

Misdiagnosis of Lumbar Septic Spondylitis as Lumbar Tuberculosis: A Case Report and Literature Review

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Abstract

Pyogenic spondylitis (PS) is relatively rare. Its clinical symptoms, laboratory tests, and early imaging findings lack distinct features, making it easily misdiagnosed as tuberculous spondylitis (TS). In February 2022, the Department of Orthopedics at Hebei Provincial People's Hospital admitted a patient with PS. This paper presents the case details and reviews the relevant literature.

Keywords: septic spondylitis, lumbar tuberculosis, imaging, case report

1. Case Report

The patient, a 37-year-old male, was admitted on February 16, 2022, due to "lower back pain for 2 months, worsening over 10 days." Two months prior, the patient experienced the onset of lower back pain without any obvious cause, and without accompanying symptoms of lower limb pain or numbness, nor any urinary or bowel abnormalities. Symptomatic treatment at a local hospital was ineffective. Ten days prior to admission, the patient's pain worsened, in the same location, causing an inability to stand and difficulty turning in bed. A lumbar CT scan at the local hospital indicated a compression fracture of the L3 vertebral body and psoas muscle edema, with a suspicion of tuberculosis. Seeking further treatment, the patient visited Hebei Provincial People's Hospital and was admitted with a diagnosis of "L3 vertebral compression fracture, spinal tuberculosis?". Since the onset of the illness, the patient reported poor spirits, loss of appetite, and poor sleep, but normal urinary and bowel functions. Over the past two months, the patient lost 25 kg in weight. He occasionally experienced fever, with the highest temperature reaching 37.3°C, and had not taken antipyretic medications. The patient denied any history of infectious diseases such as hepatitis, typhoid, or tuberculosis, as well as any history of trauma, blood transfusions, surgeries, or allergies to medications or food. On admission, the physical examination revealed the following: temperature 36.0°C, pulse 84 beats per minute, respiratory rate 21 breaths per minute, and blood pressure 133/77 mmHg. There was no obvious deformity of the spine, but there was tenderness and percussion pain at the L2-3 vertebral level, with increased pain during movement and significantly restricted lumbar mobility. There was no noticeable redness, deformity, or swelling in the lower limbs. Muscle strength and tone in the lower limbs were normal, although the patient was uncooperative with the straight leg raise test. Both dorsal pedal arteries were palpable. The Visual Analog Scale (VAS) pain score was 6.

2. Investigations on Admission

- 1) Laboratory Tests: White Blood Cell (WBC) count: $14.58 \times 10^9/L$, Neutrophils (NEUT#): $12.09 \times 10^9/L$, Hemoglobin (HGB): 116 g/L, Ferritin: 805.1 ng/mL, CRP: 104.21 mg/L, Erythrocyte Sedimentation Rate (ESR): 72 mm/h, Albumin: 28.3 g/L, Alkaline Phosphatase (ALP): 194.9 U/L, Glycated Hemoglobin

(HbA1c): 9.9%, PPD test: Negative

2) Imaging Studies:

Lumbar CT: The L3 vertebral body is slightly flattened. There are multiple bone destructions in the L2 and L3 vertebral bodies and some of their parts. The intervertebral space between L2 and L3 is narrowed, with multiple irregular slightly low-density shadows around the paraspinal region bilaterally, suggesting a secondary infection of tuberculosis.

Chest CT: No significant abnormalities observed.

Lumbar MRI: Changes in the L2 and L3 vertebral bodies; tuberculosis cannot be ruled out. Formation of abscesses in the bilateral paraspinal and psoas muscles; dural sac compression.



Figure 1.

The L3 vertebral body is slightly flattened. Multiple bone destructions are noted in the L2 and L3 vertebral bodies and some of their attachments. The intervertebral space between L2 and L3 is narrowed. Bilateral paraspinal regions show multiple irregular slightly low-density shadows, with internal septations, air accumulation, and calcifications, and unclear borders. Transverse sections show uniform protrusion of the L4-5

intervertebral discs beyond the vertebral edges, with compression of the dural sac.

Figure DEFGH:

The L2 and L3 vertebral bodies exhibit T1WI low, T2WI slightly high, and STIR high signal intensities. The L4 vertebral body shows irregular bone structure. The intervertebral space between L2 and L3 is narrowed, with disrupted structures within the corresponding vertebral canal and slightly increased T2WI signal intensity of the spinal cord. There is disc bulging at L5-S1, with compression of the dural sac and normal signal morphology of the spinal cord. Bilateral paraspinal regions, psoas muscles, and inner aspects of the kidneys show multiple irregular T1-weighted low, T2-weighted high, and STIR high signal intensities, with internal septations and unclear borders.

Figure IJ:

The L3 vertebral body shows marked flattening and patchy low-density shadows. Small patchy low-density shadows are observed at the lower edge of the L2 vertebral body. Local discontinuous bone structure is noted in the right transverse process of L3.

Figure K:

Postoperative changes are observed in the lumbar vertebral bodies, with prominent metallic artifacts.

Based on the current symptoms and auxiliary examinations, the diagnosis of lumbar vertebral tuberculosis with psoas abscess was established. The patient underwent first-line anti-tuberculosis drug therapy for 4 weeks, resulting in slight alleviation of symptoms. Follow-up tests showed a slight decrease in CRP, ESR, and WBC. Repeat lumbar spine MRI revealed changes in the L2 and L3 vertebral bodies, with tuberculosis not ruled out, and a reduction in the size of surrounding soft tissue abscesses compared to previous imaging. Consequently, the initial belief was that the anti-tuberculosis treatment was effective. Subsequently, procedures were performed to clear the lesion and reconstruct spinal stability, including lumbar posterior pedicle screw fixation, bilateral retroperitoneal drainage of the psoas abscess, and debridement of the lumbar vertebral lesion. Intraoperatively, L3 vertebral body osteolysis and multiple psoas abscesses were observed. Tissue samples were taken for pathological examination and pus was collected for bacterial culture. Pathological findings indicated infection with *Klebsiella pneumoniae*, confirmed by immunohistochemistry (CKpan negative) and acid-fast staining (no acid-fast bacilli observed). Treatment was adjusted based on drug sensitivity testing to sensitive antibiotics for 6 weeks. Follow-up examinations showed significant decreases in CRP, ESR, and WBC counts, along with marked reduction of the peripherally located abscesses on repeat lumbar spine MRI. Postoperatively, the patient recovered well and was discharged as cured. Following discharge, oral sensitive antibiotics were continued for 6 weeks. During outpatient follow-up visits, the patient reported no specific discomfort, indicating a favorable treatment outcome.

3. Discussion

Pyogenic spondylitis (PS) is relatively rare, accounting for 4% of all osteomyelitis cases, with hematogenous infection, spinal trauma, and iatrogenic infection being the main pathogenic factors. It predominantly affects young adults, but recent years have seen an increasing incidence among the elderly and immunocompromised populations (Bornemann, R., et al., 2015; Rutges, J.P., et al., 2016). The lumbar spine is the most commonly involved site, followed by the thoracic and cervical spine (Bornemann, R., et al., 2015; Rutges, J.P., et al., 2016). Spinal tuberculosis (TS) has a high incidence among spinal infections, predominantly affecting young adults and often involving the thoracic spine, followed by the lumbar spine. It is a specific spinal infection caused by *Mycobacterium tuberculosis*, typically hematogenously spread and frequently associated with primary lesions. Bacterial culture serves as the “gold standard” for diagnosis and differentiation of these two conditions, although unfortunately, both have low culture positivity rates (Fujii, J., et al., 1984).

PS often presents insidiously in its early stages, with acute or subacute onset. Literature reports indicate that 30%-43.3% of cases are accompanied by fever, often moderate to high-grade (Turunc, T., et al., 2007). Localized severe pain and spinal mobility impairment are the most common symptoms. When vertebral destruction and abscess formation compress nerve roots, segmental radiating pain, muscle spasms, and even limb paralysis can occur. In contrast, lumbar tuberculosis typically manifests with a more gradual onset, characterized by low-grade fever, night sweats, and dull or aching pain, often leading to sinus tract formation. Compared to tuberculosis, the pain in pyogenic spondylitis tends to be more severe, reflected by higher Visual Analog Scale (VAS) scores (L. Zhang, 2021). Therefore, clinical differentiation based on symptoms alone is challenging.

Laboratory tests including CRP, ESR, and WBC show varying degrees of elevation in both PS and TS, aiding in understanding disease progression, yet lacking specificity. Comparative analysis indicates that PS patients generally exhibit slightly higher increases in ESR and CRP levels compared to those with lumbar tuberculosis (Cheung, W.Y. & K.D. Luk, 2012; Eren, G.S., et al., 2014). Additionally, assessing the decrease in ESR and CRP

levels after empiric anti-tuberculosis treatment can provide insights into treatment efficacy, although this assessment is often influenced by subjective and objective factors determined by the attending physician.

In imaging studies, X-rays of patients with PS typically show narrowed intervertebral spaces of affected vertebral bodies, adjacent vertebral edge bone destruction, with less severity compared to TS patients. However, X-rays lack high specificity and sensitivity for early diagnosis (Jevtic, V., 2004). CT scans of PS patients often reveal vertebral body destruction, cavity formation, peripheral bone sclerosis, formation of bone bridges, and para-vertebral mass shadows, aiding in differentiation from lumbar tuberculosis (Chang, C.Y., et al., 2015). MRI is highly sensitive and specific in diagnosing PS, serving as the preferred imaging modality. It typically shows indistinct contours of affected vertebrae, low signal intensity on T1WI in affected vertebrae, adjacent intervertebral discs, and surrounding soft tissues. About 60% of affected vertebrae exhibit high signal intensity on T2WI, and high signal intensity on fat-suppressed T2WI (Chang, M.C., et al., 2006). On MR enhancement scans: 1) PS vertebrae often show diffuse and uniform enhancement, possibly related to inflammatory reactions; whereas lumbar tuberculosis exhibits localized and uneven enhancement. 2) Para-vertebral soft tissues in PS are generally limited with unclear boundaries, small abscesses, and relatively irregular abscess walls; whereas in lumbar tuberculosis, para-vertebral abscesses have a wide range, evident dural sac compression, clear boundaries, thin and uniform walls, and pronounced ring enhancement. 3) Lumbar tuberculosis more commonly affects multiple segments and causes extension below ligaments or para-vertebral areas (Zhang N et al., 2020; Harada, Y., O. Tokuda & N. Matsunaga, 2008).

While there are differences between these distinguishing points, atypical cases are often difficult to differentiate in clinical practice, necessitating further clinical judgment by physicians. Blood and tissue bacterial cultures yielding positive results are the gold standard for diagnosing PS, but their positivity rates are not high, thus requiring multiple cultures, CT-guided percutaneous biopsy, or intraoperative sampling to enhance detection rates (Ruf, M., et al., 2007; Beronius, M., B. Bergman & R. Andersson, 2001). In this case, the patient presented with symptoms for 2 months, including weight loss, anemia, occasional low-grade fever, and limited mobility due to lumbar pain. Upon admission, CRP, ESR, and white blood cell count were elevated, and imaging showed no obvious osteophyte formation or bridging in the affected vertebrae. The clinical symptoms, laboratory tests, and imaging findings in this case lacked distinctive characteristics and were similar to those of spinal tuberculosis. Multiple bacterial cultures were negative, compounded by the lower frequency and awareness of PS in clinical practice compared to TS, leading to a misdiagnosis of lumbar tuberculosis. Only intraoperative sampling confirmed pyogenic spondylitis.

In summary, this article summarizes the distinguishing points of PS from the perspectives of epidemiology, clinical presentation, laboratory tests, and imaging. Research and understanding of PS in clinical practice are increasingly deepening. However, its early insidious nature and diverse symptoms make early diagnosis challenging, often leading to misdiagnosis as TS. Therefore, careful patient history inquiry, thorough review of imaging studies, comprehensive laboratory testing, and when necessary, refinement of lesion biopsy guided by CT and intraoperative tissue sampling are essential to reduce misdiagnosis.

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