pulmonary cement embolism is a mechanical occlusion rather than a vascular clot, and so anticoagulation depends on the clinical judgment of pulmonologists. There is as yet no consensus algorithm regarding the treatment of pulmonary cement embolism, although case reports and case series have some positive outcomes. As a general recommendation for the avoidance of cement embolisms, bone cement should have a viscous, toothpaste-like consistency, since such a viscosity is a crucial parameter influencing the risk of leakage (15). Injection should be stopped as soon as a paravertebral cement extravasation is encountered. Another suggestion is that all patients should be controlled with a routine chest X-ray following such a procedure, prior to being discharged from hospital.

CONCLUSION

Pulmonary cement embolism after vertebroplasty is a well-known complication that usually remains asymptomatic. If a cement embolism presents with respiratory symptoms, it must be treated operatively or non-operatively with anticoagulation. It may not be a mortal clinical situation if diagnosed early and treated appropriately to the location of mechanical occlusion in the pulmonary arteries. Clinical experiences shared with case reports of cement embolisms will increase the awareness of surgeons and will guide the treatments advised by clinicians.

CONFLICTS OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

Concept - Ö.O.T., U.T., F.D.E.; Planning and Design - Ö.O.T., U.T., F.D.E.; Supervision - Ö.O.T., U.T., F.D.E.; Funding - Ö.O.T., U.T.; Materials - Ö.O.T., F.D.E.; Data Collection and/or Processing - Ö.O.T.; Analysis and/or Interpretation - Ö.O.T.; Literature Review - Ö.O.T.; Writing - Ö.O.T.; Critical Review - Ö.O.T.

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