



Case report

Unstable fracture of fusion mass in old healed tuberculous kyphosis: Case report

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ABSTRACT

Introduction and importance: Old healed spinal tuberculosis sometimes makes bony ankylosis with kyphotic deformity. This bony ankylosis with adjacent vertebra is like ankylosing spinal disorders (ASDs) such as ankylosing spondylitis and diffuse idiopathic skeletal hyperostosis. There is lots of report which revealed that conservative management might be failed in thoracolumbar fracture in ASDs. However, there is no report which shows surgical treatment was finally done because conservative management was failed in fracture healing of fusion mass caused by old spinal tuberculosis.

Case presentation: A 68 year-old male patient has suffered from spinal tuberculosis about fifty years ago and then has bony kyphotic ankylosis. He fell off a ladder and was conducted conservative treatment under diagnosis of a sprain at a doctor's office. He was diagnosed with fracture of fusion mass after computed tomography and magnetic resonance image scans in our hospital due to persistent back pain. At first, he refused operation strongly, but underwent eventually posterior fixation without anterior support and angle correction for persistent pain and fracture nonunion. We finally achieved bone union after postoperative nine months.

Clinical discussion: The characteristics of old healed spinal tuberculosis with kyphotic deformity is similar to that of ASDs. The spine fractures among the patients with ASDs can be easily missed. So, Checking whole spine CT or MRI is recommended for fracture screening to ASD patients with back or neck pain after trauma. For unstable AOSpine type B- or C-type injuries, conservative management is not recommended. This recommendations should also apply to patients with spinal tuberculosis.

Conclusion: In patients with bony kyphotic ankylosis due to spinal tuberculosis, minor trauma can cause unstable fracture. If there's found unstable fracture, surgery should be underwent as soon as possible for preventing neurologic deficits. Hence, we would like to report this case with literature reviews.

1. Background

Previous spinal tuberculosis is a common cause of a rigid kyphotic deformity [1]. Tuberculosis mostly affects the anterior column of the vertebral body, and then anterior part of affected vertebra might be collapsed and fused with rigidity [2]. This kyphotic rigid deformity with stiffness is similar to ankylosing spinal disorders (ASDs) such as ankylosing spondylitis (AS) and diffuse idiopathic skeletal hyperostosis (DISH) [3]. The patients with ASD are prone to vertebral fracture following minor traumas and vertebral fractures can be missed easily using simple radiographs, increasing the risk of neurologic complications [4]. Conservative treatment for thoracolumbar fracture with ASD

is not recommended because of biomechanical behavior [5,6]. We present a case in which the diagnosis of lumbar fractures in post-tuberculosis kyphosis had been delayed and conservative management had failed and surgery was performed.

This case report has been reported in line with the SCARE 2020 criteria [7].

2. Case presentation

A 68 year-old male patient, who had previous spine operation due to spinal tuberculosis in 1970s, suffered from back pain from 9 months ago because of falling off a 1.5 m-high ladder. He visited the doctor's office

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and then was given medication under his back sprain after taking simple radiographs (Fig. 1). Back pain had gotten worse and both leg intermittent radiating pain were occurred. He visited our hospital for further evaluation. He had an old spinal tuberculosis on T11 and underwent surgery about fifty years ago. He had a large scar on his left side. We did thoracolumbar computed tomography (CT). CT showed anterior vertebrae bodies from T10 to T12 were collapsed and fused with kyphotic deformity. Fracture on fusion mass of old healed spinal tuberculosis around L1 level (Fig. 2). Magnetic resonance images (MRI) revealed that fluid collection was found between the cranial and caudal fracture segments in the L1 vertebra body, and the fracture was extended to posterior column with T12-L1 interspinous ligament rupture (Fig. 3). According to the AOSpine TL spine injury classification [8], the subtype was a B2; N2; M2-type. MRI and CT revealed that vertebra bodies were fused from T10 to L1 without intervertebral discs and the margin of fracture fragments were sclerosis with voids in L1. The caudal fragment was shifted posteriorly and compressed spinal cord mildly. The angle of kyphosis was 65.2 degrees and the apex was T11 level.

We recommended surgical treatment for fracture on fusion mass of old healed spinal tuberculosis. Regardless of the warnings of treatment failure, he wanted conservative management strongly. Therefore, he was treated with parathyroid hormone therapy while wearing a thoracolumbosacral orthosis (TLSO) brace for 3 months. Even though conservative management for three months, the fracture was not healed, and back pain was aggravated so severely (Fig. 4). Finally, he decided to undergo surgery. Neurological symptoms were not severe and were thought to be caused by unstable fractures resulting from neural compression depending on posture. Also, he underwent surgery on his left side because of paraspinal tuberculous abscess fifty years ago (Fig. 5). Therefore, we decided to do just posterior pedicle screw fixation in situ from T11 to L3 without decompression and angle correction (Fig. 6). Left screw of L1 was fixed using the double endplates penetrating screw technique because left side of L1 vertebra was too small to insert the pedicle screws. Also, we didn't insert cage for anterior support because there was no collapse and just fluid collection between fracture fragments.

Immediately after the operation, the patient was able to walk around without back pain and intermittent radiating pain. We finally achieved fracture healing after postoperative one year (Fig. 7), and the patient also became able to live a daily life without pain.

3. Discussion

Spinal tuberculosis, also known as Pott's disease, begins in the metaphysis of the affected vertebra body. This infection would spread under the anterior longitudinal ligament and lead to multilevel involvement [2]. Therefore, anterior part of the affected vertebra might be collapsed until the healthy vertebral bodies in the region of the kyphosis approximate anteriorly and consolidate, and finally fused extending to 1 or 2 levels above and below the affected level [1]. More than half of spinal tuberculosis makes paraspinal psoas abscess and usually doesn't involve the disc space at early stage. In our patient, there was an old spinal tuberculosis on T11, and anterior vertebrae bodies from T10 to T12 were collapsed and fused with kyphotic deformity. About fifty years ago, he underwent surgery for a life-threatening paraspinal abscess and had a large scar on his left side.

The characteristics of old healed spinal tuberculosis with kyphotic deformity is similar to that of ASDs [3]. The biomechanical behavior of the continuously fused vertebrae is gradually converted from articulation to a long-bone-like rigid lever [9]. In the event of minor trauma such as ground-level falls, this long-bone-like structure is difficult to neutralize the applied force. As a result, patients with the ASDs are more prone to have spine fractures than those without the ASDs [10]. Moreover, the contiguous osseous fusion of the adjacent vertebrae might trigger displacement of fracture site and finally make neurologic impairment due to nerve compression. Our patient came to our hospital until intermittent leg radiating pain of both legs occurred abruptly. This situation is called as 'the fetal pause' due to the delayed and gradual development of neurologic deficits [11].

The spine fractures among the patients with ASDs can be easily missed on simple radiographs and consequently delayed diagnosis occurred frequently in the patients with ASDs. Delayed fracture diagnosis occurred in 19% of ASD-related spine fractures [12] and 40% of DISH-related vertebral fractures [13]. Checking whole spine CT or MRI is recommended for fracture screening to ASD patients with back or neck pain after trauma [4]. This recommendations should also apply to patients with spinal tuberculosis. In our case, the fracture was missed and nine-month delay in diagnosis was occurred after checking spine CT.

For unstable AOSpine type B- or C-type injuries, conservative management is not recommended. Most common complication is late-onset neurologic deficits because of insufficient immobilization and following nerve compression [12]. As a result, 2- or 3-above and below segmental

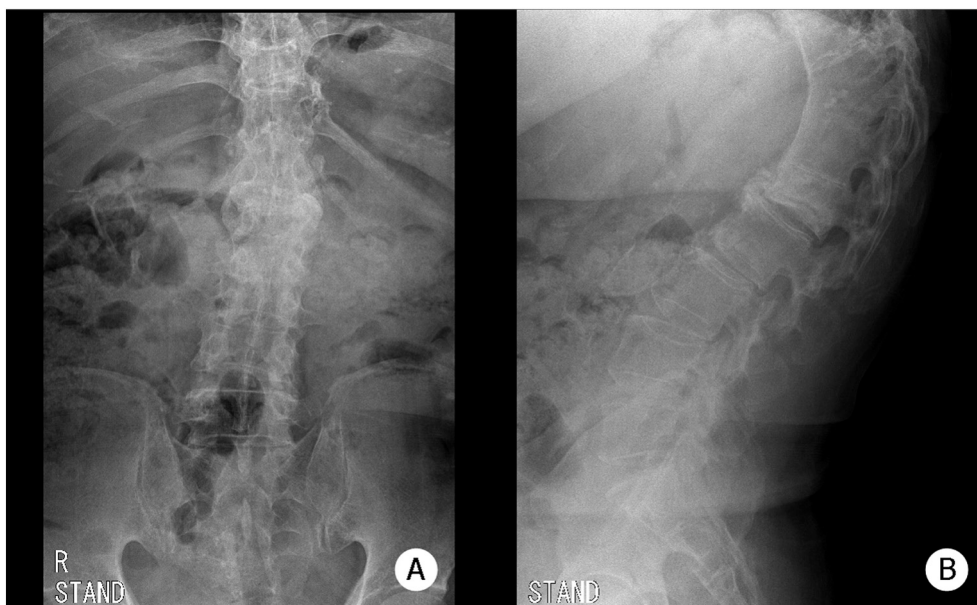


Fig. 1. The initial radiographs which were taken at doctor's office. A radiolucent line was shown in L1 vertebral body.



Fig. 2. The computed tomography that the patient first visited our hospital.. The fracture line passed through L1 vertebral body and towards the spinous process. This was fracture of fusion mass caused by old healed spinal tuberculosis.



Fig. 3. Magnetic resonance images to evaluate further more. The fracture was not healed and appeared to be in the process of nonunion. The Distal fragment was mild retropulsed and compressed spinal cord.

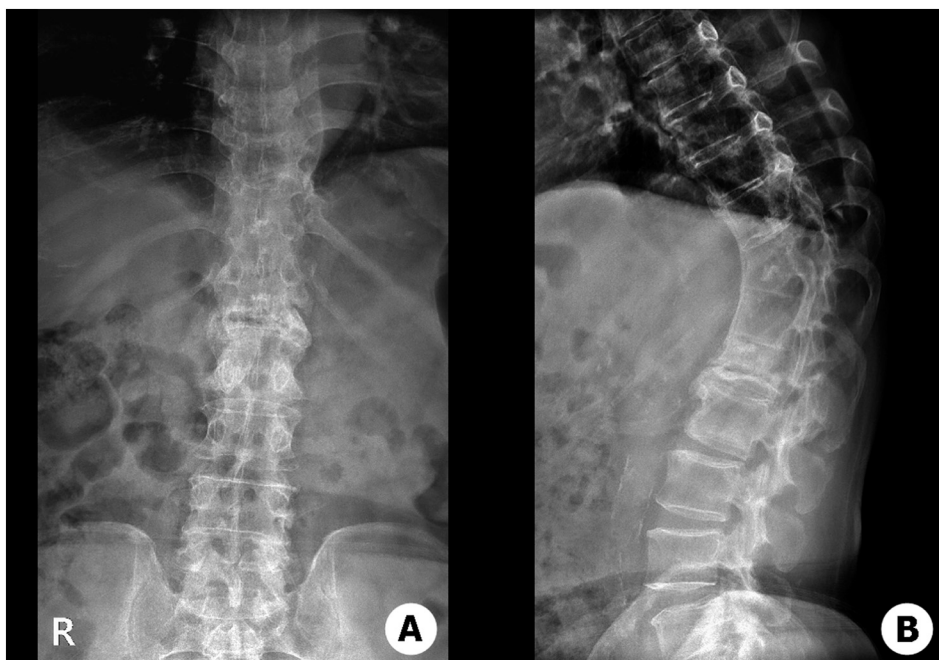


Fig. 4. After conservative management for three months, there was no evidence of union.



Fig. 5. The patient underwent surgery on his left side due to paraspinal tuberculous abscess.

posterior fixation is recommended without deformity correction if the fracture is reduced [4,14]. Our patient strongly wanted non-operative management when the fracture was diagnosed firstly. Even though the patient was immobilized using a TLSO brace and injected parathyroid hormone for three months, the fracture was not healed. After 3-month conservative treatment, he wanted to undergo surgery. We did a

posterior instrumentation from T11 to L3 using pedicle screws without anterior support. The fracture line in the L1 vertebrae passes through the left midsection and then there was no space for traditional pedicle screw fixation. Therefore, we used the double endplates penetrating screw technique for left pedicle screw of L1. We achieved bone union after postoperative one year and he could live his daily life without back pain.

4. Conclusions

We report a rare case of fusion mass fracture in old healed spinal tuberculosis, treating posterior fixation without anterior support. When patients with kyphotic deformity due to old healed spinal tuberculosis have an even minor trauma, CT or MRI should be recommended. Also, if there's found unstable fracture, surgery should be underwent as soon as possible for preventing neurologic deficits.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Funding

No financial interests exist.

Ethical statement

All the procedures performed in the case report were approved by the patient and ethics committee.

Registration of research studies

This manuscript is not a human study, but a case report.

Guarantor

Dae-Geun Kim

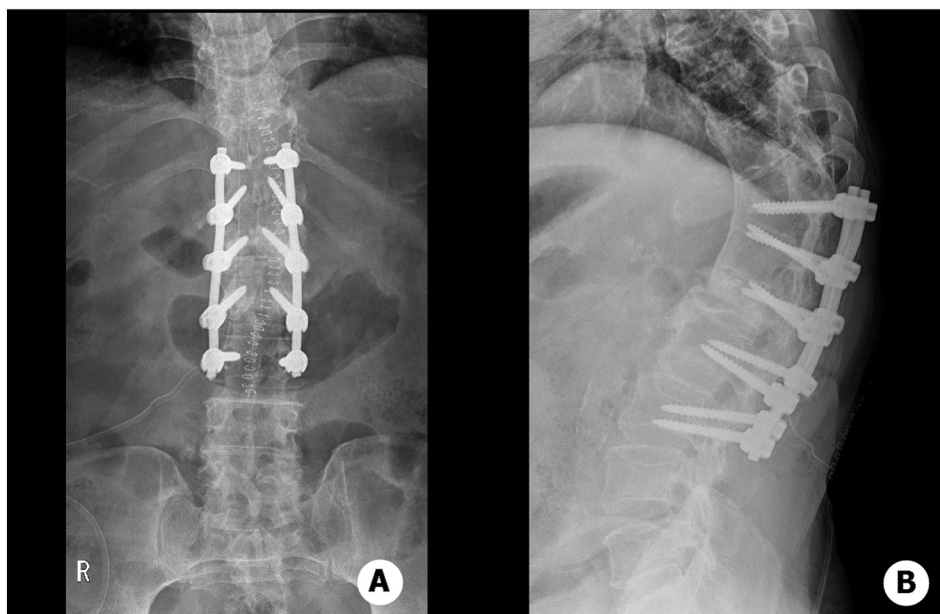


Fig. 6. Postoperative X-rays. Posterior fixation was done in situ from T11 to L3 without decompression and angle correction.

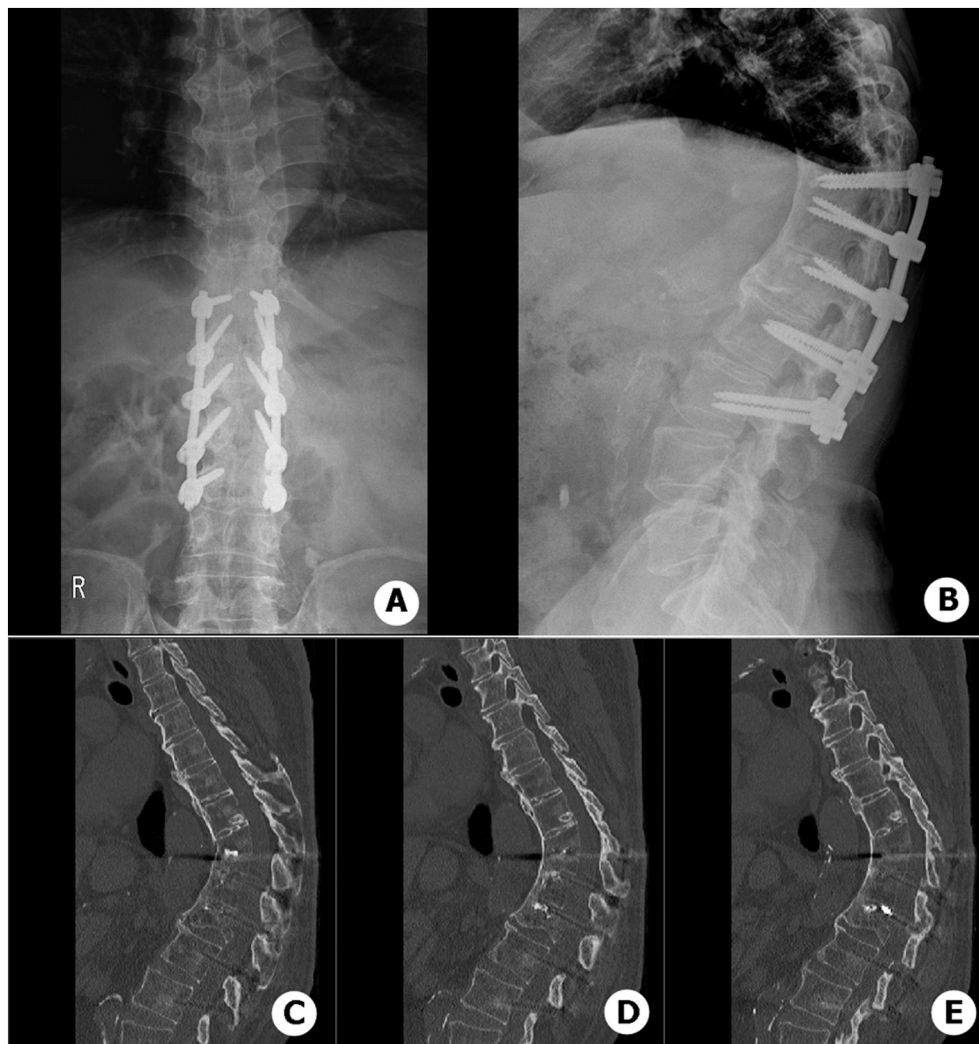


Fig. 7. The simple radiograph and computed tomography which were taken at postoperative one year. The fracture line was not seen in the L1 vertebra body, which meant that the fracture was finally united.

Provenance and peer review

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CRediT authorship contribution statement

DG Kim:supervision, study concept.
 HS Yoo: study concept, writing the paper.
 JU Shin: literature research, writing the paper.

Declaration of competing interest

No competing interests have been declared by the authors.

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