



MIGRATION OF CEMENT TO THE VENA CAVA INFERIOR DURING PERCUTANEOUS VERTEBROPLASTY: A CASE REPORT

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Received: 17th March 2019

Accepted: 16th June 2019

ABSTRACT

Percutaneous vertebroplasty (PVP) is a minimally invasive and useful method for controlling the pain in patients with vertebral compression fractures. The migration of cement to the vena cava inferior following Polymethylmetacrylate (PMMA) leakage after the PVP operation is presented in this case. Control by a CT imaging should be performed although she was asymptomatic, and the necessary premedication was ensured in terms of embolism by demonstrating invasion to the VCI.

Key words: Percutaneous vertebroplasty; Polymethylmetacrylate; Migration of cement; Vertebrae fracture

INTRODUCTION

Percutaneous vertebroplasty (PVP) is a minimally invasive and useful method for controlling the pain in patients with vertebral compression fractures developing due to metastatic diseases, multiple myeloma, osteoporosis, and aggressive hemangiomas. It is a procedure performed by percutaneous injection of polymethyl methacrylate (PMMA) into the fractured vertebral corpus. Vertebroplasty is a method, which was first defined and applied by Gilbert et al. ⁽³⁾ in 1987, and nowadays, it is frequently used in symptomatic vertebral compression fractures resistant to conservative and medical treatment. Vertebral compression fractures mainly occur secondarily to osteoporosis, and the percutaneous vertebroplasty method is used preferably compared to the open surgical method to strengthen the vertebral corpus and alleviate the pain due to comorbid factors and low bone quality of the population with osteoporosis. In the PVP method, the corpus is strengthened and pain control is provided by percutaneous penetration into the vertebral corpus by transpedicular or extrapedicular approaches with bone needles for the operation, and the

injection of PMMA bone cement into the corpus. In vertebral compression fractures that occur secondarily to osteoporosis, the complication rate of PVP is low; and these are usually minor ones. These complications have been reported to be as low as 0-5.4% ⁽⁵⁾. However, major complications such as pedicle fracture, pulmonary embolism, invasion of cement into a major vein or spinal canal pneumothorax, spinal cord compression, epidural hematoma, subdural hematoma, and death have been reported, though at the rate less than 1% (1, 5, 7, 9). The migration of cement to the vena cava inferior following PMMA leakage after the PVP operation is presented in this case.

CASE REPORT

A sixty-seven-year-old female patient was admitted to the outpatient clinic with a complaint of backache after falling. There was no remarkable event in the history of the patient who had no neurological deficit. In the Lumbar Magnetic Resonance (MR) imaging of the patient, acute collapse fracture and bone marrow edema were observed in her L3 vertebra, and with the detection of osteoporosis

in bone densitometry, the necessary medical treatment was initiated by considering that the patient's compression fracture developed secondarily to osteoporosis. Then, PVP was performed under local anesthesia for L3 vertebra of the patient and it was observed that her pain alleviated after the operation. In the patient's control after fifteen days, upon observing acute collapse fracture in her L2 vertebra again in the Lumbar MRI taken since she indicated that her backache started again, the patient underwent PVP under local anesthesia for L2 vertebra. Due to leakage to the anterior side during the operation, the operation was terminated and the lumbar Computerized Tomography (CT) of the patient was reviewed. In the lumbar CT imaging, it was observed that the vertebroplasty cement was extruded upwardly from the anterolateral side of the L2 corpus and invaded the lumen of the VCI (Figures 1 and 2).



Figure-1. The arrow shows that the vertebroplasty cement is extruded and invaded the lumen of the VCI on the axial CT.

In the MR angiography performed, it was observed that the cement was in the vena cava lumen. No free fluid that would be the sign of acute bleeding around the vein and in the abdomen was observed. The patient was consulted with

cardiovascular surgery. Clexane 0.4 cc subcutaneous 2x1 treatment was initiated for pulmonary embolism prophylaxis due to the lack of signs of bleeding. The patient with no additional problem in service follow-ups was discharged with the recommendation of outpatient clinic controls. After a 6 months follow-up, the patient's clinic is still uneventful.



Figure-2. The arrow displays that the vertebroplasty cement is extruded upwardly from the anterolateral side of the L2 corpus and invaded the lumen of the VCI on the sagittal reformatted CT.

DISCUSSION

PVP is an effective, safe and minimally invasive procedure that is frequently used to control the accompanying pain in compression fractures developing secondarily to osteoporosis, metastatic or primary bone vertebra tumors that are unresponsive to medical treatment, and also to ensure the stability of the bone structure. The primary goal of the application was to eliminate the pain and to ensure the continuity of stability. Although PVP is an effective and easy method in eliminating the pain and ensuring stability in osteoporotic vertebral compression fractures and vertebral compression fractures developing secondarily to malignancy, there is a risk of complication by 0-5.4%

even if it is administered by experienced spinal surgeons ⁽⁵⁾. These complications, the majority of which are minor, are usually complications that do not require intervention. The major complications of PVP include epidural and subdural hemorrhages secondarily to the medial wall injury of the pedicle, transient radiculopathies due to bone cement leakage, spinal cord compressions, arterial and venous injuries, pulmonary embolism and death (1, 2, 6, 8, 9). In a study in the literature, it was found out that cement leakage was 41% after PVP, but 96% of it was asymptomatic ⁽⁴⁾. It was observed that leakage migrated to the paravertebral region in 32.5% of cases with cement leakage, to the epidural region in 32% of them, into the disc in 30.5% of them, to the neural foramen in 3.3% of them, into the systemic circulation in 1.7% of them ⁽⁴⁾. In our patient, during the administration of cement during the operation, cement was administered in a controlled manner through serial shooting with a C-arm image intensifier, and the operation was immediately terminated by observing leakage to the anterior of the corpus. Since there is no leakage of cement after the PVP operation and the patient has no symptoms in the postoperative period, the patient is discharged by taking a two-way lumbar graph by surgeons. It is considered that CT imaging of the patient with cement leakage even without any symptom should be performed and the location of cement leakage should be detected.

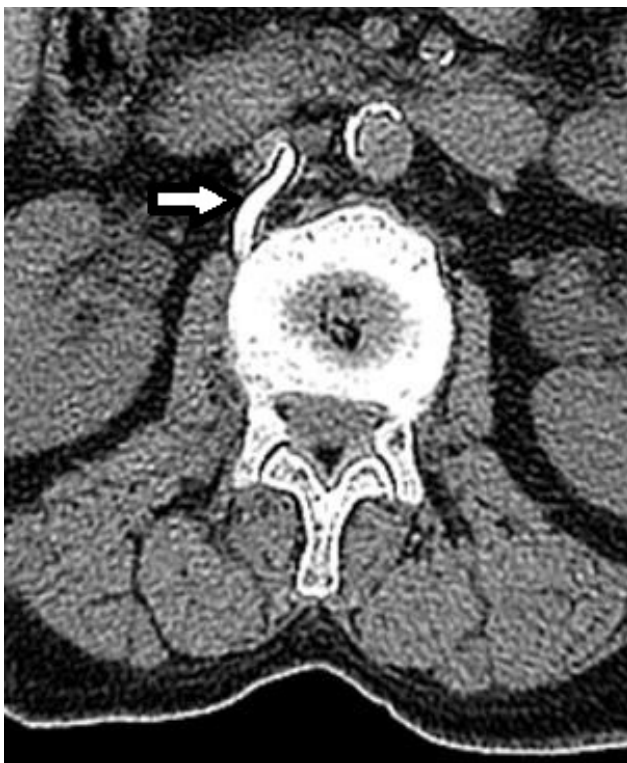


Figure-3. The arrow shows that the cement occupying a significant portion of the VCI lumen.

Another situation to be considered here is that the leakage of cement into the VCI was asymptomatic in this case. As it is seen in Figures 3, it appears that the cement occupying a significant portion of the VCI lumen did not lead to embolism or a change in the blood flow pattern within the VCI. However, a close follow-up of this patient is required for the relevant complications that may occur in the future. In the literature, there is no sufficient knowledge to create a treatment algorithm in this regard. In fact, reporting on such high ratios of the leakage of cement in the literature suggests that a close follow-up of each patient is required.

Another issue is the adjustment of cement consistency to minimize the leakage of cement. The difficulty of injection as the cement becomes hardened and increased leakage rate in the case of injection in the early stages of cement formation indicate the difficulty in finding the optimal consistency. Moreover, when the solidification rate of the cement is added as a factor, there is a serious problem of finding the optimum consistency. PMMA is likely to be replaced by a new cement material which solidifies more slowly and the injection of which does not become difficult even as it solidifies in the future.

CONCLUSION

PVP is an effective and reliable method for ensuring pain control and stability in vertebral compression fractures developing secondarily to osteoporosis or malignancy that does not respond to medical and conservative treatment methods. Although cement leakage frequently occurs during operation, adequate imaging is not performed since the patient is asymptomatic, and the localization of cement leakage is not determined. However, as it is seen in our patient, her CT imaging was performed although she was asymptomatic, and the necessary premedication was ensured in terms of embolism by demonstrating invasion to the VCI.

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