# Pyogenic Spondylitis Presenting with Skip Lesions

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We report on a 65-year-old man who presented with a 1-month history of aggravating backache and low-grade fever. He suddenly became paraplegic (Frankel B). Muscle power was grade 0~1 over the bilateral lower limbs. X-ray films showed disc space narrowing and end-plate blurring at the T9~T11 and L4~L5 levels. Magnetic resonance imaging showed an infectious lesion at T9~T11 and another at L4~L5. An emergent operation was performed under the impression of pyogenic spondylitis with spinal cord compression. The patient showed a significant recovery (Frankel D) after the thoracic and lumbar spinal surgeries. Pyogenic spondylitis usually presents as a vertebra-disc-vertebra lesion spreads to the contiguous vertebra-disc-vertebra unit. The current patient had pyogenic spondylitis with coexistent thoracic and lumbar lesions. This kind of skip lesion is common in spinal malignant metastasis, but rare in spinal infections. Awareness of the possibility of multiple lesions or skip lesions will facilitate the diagnosis and treatment of this condition. *(Chang Gung Med J 2005;28:651-6)*

**Key words: pyogenic spondylitis, vertebral osteomyelitis, skip lesions.**

Pyogenic spinal infection can be thought of as a spectrum of diseases comprising spondylitis, discitis, spondylodiscitis, pyogenic facet arthropathy, and epidural abscess.[1] Many previous reports have described infectious spondylitis as involving a mobile vertebra-disc-vertebra unit.[2-4] On the contrary, multiple spinal lesions or skip lesions are usually considered a sign of spinal malignant metastasis. In the current case report, the authors describe a rare case of pyogenic spondylitis with skip lesions of the thoracic and lumbar spine.

## CASE REPORT

A 65-year-old man with diabetes mellitus, alcoholic liver disease, and gouty arthritis, presented with aggravating low-back pain and a low-grade fever which had developed in the month prior to admission. The pain radiated to the lower anterior abdominal wall and down both legs. Intractable back pain and bilateral lower limb weakness had occurred 2 days before he was sent to the emergency department. A physical examination showed significant motor weakness (Frankel B). The muscle powers of hip flexion and knee extension were grade 1 and of ankle dorsiflexion and plantar flexion were grade 0. He felt dull over the bilateral lower limbs. The pinprick sensation was decreased below the umbilicus. The anal tone had also decreased. He was catheterized due to bladder incontinence. Laboratory studies showed a white blood cell count of 8900/μL, an elevated erythrocyte sedimentation rate of 70 mm/h, and an increased level of C-reactive protein of 175.8 mg/L. Blood culture revealed *Staphylococcus aureus.* X-ray films showed disc space narrowing and end-plate blurring at T9~T11 and L4~L5 levels.

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Magnetic resonance imaging (MRI) of the thoracolumbar spine showed disc destruction and abscess formation at T9~T11 and L4~L5 (Fig. 1).

The patient underwent a thoracotomy for debridement of the T9~T10 and T10~T11 discs, a corpectomy of the T10 body, and a retroperitoneal approach for debridement of the L4~L5 disc. Both procedures were done through the left side. The operative findings showed paraspinal abscess formations at T9~T11 and L4~L5. The involved disc

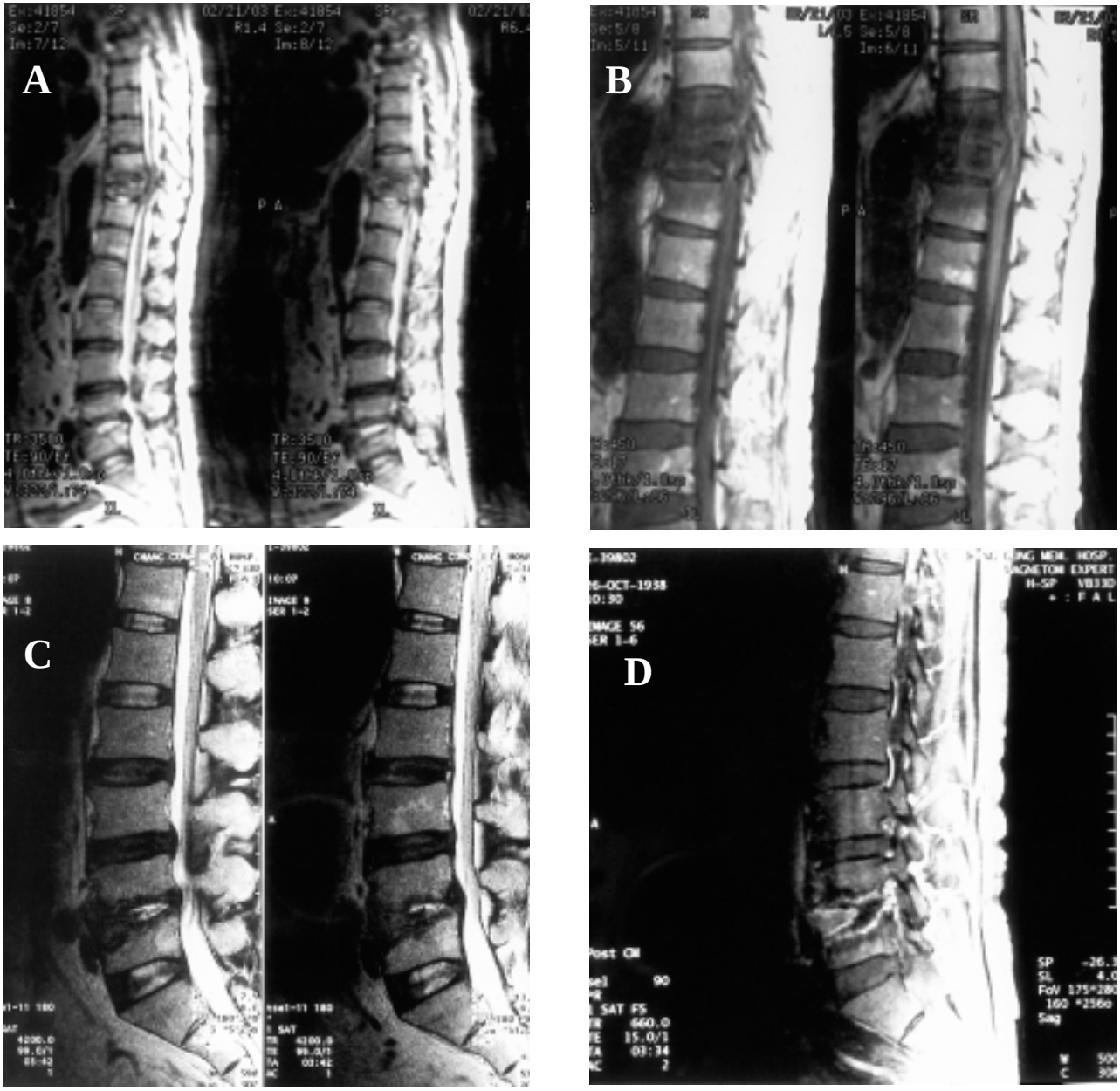


**Fig. 1** MRI (A) showing skip lesions at T9~T11 and L4~L5, respectively. Thecal sac compression was noted at T9~T11. T1-weighted image (B) of the thoracic spine showing disc space narrowing and endplate destruction between T9 and T10. T2-weighted image (C) of the lumbar spine showing abnormal disc signal change and endplate erosion at the L4~L5 discs. Gd-DTPA enhancement image (D) revealing abscess formation at L4~L5.

spaces were packed with necrotic granulated tissue. The neighboring end-plates were eroded. Left tricortical strut iliac bone grafts were used for anterior structural support (Fig. 2). No instrumentation was used in this patient. The pathology study revealed acute inflammation. Surgical specimen culture revealed *S. aureus.*

**Fig. 2** Postoperative lateral view showing a bone graft incorporated at T9~T11 and another at L4~L5 as anterior structural support.

The postoperative period was uneventful. He was instructed to wear a thoracolumbosacral orthosis, and he began rehabilitative therapy 2 days postoperatively. The patient stayed in the hospital and received a 6-week course of parenteral antibiotic therapy (teicoplanin at 200 mg/daily), because the blood culture and the thoracic and lumbar intraoperative tissue cultures revealed the presence of oxacillin-resistant *S. aureus.* His lower limb sensation dramatically improved. He could differentiate pin-prink stimulation immediately after the surgery. The lower limb muscle power gradually improved form grade 1 immediately postoperatively to grade 4 three months later. He could independently walk with the aid of a crutch and had regained voiding ability 3 months postoperatively. One year postoperatively, the lower limb muscle power had fully returned, but the patient still needed the crutches for ambulation because of hyperreflexia and involuntary motor control. An X-ray showed that the T9~T11 bone graft was united, and the L4-L5 bone graft had collapsed, but the L4~L5 segment remained stable (Fig. 3).

## DISCUSSION

Pyogenic spondylitis is a rare disease that occurs mostly in patients with a compromised immune system, such as the patient described here who had diabetes mellitus, alcoholic liver cirrhosis, and gouty arthritis. Findings on culture were positive for *S. aureus*, the most-common etiologic organism in pyogenic spondylitis.[1,3,4] The choice of antibiotics was based on the sensitivity test of the culture. Patients with pyogenic spondylitis usually present with progressive backache that does not respond to rest and analgesics. The patient herein had experienced aggravating pain for 1 month before he was sent to the emergency department and eventually became paraplegic (Frankel B). Based on his symptoms, spinal malignancy metastasis or spinal infection was suspected before the imaging studies were done. The MRI showed a lesion on the thoracic spine and another on the lumbar spine.

MRI is the modality of choice for the detection, staging, and differential diagnosis of inflammatory disorders of the spine.[5] Infectious spondylitis is characterized by the involvement of 2 adjacent vertebrae and the intervening disk with destruction of the

**Fig. 3** One year postoperatively. The lateral view shows the T9~T11 union; pseudoarthrosis had developed at L4~L5, but the segment remained stable.

end plates. The disk space is narrowed and typically exhibits water-equivalent signal intensity on T2-weighted images. Prevertebral and epidural abscess formation is common. The use of MRI can eliminate significant delays in the diagnosis.[6]

Treatment of pyogenic spondylitis can be conservative or operative. The success of nonsurgical treatment can be predicted by 4 independent variables: an age younger than 60 years, the immune status, infection with *S. aureus*, and a decreasing erythrocyte sedimentation rate.[7] Use of percutaneous suction aspiration with drainage has been shown to be an effective treatment for early-stage pyogenic spondylitis.[8] The combination of surgical debridement, interbody fusion, and posterior instrumentation is a safe and effective treatment for vertebral osteomyelitis and is indicated when there is neurologic deficits or bone destruction progress despite adequate antibiotic therapy.[1] Thecal sac neurocompression has a greater chance of causing neurologic deficits in the thoracic spine. Treatment of neurologic deficits caused by pyogenic spondylitis consists of prompt surgical decompression.[9] In a study of pyogenic spondylitis with severe neurologic deficits, Arnold et al. reported good functional recovery in 10 of 11 patients.[10] The current patient could walk and regained his ability to void after surgery.

Pyogenic spondylitis may develop as a result of hematogenous spread, contiguous involvement, iatrogenic causes, or posttraumatic inoculation. Hematogenous spread is most common, and the disease may be caused by any infection leading to bacteremia. The genitourinary tract, subcutaneous tissue, and respiratory system are often remote sites of infection. Pathogens are believed to reach the vertebral body via embolic spread from the remote sources outlined in the previous sentence. The embolics are deposited in the metaphyseal regions adjacent to the vertebral end plates, which contain end arterioles with numerous anastomoses.[11] From this location, the bacteria may break through the adjacent end plate into the contiguous disk space and into the adjacent vertebral body.

Spinal malignant metastasis is associated with tumor embolic spread to the spine by a hematogenous route, such as via a spinal infection. Multiple lesions are common in spinal metastasis and present as multiple separate lesions or skip lesions. In a study of 60 consecutive patients with spinal malignant metastasis who underwent palliative surgery, 32 patients had metastasis to the thoracic spine and 20 to the lumbar spine, while 8 had both thoracic and lumbar metastases.[12] Interestingly, contiguous vertebral involvement is seen more frequently with infections than with tumors.[13]

Both spinal malignant metastasis and spinal

infection are associated with hematogenous spread. The development of spinal metastasis is insidious and usually painless before extensive destruction of the spine occurs. The time lag between initiation of malignant metastasis and onset of symptoms allows the tumor cells to seed as multiple separate lesions or skip lesions. On the contrary, the onset of pyogenic spondylitis is rapid and associated with severe back pain, which prompts the patients to seek immediate medical attention. Antibiotic treatment is mandatory for either conservative or surgical treatment, as it prevents the development of sites of secondary infection. Pyogenic spondylitis can involve multiple vertebrae and discs by contiguous spread and presents as a single lesion instead of skip lesions. The current patient had back pain and low-grade fever before treatment. The time lag before his symptoms became severe enough for him to seek medical attention probably allowed development of 2 separate infectious sites. MRI findings of multiple separate lesions or skip lesions are a common sign of spinal metastasis.[12,13] In rare circumstances like the current patient, the finding can be pyogenic spondylitis.

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# 化膿性脊椎炎以跳躍式病變表現

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我們報導一位 65 歲男性，發燒並且下背痛一個月，他突然下肢癱瘓，核磁共振檢查發現 $T_{9}$-$T_{11}$ 和 $L_{4}$-$L_{5}$ 有兩個感染源，緊急手術後神經功能明顯改善，化膿性脊椎炎通常侵襲一個椎體－椎間盤－椎體單元或是漫延到鄰近的椎體－椎間盤－椎體單元。此病患同時在胸椎與腰椎發生跳躍性的化膿性脊椎炎。此種表現在脊椎腫瘤轉移常見，脊椎感染則很少見。了解跳躍性病變的病理與可能性，可幫助臨床醫師診斷與治療化膿性脊椎炎。(長庚醫誌 2005;28:651-6)

**關鍵字**：化膿性脊椎炎，椎體骨髓炎，跳躍式病變。

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