

Asymptomatic Azygos Vein Cement Embolism: A Potential Risk of Cement Injection via Cannulated Screw: A case report

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ABSTRACT

Objective: Vertebroplasty is a method that stabilizes the fracture and relieves pain by injecting cement into the vertebral body that has lost its height for some reason. Cement injection can also be done through kyphoplasty and cannulated screw. During the injection, protrusion of the cementum from the corpus is a complication that must be avoided in this procedure. Cement extending out of the corpus may cause pulmonary cement embolism (PCE) via the azygos vein.

Case: A 76-year-old female patient was admitted to our clinic with the complaint of low back pain that had been going on for one year. The patient, who did not have motor or sensory deficits in the examination, described neurogenic claudication at 200 meters as well as sensitivity in the lumbar region. An osteoporotic collapse fracture in the L1 vertebra was detected in the patient's imaging. Transpedicular fixation, decompression, and cement-augmented pedicle screw were applied to the patient. After the operation, vena azygos cement embolism was detected in the thoracolumbar computed tomography (CT) scan conducted for follow-up. Although detailed tests were performed for pulmonary embolism (PCE), no findings were detected in the asymptomatic patient. During the follow-up examination after discharge, the patient did not report any respiratory complaints, pain in the lumbar region, or neurogenic claudication complaints.

Conclusion: PCE may develop after cement leakage into the azygos vein during cement injection. Although most PCEs remain asymptomatic, sometimes serious or even fatal sequelae have been reported. Cement overflows not reflected in fluoroscopy during the procedure can be detected by post-procedure imaging, and patients can be protected from serious complications.

Keywords: Vertebroplasty, Cement Injection, Claudication

INTRODUCTION

Vertebroplasty is a procedure that consists of the image-guided injection of a cement polymer, usually polymethylmethacrylate, into the vertebral body to increase the stability of the vertebrae with height loss (1). Percutaneous vertebroplasty can be performed, as well as cement injection into the vertebral corpus by means of cannulated pedicular fixation screws, which have been widely used recently (2). Leaking into the venous system and passing from there to the lungs, causing PSE is a complication that can have serious consequences.³ Cement leakage into the azygos vein is the only risk factor for the formation of PSE (3,4).

CASE

A 76-year-old female patient presented to our clinic with a complaint of low back pain that had been ongoing for one year. A collapse fracture in the L1 vertebra was detected in the lateral lumbar radiograph of the patient, who had no history of trauma and motor and sensory deficits in the examination, taken after describing neurogenic claudication at 200 meters and tenderness in the lumbar region. The patient's preoperative Oswestry disability index (ODI): 58 and the visual analog scale (VAS): 7 were evaluated. Bone densitometry was performed, and osteoporosis was detected in the patient, considering the absence of trauma history and the patient's age. Lumbar magnetic resonance imaging (MRI) and lumbar CT showed that the collapse fracture in the L1 corpus caused compression in the spinal canal (**Figure 1, 2**).

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Transpedicular fixation between T10-L4 vertebrae, decompression with L1 laminectomy and cement injection to T10, T11, L1 corpuscles via cannulated screw were applied to the patient. Vena azygos cementum embolism was detected in control thoracolumbar CT took after the operation (**Figure 3, 4**). No signs of PSE were found in the asymptomatic patient who underwent thoracic CT for PSE.

No dyspnea or low saturation was observed during the hospitalization. The patient, who described his pain in the lumbar region and neurogenic claudication complaints had disappeared in the follow-up examination after discharge, stated that he had no respiratory complaints. The patient's ODI: 18 and VAS: 2 were evaluated in the postoperative control.



Figure 1: Lumbar MRI images of the patient show L1 collapse fracture (A) in sagittal section and compression of the spinal canal (B,C) in axial sections.



Figure 2: In the preoperative lumbar CT images of the patient, L1 collapse fracture (A) in the sagittal plane and bone compression on the spinal canal in the axial plane (B, C) are seen.

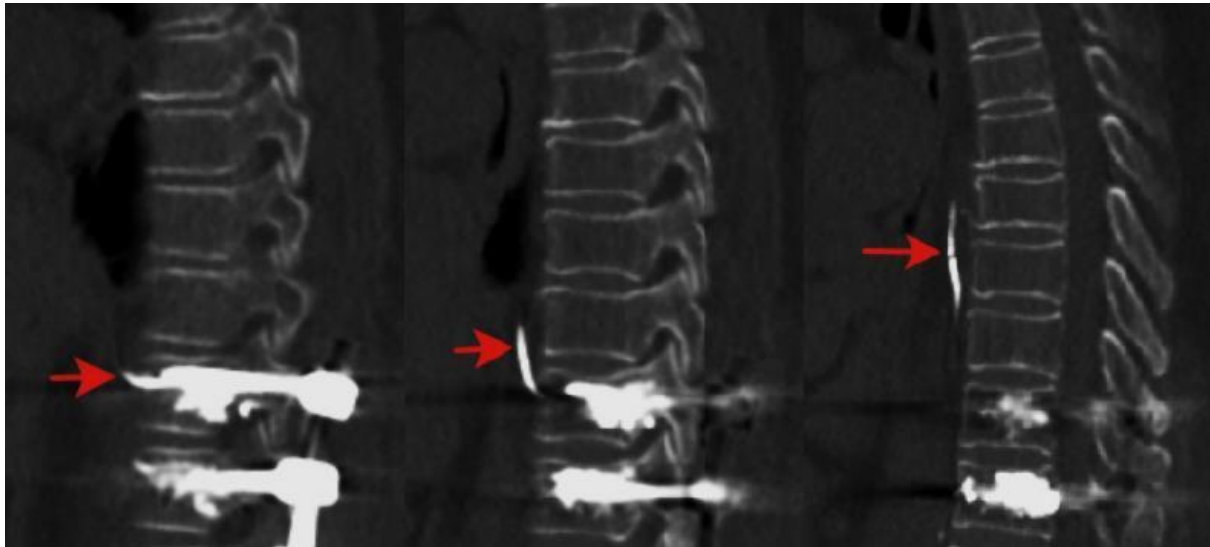


Figure 3: Cementum is observed along the azygos vein on CT sagittal sections of the patient's thoracic vertebra (red arrow).

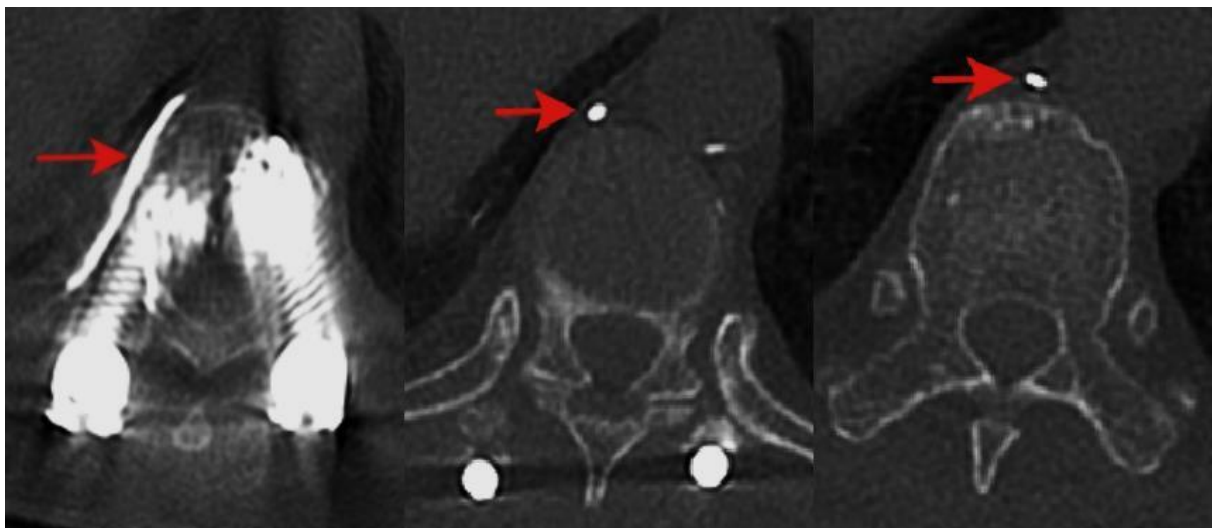


Figure 4: Cementum is observed along the azygos vein in CT axial sections of the patient's thoracic vertebra (red arrow).

DISCUSSION

Vertebroplasty is a radiologically guided procedure consisting of injection of polymethylmethacrylate cement into the vertebral body (1). Its primary indications are the treatment of osteoporosis, multiple myeloma, metastases and painful compression fractures after hemangioma (5). Potential complications of cement injections include bleeding at the puncture site, pain, bone infection, spinal cord injury, radiculopathy, leakage of bone cement into the epidural or paravertebral spaces and migration of cement into the venous system and embolization to the pulmonary vasculature (1). Other major complications associated with cement leakage may include thermal injuries from the exothermic polymerization process (6). When the literature is reviewed, cement extrusion between 3.5-25% has been reported after percutaneous vertebroplasty, while a wide range of cement leakage, such as 5-80%, has been reported after the application of cement-supported pedicle screw (2). This statistical difference suggests that overflows are more common in cementum applied via pedicle screws.

We applied cement-supported pedicle screw in this case because of the need for decompression and fixation.

During injection, the cement overflows out of the corpus and causes PSE through the venous system, which is a complication that is avoided in this procedure. Although PSE is considered a rare complication, studies have reported that cement overflows, which cannot be detected by fluoroscopy during the operation, are actually much more common than previously thought (4). The reason why PSE is seen as a rare complication is that the c-arm scope can provide images from one angle, and the patients were not evaluated with postoperative control thorax CT in previous studies. At the same time, the majority of patients who develop PSE are asymptomatic (7,8). This situation causes the physician to follow the patient not to need further examination. Our clinic performs control thorax CT evaluation after cement injection cases as a standard. Despite azygos vein cement leakage in the control CT evaluation of our asymptomatic case, we did not find any PSE findings.

Today, traditional fluoroscopy is still used in many clinics during cement injection. Potet et al. (8) reported that in cases of vertebroplasty performed with intraoperative CT fluoroscopy, they did not find any signs of PSE in the control CT after the procedure. This suggests that CT fluoroscopy guidance may play an effective role in the prevention of PSE in cement injection cases.

Percutaneous vertebroplasty and cement-supported pedicle screw placement aim to stabilize the spine as well as relieve pain symptoms. Blasco et al. (9) reported that patients' pain scores after vertebroplasty decreased significantly compared to conservative treatment in their 12-month follow-up study. The significant improvement in our case's postoperative ODI and VAS scores supports the benefits of cement injection for pain symptoms related to collapse fracture in patients.

CONCLUSION

Based on a review of the literature and our case, it is predicted that asymptomatic venous leakage may occur even if a patient does not show pulmonary symptoms after cement injection. Therefore, routine thoracic CT scanning is recommended to reduce mortality and morbidity rates in the long term.

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