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Case Report

The treatment for an old patient with osteoporotic vertebral fracture nonunion and severe spinal deformity

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Abstract: We report the case of a 79-year-old lady who presented with lumbar pain and limited lumbar activity for 7 months. The radiological examination of the patient showed L1 vertebral body fracture and bone nonunion. The spine of patient showed severe scoliosis and kyphosis. This disease belongs to the special kind of Kummell's disease. The vertebroplasty combined with pedicle fixation was operated on the patient. The operation was completed successfully with no observed complications. Severe back pain relieved after the operation. The reports about old patients with vertebral instability fracture, severe spinal deformity and nonunion of bone are rare in literature. The vertebroplasty combined with pedicle fixation is suitable for the old patients with osteoporotic vertebral fracture nonunion and severe spinal deformity.

Keywords: Vertebroplasty, nonunion, deformity, kummell's disease

Introduction

In recent years, the incidence of osteoporotic fracture increases. Treatment of vertebral fracture nonunion after osteoporotic compression fracture (OVCF), especially with severe scoliosis or kyphosis, is difficult to deal with. Increasing attention is paid on the treatment and healing effect of this kind of disease. This type of osteoporotic vertebral fracture combined with bone nonunion and severe deformity is a special kind of Kummell's disease. It can manifest as delayed vertebral collapse, post-traumatic vertebral osteonecrosis, pseudoarthrosis, vertebral body vacuum sign and so on [1, 2]. The causes of the disease are complex. Most scholars believe that the vertebral body fracture on the basis of osteoporosis leads to vertebral collapse and pseudoarthrosis. German physician kummell first systematically described the disease in 1895 [3, 4]. Kummell's disease is prone to occur in the elderly and at the thoracolumbar segments [5]. With the increase of age, the increased incidence of osteoporosis, thoracolumbar stress concentration and large range of motion can lead to nonunion on the basis of primary disease. The disease is often caused by spinal trauma and spinal deformity usually occurs at the thoracolumbar segment after months or years. There is no consistent viewpoint on the pathogenesis of the disease and the possible mechanisms include avascular necrosis, microfracture, etc. Patients who suffered from the disease often have obvious pain symptoms and their quality of life is affected seriously.

In this article, we present a unique case which is rare in literature and discuss the postoperative effect of the surgery.

Case report

A 79-year-old lady presented with lumbar pain and limited lumbar activity for 7 months. The patient had sprained his waist a year ago and she got pain in the waist suddenly. The pain relieved soon so the patient did not pay attention on it. Four months after the damage, the back pain reappeared and aggravated gradually. Pressing pain of thoracolumbar vertebra was obvious when she entered our hospital. Neurological examination revealed normal strength in both lower limbs. The bilateral straight leg-rais-

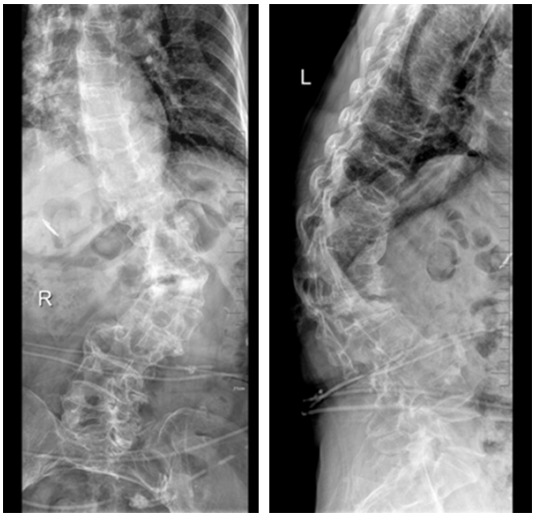

Figure 1. The preoperative X-ray scan shows the severe deformity of the spine and the spine presenting an unstable state.

Figure 2. Preoperative computed tomography (CT) images of the patient revealing the shape of the bone nonunion site and the mass bone hyperplasia between adjacent vertebral bodies mainly due to the unstability of the spine.

ing test was negative. The X-ray scans showed the compressed vertebral body (**Figure 1**). Computed tomography (CT) examination revealed the severe spinal deformity and the L1 vertebral body bone nonuion (**Figure 2**). The magnetic resonance (MR) imaging revealed high signal at the position of the bone nonunion on the T2-weighted images (**Figure 3**). It may be due to the collection of the fluid or gas [6]. Under the general anaesthesia, vertebroplasty combined with pedicle fixation was performed

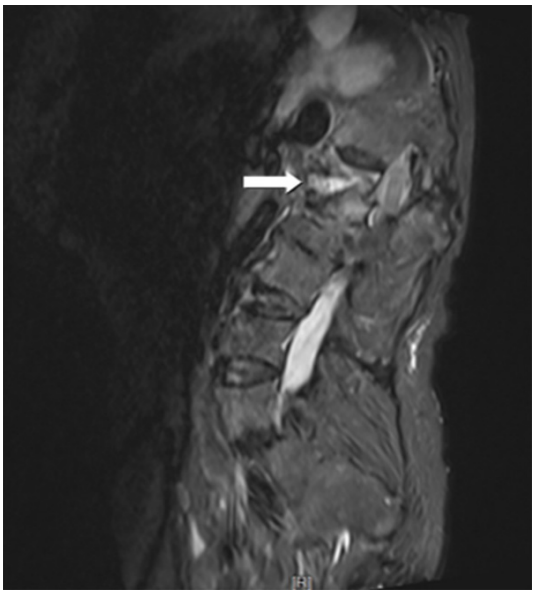

Figure 3. Preoperative magnetic resonance imaging demonstrating the 'vacuum cleft' which presenting high signal on the T2-weighted images. (The arrow mark location is the high signal area).

on the patient. On account of severe instability of the spine, the pedicle fixation was done firstly. The stability of the spine was strengthened and the deformity of the spine was partly corrected. Then the vertebroplasty was done on the patient. Bone cement could fill the vacuum cleft and eliminate the bone nonunion. The patient's back pain was obviouly relieved after the surgery. From the postoperative imaging examination, we can see that the stability of spine recovered and the bone nonunion site was filled with bone cement (**Figure 4**). One week after the operation, the patient could walk on crutches.

Discussion

The long-term spinal imbalance of elderly patients with severe kyphosis or scoliosis is prone to cause serious bone hyperplasia and osteophyte formation. It leads to the relatively stable state of the deformed segment of the spine. However, once the trauma occurs, it can easily lead to bone fracture nonunion and cause the damage of three columns [7]. The spine will be in very unstable state. Kummell's disease is prone to occur at the thoracolumbar segments and it's diagnosis and treatment are complicated. Effect of non-surgical treatment on Kummell's disease is poor. The develop-

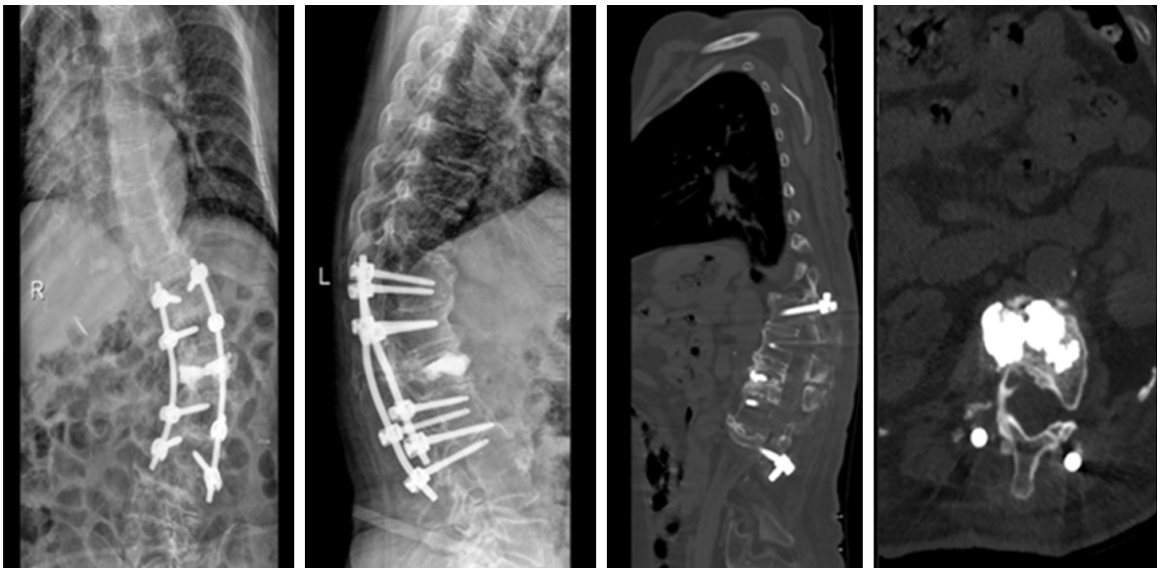

Figure 4. The postoperative X-ray and CT imaging examinations showing the appropriate internal fixation and eliminated bone nonunion filled by the bone cement.

ment of this disease is devided into 3 stages. First stage: The patient's spine was injured and patients presented with back pain for a short time. Second stage: The pain recurrence and the symptoms persist. Third stage: In the absence of further trauma, the spine presents kyphosis. The imaging examinations of the disease also have its characteristics such as the compressed vertebral body and the vacuum cleft [8-10]. X-ray and CT examinations can clearly show the shape and distribution of the vacuum cleft [11]. Anterior part of the vertebral body is narrow while the posterior part of it is wide. The magnetic resonance (MR) imaging can demonstrate the signal change of the nonunion site and the fracture site of the vertebral body presents high signal on the T2-weighted images [12]. This case has the characteristics of spinal deformity and vertebral fracture nonunion. This kind of case is pretty rare in clinic. In treatment of such cases, due to the presence of prominent and obvious deformity and severe osteoporosis in patients, simple vertebroplasty is difficult to restore spinal stability, so we recommend to firstly select pedicle fixation to recover the stability of the spine. Vertebroplasty combined with pedicle fixation can play an important role in cure of the old patients with vertebral instable fracture nonunion and severe spinal deformity. On the one hand, this operation can correct partial spinal deformity and recover the stability of the spine. On the other hand, it can eliminate the nonunion. The patient's symptoms obviously relieved after the operation and no complications occurred. In conclusion, vertebroplasty combined with pedicle fixation is a suitable option for the old patients with osteoporotic vertebral fracture nonunion and severe spinal deformity.

Disclosure of conflict of interest

None.

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