Clinical Case Report

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Modified posterior vertebral column resection for Kümmell disease

Case report

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Abstract

Rationale: Kümmell's disease is defined as delayed traumatic vertebral collapse disease in which patients develop a kyphosis after asymptomatic minor spinal trauma. Both anterior approach and posterior approach have been reported, however, there is no standard treatment for Kümmell's disease.

Patient concerns: We described a successful modified posterior vertebral column resection in a patient with Kümmell's disease. A 65-year-old woman reported persistent back pain for almost three months.

Diagnoses: Kümmell's disease was diagnosed based on computer tomography (CT) and magnetic resonance imaging (MRI).

Interventions: Modified posterior vertebral column resection combined with short-segment fixation was designed to treat this disease.

Outcomes: The procedure was successful without any complications. Patient reported that symptoms were obviously improved in one week after operation.

Lessons: Modified posterior vertebral column resection combined with short-segment fixation is an effective treatment option for Kümmell's disease.

Abbreviations: CT = computer tomography, MRI = magnetic resonance imaging, VAS = visual analogue scale.

Keywords: Kümmell disease, modified posterior vertebral column resection, short-segment fixation

1. Introduction

Kümmell disease is defined as delayed traumatic vertebral collapse disease and first described by Hermann Kümmell in 1891.[1] The symptoms of Kümmell disease mainly include vertebral collapse and kyphosis progression after asymptomatic minor spinal trauma.[2,3] For patients with persistent pain and without neurological symptoms, percutaneous vertebroplasty or kyphoplasty can be performed.[4,5] However, both two operation are reported with high risk of cement leakage especially the peripheral walls of vertebral bodies are not always intact in Kümmell disease.[6] For patients with neurological symptoms or posterior cortex breakage, anterior or posterior surgery for spinal cord decompression, and internal fixation of bone graft are needed to reconstruct the spinal stability.[7] However, the anterior approach usually involves a longer operation time and may injure the internal organs.[8] In the current study, the posterior approach including decompression and a modified posterior vertebral column resection was performed to correct the kyphotic deformities, with short-segment fixation to restore sagittal balance and stabilize the spinal column. This paper described a modified posterior vertebral column resection combined with short-segment fixation for the treatment of Kümmell disease and evaluates the clinical and radiographic results.

2. Case report

2.1. History

A 65-year-old woman reported persistent back pain for almost 3 months. The symptoms would be severe after walking or changing positions and would be slightly relieve after taking painkillers. The patient described no pain or numbness in her legs. She also described no bowel or bladder voiding difficulties. The patient reported past medical history of hypertension, coronary heart disease, cerebral infarction, and asthma, all of which were well controlled.

2.2. Physical exam

Physical exam demonstrated kyphosis of the thoracic spine in standing position and lumbar vertebra bend forward and

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The authors have no conflicts of interest.

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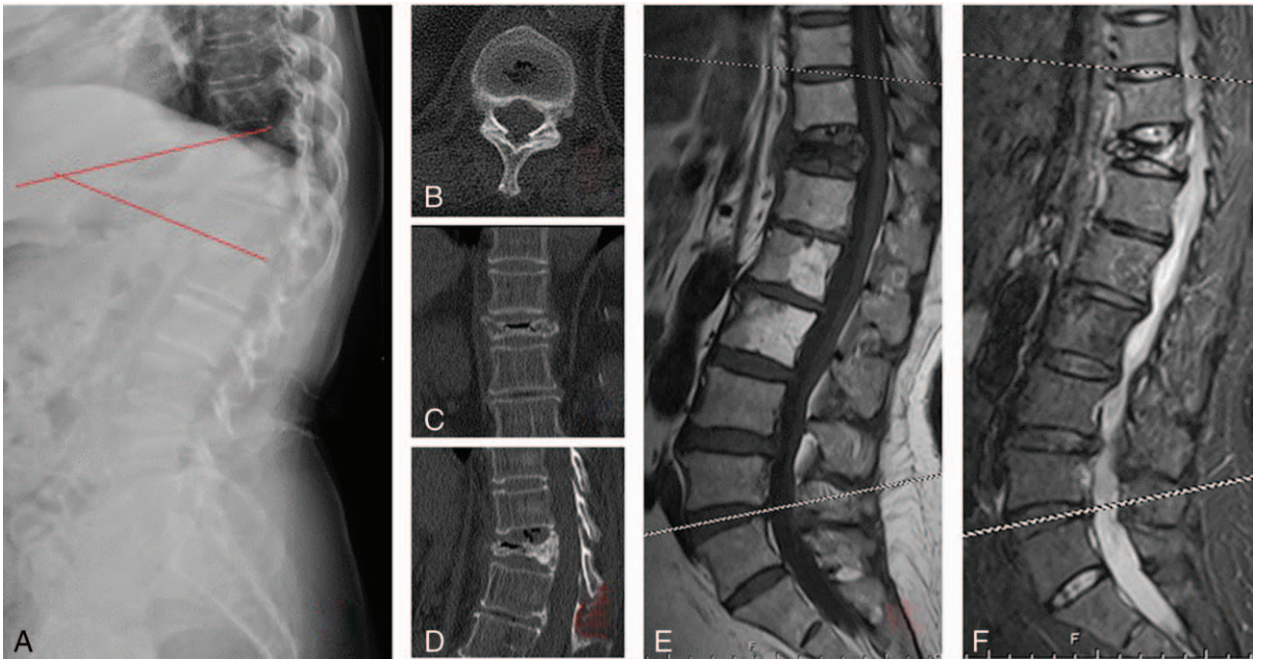

Figure 1. A is preoperative lateral X-ray; B, C, and D are preoperative CT; E and F are preoperative MRI. CT = computed tomography, MRI = magnetic resonance imaging.

backward straight activities were limited. There is obvious rap pain in back about T12 level. The patient's general medical examination was unremarkable in upper and lower extremity motor, stretch reflex, and sensory examinations.

2.3. Imaging

X-ray, computed tomography (CT), and magnetic resonance imaging (MRI) exams were performed after the patient in hospital (Fig. 1). The lateral X-ray showed T12 fracture with 40° kyphotic cobb angle. CT showed an intravertebral vacuum sign. Sagittal T1-weighted MRI showed a decreased signal intravertebral vacuum cleft and posterior cortex breakage with cord compression in T12. Sagittal T2-weighted MRI showed an increased signal in the intravertebral vacuum cleft. The patient was diagnosed with Kümmell disease (Stage III).[9]

2.4. Operation

The operation was performed under general anesthesia and prone position. A standard posterior exposure of the spine was given, pedicle screws were inserted in target vertebrae T10, T11, L1, and L2 under C-arm guidance.[10] The screws were connected on the left side with a temporary stabilizing rod. Laminectomy was performed to decompress and fully visualize the spinal cord.[10] Careful subperiosteal dissection was carried out on the right side to exposure the lateral wall of the T12 vertebral body until the anterior aspect was reached. The right side pedicle and articular process of the T12 vertebral body were removed. T11/T12 and T12/L1 intervertebral disks were also removed. Then, the temporary stabilizing rod was replaced by rod bended to the desired contour. Autologous bone graft and titanium mesh were placed in the intervertebral space. Another rod with the desired contour was connected on the right side. Adequate hemostasis was ensured and wound was thoroughly irrigated with saline. Drainage tube was inserted and the surgical wound was closed layer-by-layer.[10] Time from skin incision to completion of wound closure lasted 150 minutes, and estimated blood loss totaled 600 mL.

2.5. Postoperative course

Postoperatively, the patient was given preventive antibiotic treatment for 1 day, pain treatment for 3 days, and anticoagulant therapy for 1 week. The drainage tube was removed at 3 days postoperative when volume of drainage was less than 50 mL per 24 hours. Patient was allowed out of bed with a custom-made plastic orthosis at 1 week after operation. The plastic orthosis was kept for at least 3 months. The patient was allowed out of hospital at 12 days after operation when surgical suture had been removed.

2.6. Follow-up/imaging

Pain assessments were conducted using the visual analogue scale (VAS). VAS for preoperative, 1 week after operation, and 1 year after operation were 9 score, 3 score, and 2 score, respectively, which demonstrated significant improvement. The patient resumed normal activities and returned to work at 3 months after operation. Kyphotic Cobb angle for preoperative, 1 week after operation, and 1 year after operation were 40°, 8°, and 17°, respectively, which demonstrated significant improvement (Fig. 2).

3. Discussion

There have been multiple reports of operative approaches for Kümmell disease in the literature. Zhang et al[6] reported modified transpedicular subtraction and disc osteotomy combined with long-segment fixation was an effective treatment option for Kümmell disease with neurological deficits. Li et al[9] reported the efficiency of short segment fixation with transpedicle body augmenter (a titanium spacer with bone-ingrowth porous surface) to treat Kümmell disease with cord compression. Zhang

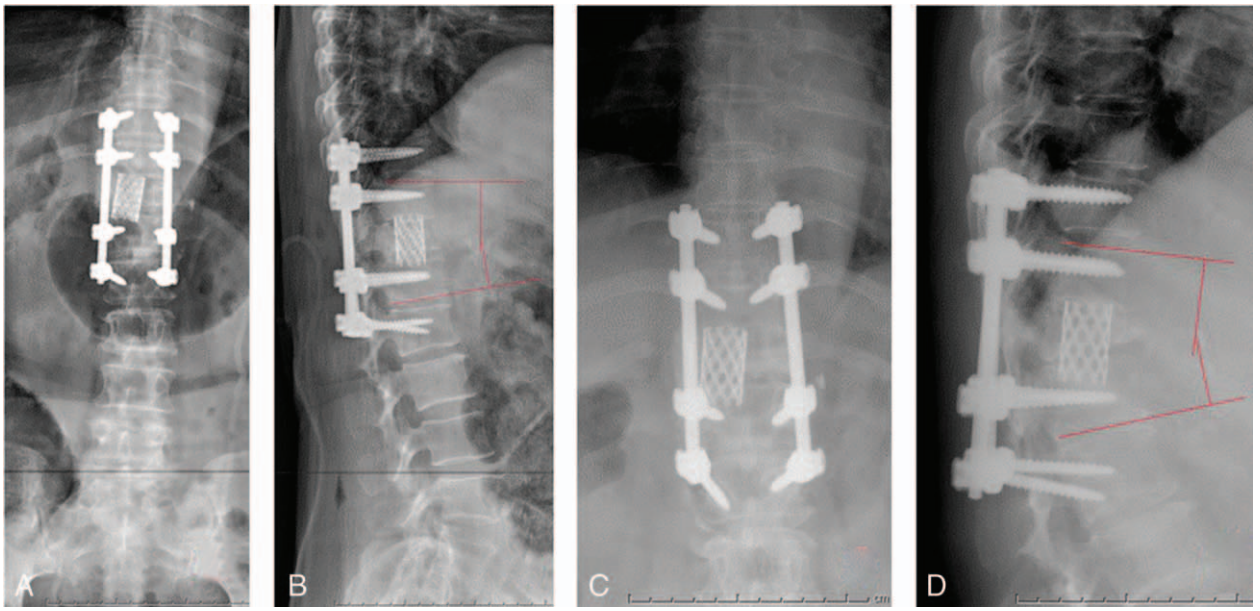

Figure 2. A and B are X-ray in 1 week after operation; C and D are X-ray in 1 year after operation.

et al[7] reported posterior decompression with short-segment fixation and fusion combined with vertebroplasty was an effective treatment for Kümmell disease with neurological deficits. Although the patient without neurological deficits, body height loss in the patient was severe which lead to kyphosis of the thoracic spine. Modified posterior vertebral column resection combined with short-segment fixation was performed to correct kyphosis. The symptom of patient also got obvious improvement.

Modified posterior vertebral column resection is not a revolutionary modification of the classical posterior vertebral column resection technique but just simplifies the procedure through a unilateral approach instead of a bilateral approach. Wang et al[10] reported that satisfactory correction of sagittal deformity, functional improvement, and pain relief can be achieved by modified posterior vertebral column resection, and it has the advantage of shortening surgery time, reducing blood loss, and incidence of nerve root impingement over classical posterior vertebral column resection technique.

There were several defects in lateral X-ray 1 year after operation: pedicle screws in L2 loose, titanium mesh subsidence, and kyphotic Cobb angle increase. Osteoporosis of patient, intraoperative repeated insert pedicle screws, and osseous endplate damaged may explain the defects. The symptom of patient was obvious improved and kyphosis was obvious correct.

In brief, modified posterior vertebral column resection combined with short-segment fixation is an effective treatment option for Kümmell disease.

3.1. Ethical review and patient consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. The study obtained ethics committee approval from the third hospital of Hebei Medical University.

References

[1] Swartz K, Fee D. Kummell's disease: a case report and literature review. Spine 2008;33:E152–155.
[2] Matzaroglou C, Georgiou CS, Assimakopoulos K, et al. Kummell' s disease: A rare spine entity in a young adult. Hell J Nucl Med 2010;13: 52–5.
[3] Li H, Liang CZ, Chen QX. Kummell's disease, an uncommon and complicated spinal disorder: a review. J Int Med Res 2012;40:406–14.
[4] Wang D, Wang L, Xu J, et al. Value of forceps biopsy and kyphoplasty in Kummell's disease. Orthopedics 2013;36:e1014–9.
[5] Yang H, Gan M, Zou J, et al. Kyphoplasty for the treatment of Kümmell's disease. Orthopedics 2010;33:479.
[6] Zhang X, Hu W, Yu J, et al. An effective treatment option for Kummell disease with neurological deficits: modified transpedicular subtraction and disc osteotomy combined with long-segment fixation. Spine 2016;41: E923–30.
[7] Zhang GQ, Gao YZ, Zheng J, et al. Posterior decompression and short segmental pedicle screw fixation combined with vertebroplasty for Kummell's disease with neurological deficits. Exp Ther Med 2013;5: 517–22.
[8] Wang F, Wang D, Tan B, et al. Comparative study of modified posterior operation to treat Kummell's disease. Medicine 2015;94:e1595.
[9] Li KC, Li AF, Hsieh CH, et al. Another option to treat Kummell's disease with cord compression. Eur Spine J 2007;16:1479–87.
[10] Wang H, Zhang D, Sun YP, et al. Unilateral posterior vertebral column resection for severe thoracolumbar kyphotic deformity caused by old compressive vertebrae fracture: a technical improvement. Int J Clin Exp Med 2015;8:3579–84.