



Percutaneous kyphoplasty for a patient of thoracolumbar osteoporotic vertebral compression fractures with distal lumbosacral pain: a case report

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Abstract: When patients combined thoracolumbar osteoporotic vertebral compression fracture (OVCF) with lumbar degenerative disease, whose main clinical manifestations are distal lumbosacral pain (DLP), the therapeutic schedule should be made cautiously. We reported an 80-year-old female presented with long-term lumbosacral pain accused of lumbar disc herniation. Percutaneous kyphoplasty (PKP) had been received because of OVCF at L1 vertebral body. Twenty days ago, the elderly felt the DLP was aggravated with no obvious reason. Magnetic resonance imaging (MRI) showed the fresh compression fracture of L2 vertebral body, but the palpation found absence of focal tenderness. Then, we chose to perform PKP at L2 vertebral body, and the patient felt substantial pain relief of lumbosacral area after operation. This case showed that patient manifested as DLP that combined thoracolumbar OVCF with lumbar degenerative disease, PKP has a significant relieving effect on lumbosacral pain.

Keywords: Percutaneous kyphoplasty (PKP); thoracolumbar osteoporotic vertebral compression fracture (OVCF); lumbar disc herniation; distal lumbosacral pain (DLP)

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Introduction

Thoracolumbar osteoporotic vertebral compression fracture (OVCF) is a severe complication of osteoporosis, which significantly affect the life quality of patients (1). Fragile fracture can be caused by minor injury in daily activities. Thoracolumbar OVCF often causes pain around the area of injured vertebrae. However, some thoracolumbar OVCF patients can only present as distal lumbosacral pain (DLP) and no focal tenderness, which as the patients with lumbar degenerative disease, such as herniation, stenosis and spondylolisthesis (2). Therefore, it is difficult to determine the reasons of DLP and choose the appropriate treatment method.

Herein, we reported an elderly woman who suffered from OVCF at L2 vertebral body and L4/5 disc herniation only complained low lumbosacral pain. The patient

accepted operation at injured vertebrae treated by percutaneous kyphoplasty (PKP). We present the following case in accordance with the CARE Reporting Checklist (available at <http://dx.doi.org/10.21037/apm-19-264>) (3).

Case presentation

An 80-year-old female with lumbar disc herniation accompanied by mild lumbosacral pain, was treated conservatively for 10 years. She suffered from compression fracture due to falls and underwent PKP at L1 vertebral body three years ago. The lumbosacral pain became worse with no obvious reason for 20 days. Physical examination revealed no tenderness and percussion pain at L1–2 vertebral body. The straight left-leg raising test was limited to 60 degrees. The muscle strength and sensation of lower

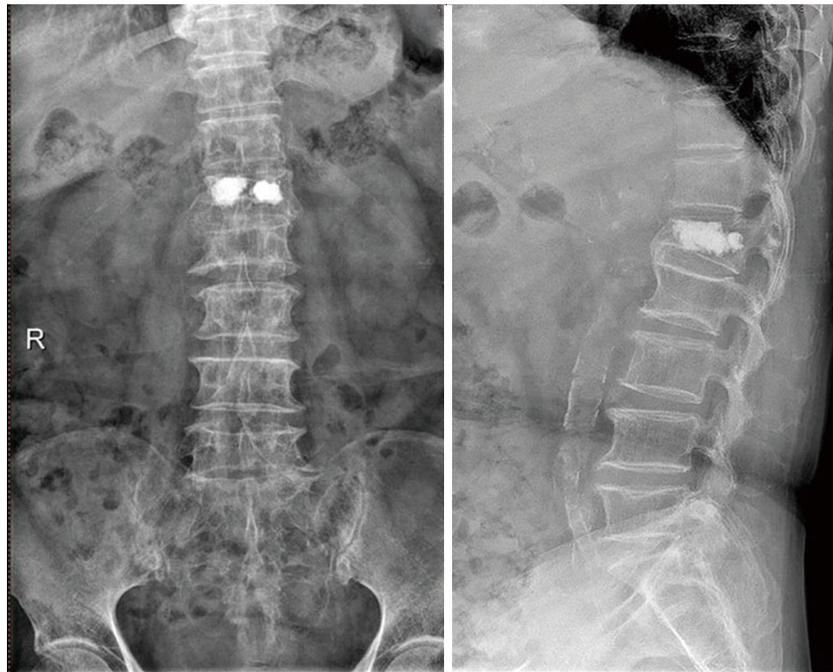


Figure 1 Preoperative X-ray showing the changes of L1 after and L2 vertebral fracture.

limbs were basically normal. Pathological reflex was not elicited.

Laboratory tests included total blood cell count, CRP and electrolyte levels being within the normal ranges. Bone mineral density of lumbar spine measured by dual-energy X-ray absorptiometry (GE Lunar Prodigy, USA) showed severe osteoporosis with a T-score of -3.7 . Radiography showed that L2 vertebral compression fracture and L1 filling with polymethyl methacrylate (PMMA) cement (*Figure 1*). CT showed wedge-shaped changes of L2 vertebral body (*Figure 2*). MRI showed bone marrow edema signal within L2 vertebral body and L4–5 lumbar intervertebral disc herniation (*Figure 3*).

According to the symptom and the will of the elderly, we firstly chose PKP for the treatment after careful preoperative discussion. The surgical procedure of PKP is as follows (4). Under the guidance of C-arm fluoroscopy, trocar and cannula systems were used to penetrate the pedicle and then entered the injured vertebrae. Removing the trocar and inserting a balloon into each guiding cannula. The balloons were inflated and removed from the vertebral body. PMMA cement was injected into the vertebral cavity when it became doughy and could stay at the tip of the cement inserter. The injection process was monitored continuously under C-arm fluoroscopy. If it became

difficult due to high resistance or the cement approached the vertebral wall, the operation should be discontinued. The amount of bone cement was 6 mL. No cement leakage occurred. Postoperative radiography showed that bone cement distributed sufficiently within L2 vertebral body (*Figure 4*). On the first day after PKP, the lumbosacral pain was relieved to a large extent. The limitation of movement was significantly improved, and he could walk slowly without assistance.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report.

Discussion

OVCF frequently occur in the elderly or postmenopausal women. The clinical symptoms of OVCF are mainly focal tenderness and percussion pain accompanied by limited activity of waist. Many studies have shown that thoracolumbar vertebral fractures can cause non-midline or DLP without obvious local physical signs. Senile patients are often suffering from lumbar degenerative diseases, such

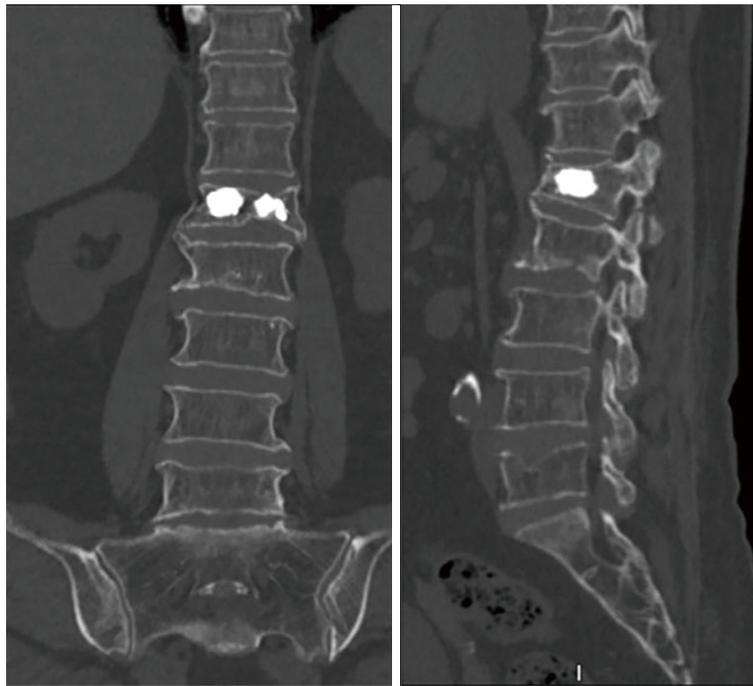


Figure 2 Preoperative CT showing high signal intensity in L1 caused by cement filling, and wedge-shaped changes of L2 vertebral body.



Figure 3 MRI findings: the cross-section of L1 vertebral body was deformed and its height was reduced. There were low signal intensity of T1 and T2 in L2 vertebral body and high signal intensity of FST2 in L2 vertebral body, L4–5 lumbar intervertebral disc herniation, dural sac compression, no significant changes in spinal cord signal.

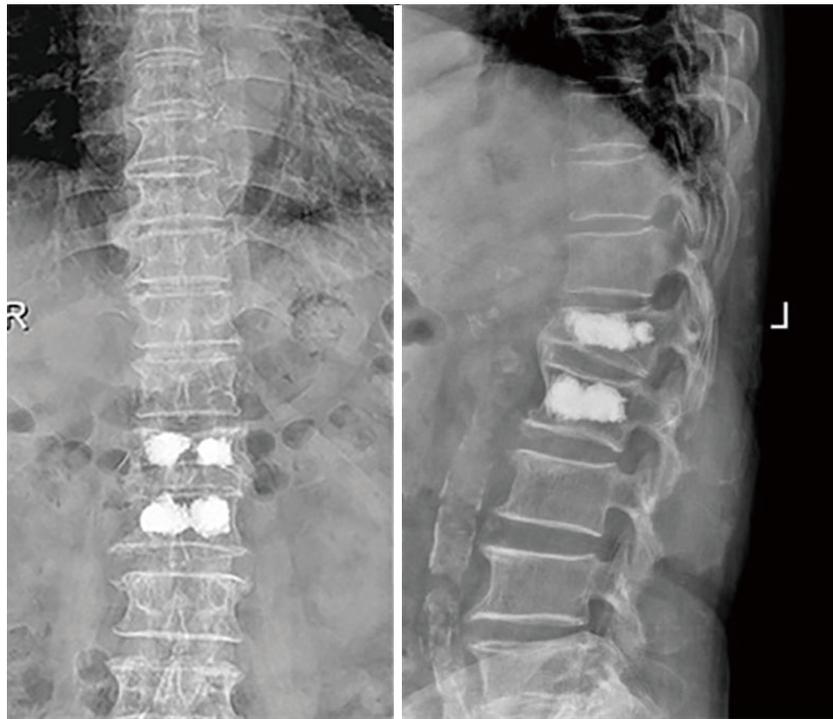


Figure 4 Postoperative lateral X-ray images showing the cement within the fractured L1 and L2 vertebrae distributed well and no cement leakage after percutaneous kyphoplasty (PKP).

as disc herniation and spinal stenosis, which can also lead to occurrence of DLP. Therefore, it is difficult to judge the reasons of DLP in patients of thoracolumbar OVCF combined with lumbar spondylopathy.

PKP is one of the most common surgical methods for the treatment of OVCF. It can restore the height of the compressed vertebrae, enhance the strength of the vertebral body and improve the life quality of the patients. Libicher *et al.* (5) found that PKP provides higher strength and stiffness for the centrum. But the excessive increase of vertebral stiffness could lead to non-uniform distribution of load stress. The stress would transmit directly through the endplate instead of trabeculae to the adjacent vertebrae, which increased the probability of refracture. In addition, Zhang *et al.* (6) confirmed that uneven distribution and excessive injection of bone cement will increase the incidence of adjacent segmental fracture postoperatively. The reasons of refracture for the patient in this case may be due to excessive load stress and inactive treatment for osteoporosis after operation.

OVCF and disc herniation could both lead to lumbosacral pain. The patient complained of aggravated lumbosacral pain for 20 days with no obvious inducement,

and the X-ray revealed fresh compressive fracture of L2 vertebrae. Currently, some studies reported cases of DLP caused by thoracolumbar fractures (7), thus we considered the main reason for the sudden exacerbation of DLP is the new-onset compression fracture. Thus, we chose a minimally invasive method for this patient, and the DLP was improved to a great extent after operation.

There are several studies which have discussed the possible reasons of DLP following thoracolumbar vertebral fractures. Niu *et al.* (8) suggested that thoracolumbar vertebral fracture with surrounding soft tissue and facet joint injury may stimulate the sympathetic ganglion or dorsal branch of T11–L2, which leading to DLP. Wilson *et al.* (9) found that the changes of vertebral appendages may play a dominant role in causing lumbosacral pain after vertebral compression fractures. Besides, Sagittal imbalance of paravertebral muscles and overload of facet joints caused by adjacent compressive fractures, which leads to biomechanical instability. These pain areas are several segments apart from the fracture identified on the image. Doo *et al.* (10) believed that the loss of vertebral height destroyed the surrounding vertebral joints, narrowed the intervertebral foramen and presented symptoms of

paravertebral and lumbosacral pain.

PKP has a definite effect on relieving pain of patient with OVCF, it can restore vertebral height and enhance biomechanical stability. In addition, bone cement undertakes a considerable part of the axial stress, which reduces the stimulation of nerve in vertebral body caused by micro-motion of fracture line. PMMA has exothermic and toxic effects, which may damage nerve endings in vertebral body (11). However, the reasons why PKP can relieve the DLP in patients need to be further elucidated. Yang *et al.* (12) supposed that the orientation of the facet joints changed after kyphoplasty, which alleviated the irritation to the dorsal branch of sympathetic nerve, was the primary cause for the relieving of DLP.

In conclusion, when the patients complicated with lumbar disc herniation and thoracolumbar compression fracture and the clinical symptom is only DLP, accurate judgment of the source of distal pain of the responsible vertebra (definite diagnosis) is the key to the selection of surgical options and good curative effect. When patients have clinical manifestations of lumbosacral pain, we cannot ignore the possibility of suffering from OVCF. PKP has an effect on improving normal vertebral height and restoring biomechanical stability. It can reduce the stimulation of the dorsal branch of sympathetic nerve caused by fracture, which may be the reasons of relieving lumbosacral pain.

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Footnote

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/apm-19-264>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional

and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report.

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