

A Case of Pyogenic Spondylitis Treated by Multi-staged Surgery

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P pyogenic spondylitis is a rare infectious disease with approximate annual incidence of one in 250000 of the population in England¹, and it represents 2 to 4% of all cases of bone infection.¹¹ However, this rare disease should always be included as a differential diagnosis for patients with back pain and unknown fever, especially when he/she has risk factors such as diabetes mellitus, presence of a distant focus of infection, immunocompromised status, or intravenous drug abuse.^{2, 12} Although conservative treatment with antimicrobials and immobilization is the main-

Pyogenic spondylitis is an acute infectious condition with rapid progression and worse clinical outcome if not detected in time.

A 63-year-old female, presented with fever, middle-back pain and acutely progressing paraplegia. Magnetic resonance imaging (MRI) showed signs of pyogenic spondylitis. Decompressive laminectomy was performed as an emergency treatment. Follow-up computed tomography (CT) showed progression of local kyphosis at the thoracic lesion. Under control of infection with antibiotics, she underwent two more surgeries to stabilize the thoracic spine. Finally, she became ambulant after rehabilitation.

A case has been reported here for its rarity and difficulty in formulating surgical strategy has been discussed.

Key Words: fusion and fixation, laminectomy, multi-staged surgery, pyogenic spondylitis

stay primary treatment, surgical intervention should be considered when the patient has neurological impairment.^{2, 3, 6, 9, 12} With regard to pyogenic spondylitis in the thoracolumbar spine, various surgical approaches have been reported so far: a minimally invasive technique with endoscope- or computer tomography (CT)-guided surgery, corpectomy and fusion via transthoracic approach, and posterior fixation with metal implants.^{3, 6, 7, 8, 9, 11, 12} These surgical options should be properly selected for each case. However, when the patient shows acute progression of neurological impairment, the emergent situation can influence decision-making about the surgical strategy. We report a case of pyogenic spondylitis manifested with rapidly progressed paraplegia. The clinical features of pyogenic spondylitis and treatment strategy for the disease will be discussed.

Case Report

A 63-year-old otherwise healthy female had a history of subarachnoid hemorrhage (SAH) due to rupture of a basilar tip aneurysm on May 13, 2007. She was successfully treated with endovascular coil embolization and conservative management. She recovered well except for muscle weakness in the lower extremities and was transferred to another hospital for rehabilitation on June 2. Then fever developed over 39 degree centigrade in the beginning of July. The laboratory test showed signs of infection. Therefore, she was treated as septicemia with an unknown focal infection. Although high-grade fever gradually resolved

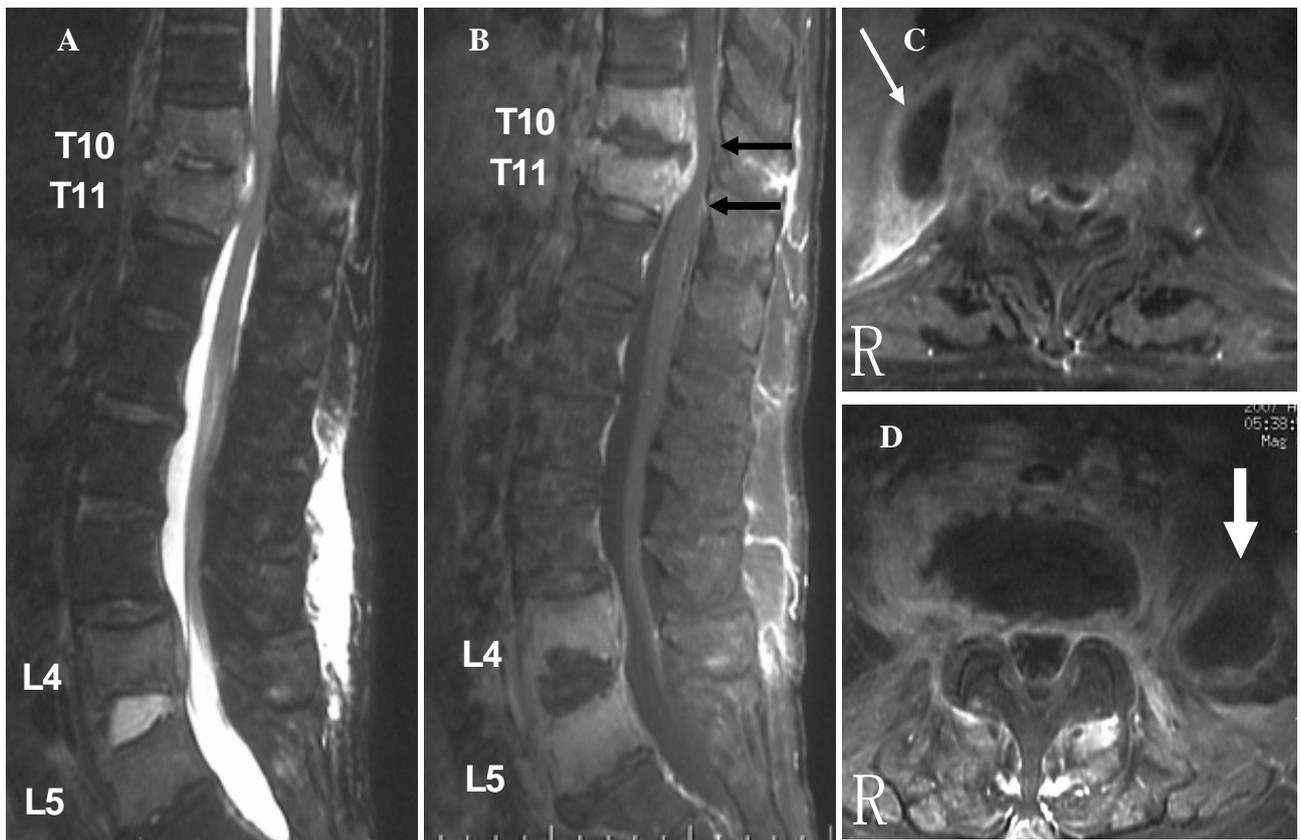


Figure 1. Preoperative magnetic resonance (MR) images of the thoraco-lumbar spine taken on the admission day. A: Sagittal fat suppression T2-weighted MR image showed that signal intensities of T10, 11, L4, and L5 vertebral bodies were increased compared with other vertebral bodies. B: Sagittal T1-weighted MR image with gadolinium revealed that vertebral bodies of T10, 11, L4 and L5 were well enhanced. The spinal cord is compressed from the ventral side by the enhanced mass lesion in the T10-11 level (arrows). C: Axial T1-weighted image at T10 level showing ring enhanced lesion, which is interpreted as an abscess, in the right paravertebral region (white arrow). D: Axial T1-weighted image at L4-5 level showing ring enhanced lesion, which is also interpreted as an abscess, in the left iliopsoas muscle (white arrow).

with antibiotics, she began to complain of middle to low back pain after falling on the floor. Magnetic resonance imaging (MRI) of the thoracolumbar spine showed destructive change in the vertebral bodies of T10-11 and L4-5. Formation of multiple abscesses in the epidural space at T10-11, right paravertebral region at T10, and left iliopsoas muscle at L4-5 were suspected on MRI with gadolinium (Figure 1). Pyogenic spondylitis was diagnosed and the patient was transferred to our hospital on 7th August, 2007. She developed motor weakness in lower extremities and numbness below the T11 dermatome level. Paraparesis progressed rapidly and she became almost completely paraplegic about 6 hours after the admission.

First Operation: T9-11 Laminectomy

Decompressive laminectomy of T9-11 was emergently performed. Operative findings revealed slight purulent discharge around the dural sac. On the next day, paraplegia remarkably improved to grade 4/5. However, severe middle back pain persisted. Although post operative MRI showed

successful decompression (Figure 2A), serial MR/CT images showed progressive kyphotic deformity at T10-11 (Figure 2B). CT-guided percutaneous aspiration of the abscess at the T10 right paraspinal region showed purulent fluid that was negative in culture including tubercle bacillus. The patient was completely immobilized. After prolonged administration of antibiotics, inflammatory markers such as CRP and ESR gradually improved. Then second surgery was planned for the T10-11 lesion.

Second Operation: Anterior Corpectomy and Fusion at T10-11

Anterior corpectomy and fusion via right transthoracic approach was performed after about 5 weeks of first surgery. Operative findings confirmed the epidural abscess. After curettage of collapsed vertebral bodies of T10-11, fusion was done with a titanium mesh cage filled with crushed autologous rib and was fixed with titanium instrumentations (Figure 3A). Numbness in the patient's lower extremities was totally diminished after the second



Figure 2. Serial magnetic resonance (MR) images taken after the first operation. A) Sagittal fat suppression T2-weighted MR image taken on the next day after the first operation. The cerebrospinal fluid space became slightly visible behind the spinal cord by laminectomy (white arrows). B) Follow-up sagittal T2-weighted MR image taken 2 weeks after the first operation. Anterior part of the T10 vertebral body is compressed and local kyphosis at T10-T11 level has aggravated compared with past MR image

surgery. Purulent fluid taken at the second operation also resulted in negative culture. Despite a successful anterior operation, her spinal column was still considered to be unstable because posterior supportive elements such as laminae, spinous processes and ligaments had already been removed at the first surgery.

Third Operation: Posterior Fixation from T7, 8 to L1, 2

Posterior fixation was performed after about 1.5 months of 2nd surgery. Pedicle screws were placed at T7, T8, L1, and L2, together with longitudinal rods to stabilize the spinal column from the T7 to L2 level (Figure. 3B). As for the lumbar lesion, progressive destruction was not observed on follow-up MR or CT images. The patient was allowed to walk wearing a brace and was transferred to another hospital for rehabilitation. Finally, she became independently ambulant and was discharged from the hospital.

Discussion

Pyogenic spondylitis usually presents with nonspecific symptoms such as skeletal pain and fever. Neurological deficits are also one of the common symptoms with a frequency of 19-33%.^{11, 12} Administration of antibiotics before tissue or blood sampling might be associated with negative cultures.^{2, 5}

Although morbidity and mortality have been decreasing by conservative and surgical treatment, prompt diagnosis of pyogenic spondylitis and identification of the causal microorganism are still very important in the treatment.^{12, 13} Diagnostic delay often leads to disastrous consequences, such as septicemia, spinal deformity, abscess formation in and around the spinal column and finally neurological deficit.^{6, 7, 12, 13}

The causal factor of pyogenic spondylitis could not be determined in our case. The patient suffered from SAH about 3 months before the onset of pyogenic spondylitis. Two pathways for spinal infection are possible in our case: 1) hematogenous spread or 2) local spread through lumbar spinal drainage during SAH management. Hematogenous bacterial spread is the most common cause of spinal infection.¹³ Although epidural catheterization has also been reported as a source of spinal infection,¹⁵ the positive blood culture and skip lesions of thoracic and lumbar spine imaging suggest a hematogenous cause in the present case.

Surgical intervention is indicated in the following situations: 1) failed conservative treatment, 2) extensive bony destruction presenting instability or mal-alignment, 3) intractable pain, 4) abscess formation in/around the spinal column, and/or 5) presence of neurological deficit.^{2, 3, 9, 12} Surgical intervention with eradication of the infected vertebral body and reconstruction for alignment and stability of the spinal column can provide relief of local pain and earlier ambulation.^{4, 9, 12} Controversies remain regarding the timing of surgery, surgical approach, and the use of metal implants in the presence of active infection.^{9, 12} Recent advancement of minimally invasive surgery, including thoracoscopic debridement or CT-guided percutaneous biopsy and drainage play an important role especially for patients with poor general condition.^{6, 7, 8, 12} However, these techniques cannot be applied to those who have extensive bony destruction and/or epidural compressing mass lesion, as in the present case.⁶ In general, decompressive laminectomy would not be performed as a first surgical intervention for pyogenic spondylitis in the thoracic spine because of the limited surgical access to the ventrally located focus of the infection or compressing mass lesion, and the potential risk of aggravation of kyphosis after the procedure.^{10, 11, 12} In the present case, anterior decompression or posterior decompression and fixation might have been an ideal procedure for the first surgery. However, simple laminectomy was selected as a

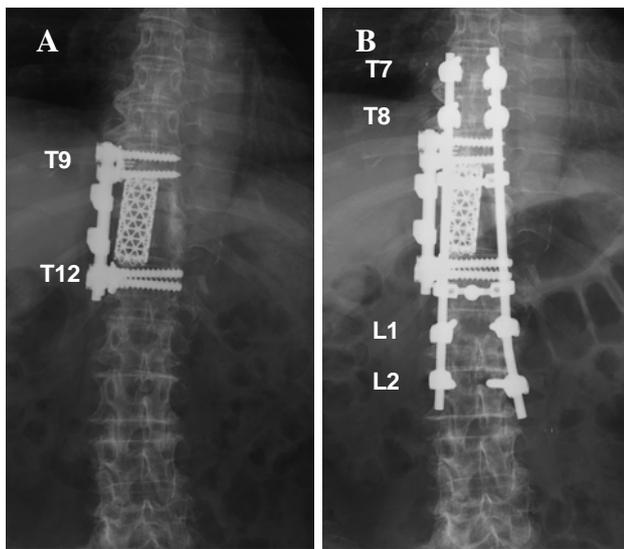


Figure 3. Antero-posterior view of radiographs of the thoraco-lumbar spine taken after the second (A) and third (B) operation. A) Radiograph taken after anterior corpectomy and fusion. Vertebral bodies of T10 and T11 are replaced by a titanium mesh cage. Four titanium screws in the vertebral bodies of T9 and T12 are linked by longitudinal rods. B) Radiograph taken after posterior fixation. Pedicle screws are placed bilaterally in T7, T8, L1, and L2. Pedicle screws are linked by longitudinal rods.

surgical procedure for acutely progressive paraplegia because the transthoracic approach was technically demanding and special instruments were not available in such emergent situation. In the present case, strict bed confinement and wearing of a body brace was suggested to the patient after the first operation. Fortunately, the patient's paraplegia markedly improved after the laminectomy. The second surgery, anterior corpectomy and fusion, successfully reconstructed a part of anterior and middle columns. However, the affected spinal column was not stable enough because the middle and posterior columns were already lost in the first operation. A third surgery for posterior fixation finally stabilized the spinal column and allowed the patient to lead a better life.

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