

Intracranial Hypotension as A Rare Complication of Vertebroplasty: A Case Report

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Abstract-

Background: Vertebral compression fracture is one of the frequent complications of osteoporosis. Percutaneous vertebroplasty (PVP) has been applied in the treatment of osteoporotic vertebral compression fractures, multiple myelomas and vertebral metastatic lesions. Complications of the procedure include bleeding at the puncture site, local infection, cement leakage in the vertebral canal and intervertebral foramen. Cerebrospinal fluid leakage after the procedure was rarely mentioned in the literature.

Case Report: A 51-year-old healthy female patient has no neurologic or orthopedic illness before. She suffered from severe low back pain since 10 days ago after some exercise. She has back pain with radiating to bilateral subcostal areas. The pain aggravated by bending forward. X ray of spine showed T12 vertebral body compression fracture. MRI demonstrated compression fracture at T12 with bone marrow edema and increased bone marrow enhancement. Bone mineral density checked by Dual-energy X-ray absorptiometry revealed osteopenia. The symptoms were not relieved by conservative treatments and she received vertebroplasty for pain relief. The operation course was smooth, but she started to suffer from orthostatic headache after the procedure. Spinal MRI revealed fluid accumulation at posterior epidural space of T11-12-L1 and CSF leakage was impressed. Intracranial hypotension related to CSF leakage was diagnosed according to the Diagnostic criteria formulated by Schievink, et al (2008). After hydration and bed-rest, her symptoms improved gradually without epidural blood patch.

Conclusion: Our report highlights the possibility and importance of intracranial hypotension related to CSF leakage after vertebroplasty. Clinicians should be alert to this complication.

Key Words: percutaneous vertebroplasty, cerebrospinal fluid leakage, intracranial hypotension, complication, spinal compression fracture

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INTRODUCTION

Osteoporosis is common in elderly patients and

often results in complications, such as compression fracture⁽¹⁾. The spinal vertebral compression fractures, one of the frequent complications of osteoporosis⁽²⁾,

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account for one of the common reasons for hospitalization in elderly patients and frequently cause increasing complication or mortality during hospitalization⁽³⁾. Conservative and non-surgical treatments like local analgesia, bed-rest, osteoporosis medications, bracing and physical therapy were useful in acute fracture that facilitate mobility and avoid prolonged bed rest⁽⁴⁾. The percutaneous vertebroplasty (PVP), a minimally invasive therapeutic procedure, has been applied in the treatment of osteoporotic vertebral compression fractures, multiple myelomas and vertebral metastatic lesions⁽⁵⁻⁷⁾. Previous studies showed that percutaneous vertebroplasty, via injecting hypoviscous bone cement into the vertebrae, can stabilize the spine, reduce pain, and improve quality of life⁽⁸⁾. Though some case reports have mentioned about complications, such as bleeding at the puncture site, local infection, cement leakage in the vertebral canal and intervertebral foramen^(9,10), the risk of vertebroplasty is still considered to be low. Here we report a case with intracranial hypotension after vertebroplasty for compression fracture.

CASE REPORT

Mrs. A is a 51-year-old healthy woman with no history of neurologic or orthopedic illness before. She suffered from severe low back pain since about 10 days ago after some exercise. She has back pain with radiating to bilateral subcostal areas. The pain aggravated by bending forward. X ray of spine showed T12 vertebral body compression fracture. MRI demonstrated compression fracture at T12 with bone marrow edema and increased bone marrow enhancement. Bone mineral density checked by Dual-energy X-ray absorptiometry revealed osteopenia. The symptoms were not relieved after conservative treatments. She visited our neurosurgical department and percutaneous vertebroplasty (PVP) was arranged. Under intravenous anesthesia, the procedure was performed with percutaneous injection of 4 ml of percutaneous polymethylmethacrylate (PMMA) bone cement (Zimmer) through the left T12 pedicle after informed consent. The operation course was smooth without intra-operative complications. However, a few hours after the procedure, she started to suffer from severe posture related headache. She felt severe headache (fullness in quality) in association



Figure 1. L spine X ray extension and flexion view showed anterior wedge deformity of T12 vertebral body, indicating compression fracture (arrow)



Figure 2. L spine MRI showed compression fracture at T12 with marrow edema and increased marrow enhancement (arrow)

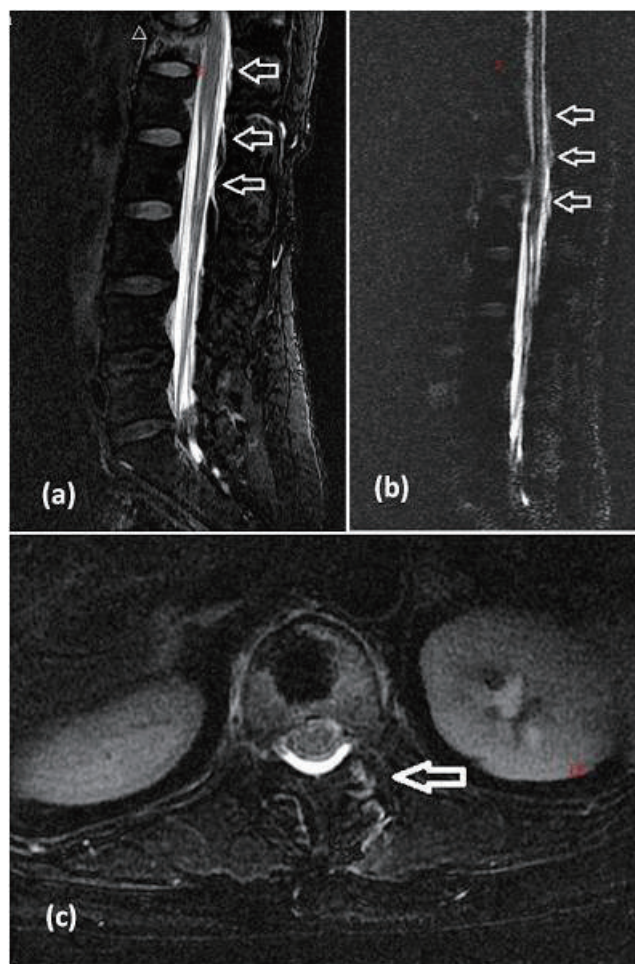


Figure 3. MRI of cervicothoracic spine (a) sagittal T2WI (b) myelography (c) T2 axial view. Fluid accumulation at posterior epidural space of T11-12-L1 and cerebrospinal fluid (CSF) leakage was impressed (arrow)

with nausea, vomiting and neck stiffness. The symptoms occurred within five minutes while she sat up or stood up and subsided soon after lying down. Some analgesics were administered and she was discharged. However, the symptoms persisted at home, so she visited Neurologic clinic and admission was arranged under the impression of intracranial hypotension related orthostatic headache. CT of brain demonstrated no organic brain lesion. Spinal MRI was arranged and it revealed fluid accumulation at posterior epidural space of T11-12-L1 and cerebrospinal fluid (CSF) leakage was impressed (fig 3). Compression fracture of T12 vertebral body status post vertebroplasty

with bone marrow edema was also noted in the same image. There was no bone cement leakage. The diagnosis of low cerebrospinal fluid pressure related headache was made according to the International Classification of Headache Disorders, 3rd edition, beta version⁽¹¹⁾. After adequate hydration and bed-rest for five days, her symptoms improved without performing epidural blood patch. She was discharged without headache and there was no recurrence of headache during outpatient follow-up.

DISCUSSION

To our knowledge, intracranial hypotension related to CSF leakage after the procedure of percutaneous vertebroplasty was rarely mentioned in the literature. Vertebral compression fracture is a common complication in elderly osteoporotic patients⁽²⁾.

Conservative and non-surgical treatments like local analgesia, bed-rest, osteoporosis medications, bracing and physical therapy were useful in acute fracture that facilitate mobility and avoid prolonged bed rest⁽⁴⁾. Patients with poor response to conservative treatments in clinical settings need some aggressive or invasive procedures to reduce patients' discomfort sometimes⁽¹⁾. Among these invasive procedures, percutaneous vertebroplasty and kyphoplasty are commonly used. Previous studies showed that percutaneous vertebroplasty, via injecting hypoviscous bone cement into the vertebrae, can stabilize the spine, reduce pain, and improve quality of life⁽⁸⁾. However, the benefit of PVP had been proved not superior to those of conservative treatment in recent randomized trials^(12,13).

There are only few case reports discussing about the complications of PVP, such as bleeding at the puncture site, local infection, and cement leakage in the vertebral canal and intervertebral foramen^(9,10). Besides, some severe complications, such as lumbar artery pseudoaneurysm, pulmonary embolism and osteoporotic vertebral compression fracture of proximal vertebrae were also noted in recent reports^(14,15).

Intracranial hypotension is usually seen spontaneously or as complications in patients after medical procedures like lumbar puncture, trauma, or surgery^(16,17). The frequent symptoms of intracranial hypotension include orthostatic headache, dizziness, nausea, vomiting, and some special signs like photophobia, phonophobia and late symptoms

like mental status changes or coma; some of them may indicate meningeal irritation and some indicate the severe complication of intracranial hypotension⁽¹⁸⁾.

Some clinical imaging tools are helpful to detect the etiology of orthostatic headache. The findings in brain MRI in relatively severe cases has been described by Schievink, et al. as subdural fluid collections or hygromas, pachymeningeal enhancement, engorgement of venous structures, pituitary hyperemia, and sagging of the brain^(19,20).

There were different diagnostic criteria of spontaneous spinal CSF leakage and intracranial hypotension. One of the most commonly used was established by International Classification of Headache Disorders⁽¹¹⁾.

As for treatment, conservative medical therapies including bed rest, hydration, caffeine, or steroids are appropriate for patients with mild symptoms. If these treatments fail, some invasive approaches such as epidural blood patch (EBP) or surgical treatment may be helpful to those patients with severe and intolerable symptoms⁽²¹⁻²³⁾.

Our patient had no headache history before. The pre-surgical T-L Spine MRI revealed compression fracture at T12 vertebral body without evidence of CSF leakage. She suffered from typical orthostatic headache immediately after the percutaneous vertebroplasty and spinal MRI proved CSF leakage at posterior epidural space of T11-12-L1 where bone cement (Zimmer) was injected. Intracranial hypotension secondary to the vertebroplasty is the most likely diagnosis. The patient was treated conservatively and was symptoms free without invasive epidural blood patch.

CONCLUSION

Our report highlights the possibility of intracranial hypotension related to CSF leakage after percutaneous vertebroplasty. This reminds clinicians to be aware of this rare complication. If the intracranial hypotension is not diagnosed and treated properly, patients may suffer from prolonged headache or even more severe complications.

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