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CASE REPORT

Isolated Unilateral Facet Tuberculosis of the Lumbar Spine: A Case Report

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INTRODUCTION

Spinal tuberculosis without vertebral body involvement is rare and can be challenging to diagnose given its non-specific clinical symptoms and atypical radiological features. We present a case of isolated unilateral facet tuberculosis of the lumbar spine in a 70-year-old man who presented with right lower limb radiating pain, weight loss and dry cough. Subsequent radiological and histopathological examination confirmed spinal tuberculosis involving isolated unilateral facet.

CASE PRESENTATION

A 70-year-old man presented with a 3-month history of back pain and radiating pain as well as impaired sensation over the right buttock and lateral side of the right lower limb since January 2023. He had no history of trauma or injury but had lost 10 pounds in the last 6 months and had a chronic dry cough with occasional shortness of breath at rest. Medical history was otherwise unremarkable with no history of primary neoplasm or family history of malignancy. He was admitted to the orthopaedic ward after presenting to the emergency department due to unbearable pain.

Physical examination revealed fair general condition, blood pressure 164/85 mm Hg, pulse rate 102 bpm, and no fever. There was localised paraspinal muscle spasm and tenderness at the right L4-L5 level. There was mild reduced sensation over the right L3 to L5 dermatome and right big toe dorsiflexion power reduced to grade 4/5 of the Medical Research Council Scale for Muscle Strength (corresponding to L5 myotome). Both lower limbs had preserved power and limb reflexes were unremarkable.

Laboratory Investigation

Laboratory investigations revealed a microcytic hypochromic anaemia with haemoglobin level 12.6 g/dL, mean corpuscular volume 78.6 fL, mean corpuscular haemoglobin level 25.4 pg, white blood cell count 8.4×10^9/L, and platelet count 266×10^9/L. Erythrocyte sedimentation rate was increased at 42 mm/h, and C-reactive protein level was elevated at 20.1 mg/L.

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Ethics Approval: The patient was treated in accordance with the Declaration of Helsinki. Patient's informed consent for the study and publication was obtained.

Liver and renal function tests were unremarkable. Blood tests for tumour markers including carcinoembryonic antigen, carbohydrate antigen 19-9, alpha-fetoprotein, and prostate-specific antigen were all normal.

Radiological Investigations

Lumbar spine radiograph showed mild disc narrowing at L4-L5 level with no lytic changes or endplate erosion (Figure 1). No significant erosion or arthrosis at the facet joints of the lumbar spine were noted.

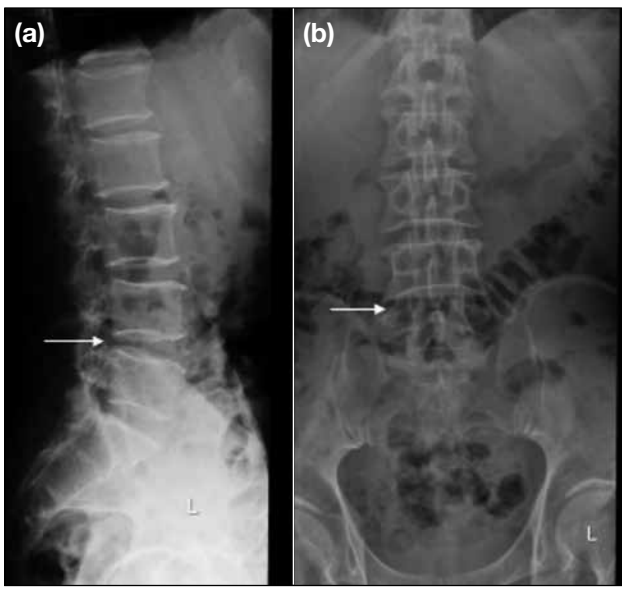

Figure 1. (a) Lateral and (b) frontal projection of the lumbar spine radiograph of the patient showed mild disc narrowing at L4-L5 level (arrows), without lytic changes or endplate erosion.

In view of the history of back pain and radiating right lower limb pain, magnetic resonance imaging (MRI) of the lumbar spine was performed and revealed abnormal bone marrow oedema in the right L4 inferior articular process and the right L5 superior articular process adjacent to the right L4/5 facet joint. No significant joint effusion in the right facet joint was seen. Bony erosion of the right L5 superior articular process was also noted. There was a T2-weighted slightly hyperintense epidural lesion in the right lateral recess and the right subarticular region of the spinal canal at level L4-L5, compressing the thecal sac and the right L5 descending nerve (Figure 2). The rest of the spine in T2-weighted sagittal screening was unremarkable.

A contrast MRI (intravenous gadolinium injection) was performed 10 days later (Figure 3), which confirmed the epidural lesion at the right lateral recess with rim enhancement, suggestive of an epidural abscess. There was also interval development of a 1-cm small peripheral rim-enhancing nodular T1-weighted intermediate soft tissue lesion posterior to the right L4/5 facet, next to the right L5 lamina.

Dual-energy computed tomography (DECT) of the

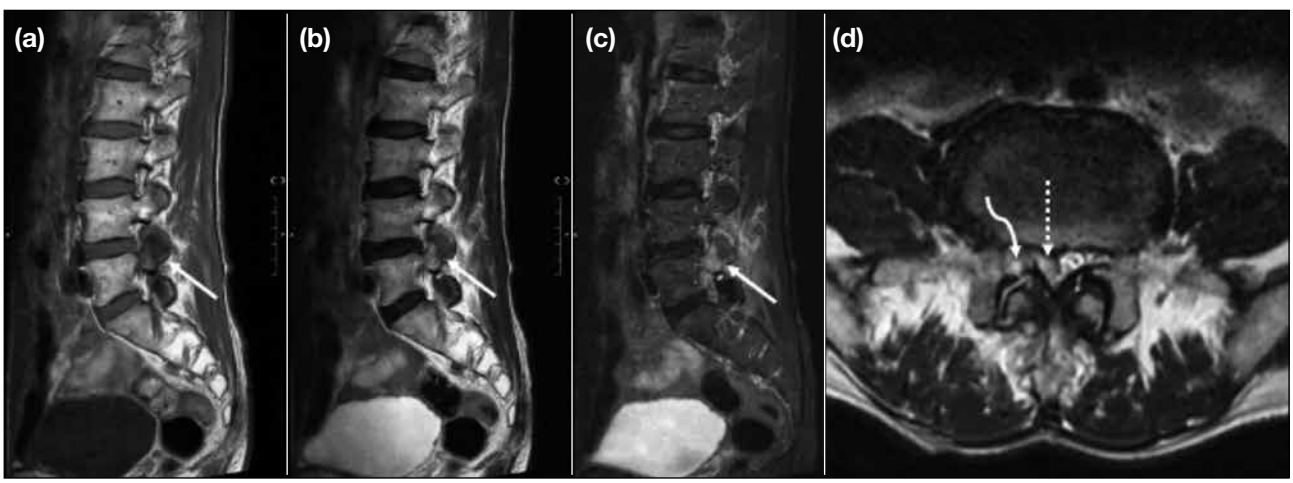

Figure 2. Magnetic resonance imaging of the lumbosacral spine of the patient. (a) T1-weighted sagittal image, (b) T2-weighted sagittal image, (c) T2-weighted short tau inversion recovery sagittal image, and (d) T2-weighted axial image at L4-L5 level. Abnormal bone marrow oedema in the right L4 inferior articular process and the right L5 superior articular process adjacent to the right L4/5 facet joint was shown (arrows in [a] to [c]). There was no significant joint effusion in the right facet joint. (d) Bony erosion of the right L5 superior articular process was noted (curved arrow). T2-weighted slightly hyperintense epidural lesion in the right lateral recess and the right subarticular region of the spinal canal at L4-L5 level was noted (dashed arrow), with compression on the thecal sac and the right L5 descending nerve.

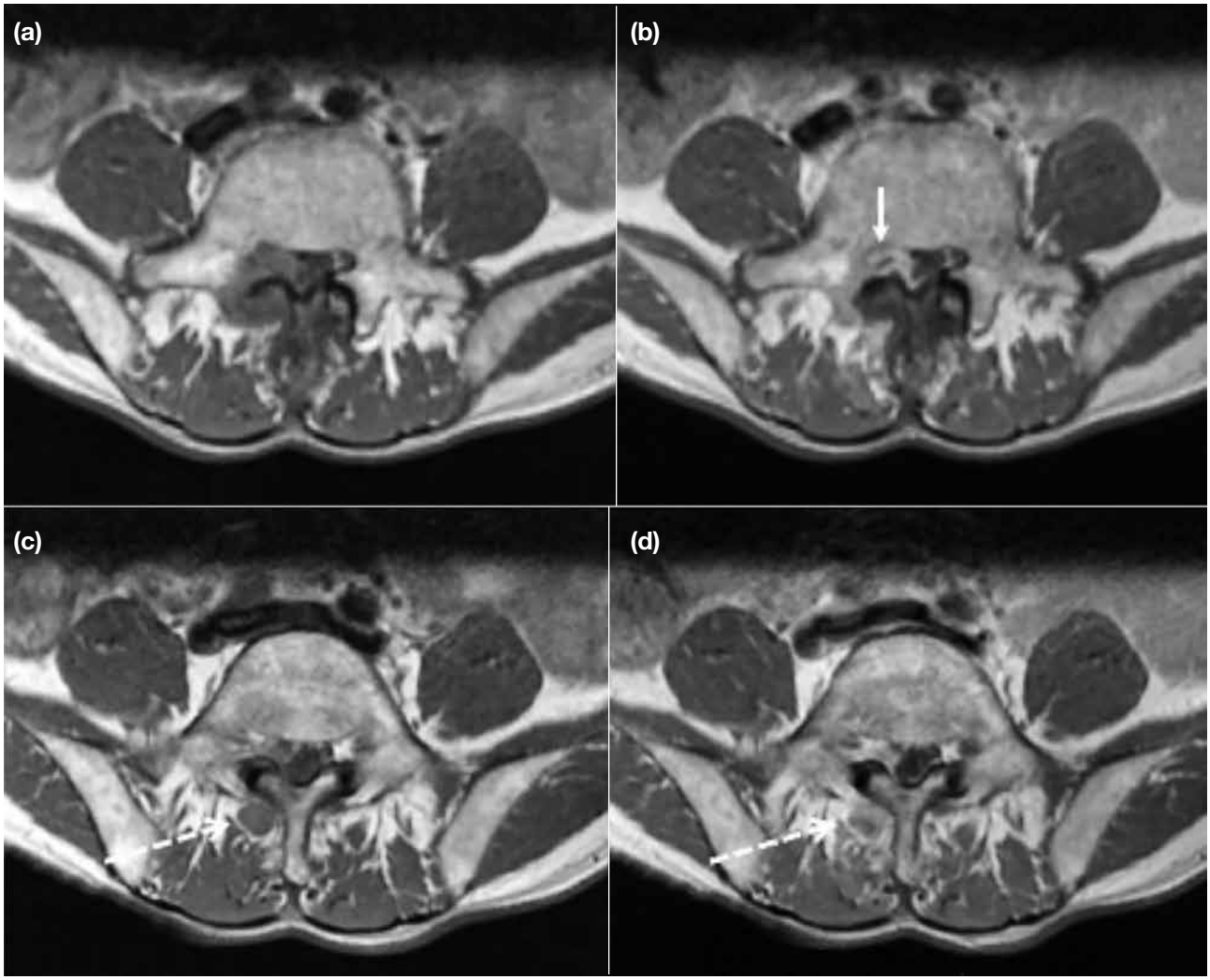

Figure 3. Contrast magnetic resonance imaging of the lumbar spine of the patient at L4-L5 level. (a, c) T1-weighted axial scan and (b, d) T1-weighted post-contrast scan showing the epidural lesion at the right lateral recess with rim enhancement, suggestive of epidural abscess (arrow in [b]). There was also interval development of a 1-cm small peripheral rim enhancing nodular T1-weighted intermediate soft tissue lesion (dashed arrows in [c] and [d]) posterior to the right L4/5 facet and next to the right L5 lamina.

lumbar spine showed no internal calcification or significant monosodium urate on colour-coded DECT. Computed tomography (CT) showed focal bone erosion at the superior articular process of L5 and small nodular soft tissue posterior to the right L4/5 facet next to the right L5 lamina (Figure 4), corresponding to the MRI findings.

Chest radiograph revealed progression of left upper zone opacification compared with an X-ray 6 years previously (Figure 5). Sputum acid-fast bacillus smear test was negative, but sputum culture 6 weeks later grew *Mycobacterium tuberculosis*. At this stage the top differential diagnosis was infective facet arthritis (particularly tuberculosis) but other possible differential diagnoses included gouty arthritis (unlikely because of negative urate deposition on DECT and no prior history of gouty arthritis) and malignancy (but no personal or family history of neoplasm and normal tumour markers). Radiologically, the imaging features were more suggestive of a joint disease with involvement of both articular sides of the right L4/5 facet. Malignancy or metastasis would be considered unlikely to cross the facet joint. The interval development of a small peripheral rim-enhancing nodular soft tissue lesion posterior to the right L4/5 facet after 10 days (on contrast MRI) also pointed to infection and made other differential diagnoses unlikely.

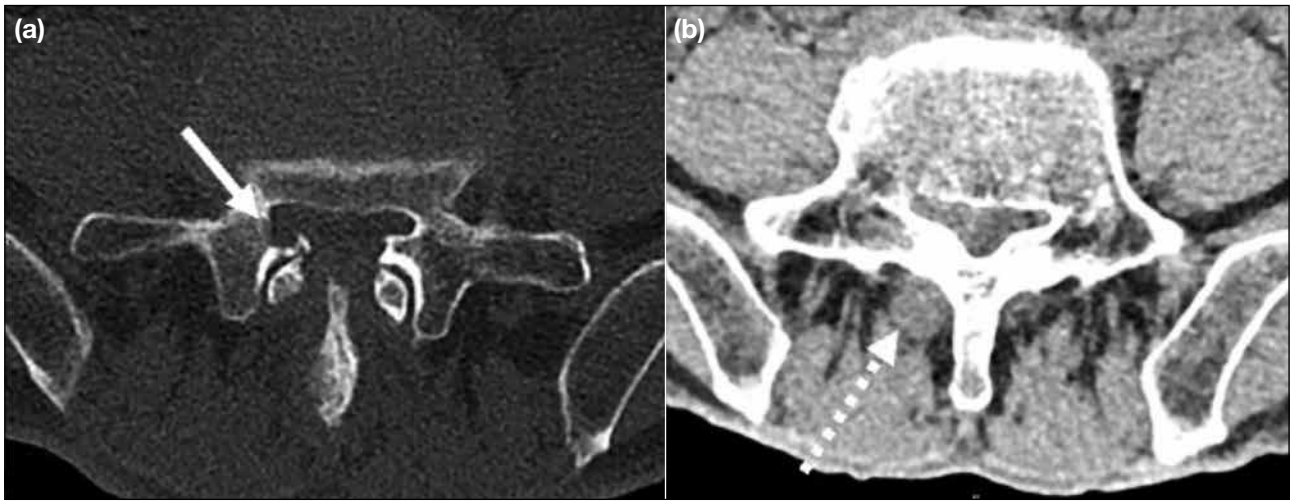

Figure 4. Axial computed tomography showing (a) focal bone erosion at the superior articular process of L5 (arrow) and (b) a small nodular soft tissue lesion posterior to the right L4/5 facet next to the right L5 lamina (dashed arrow).

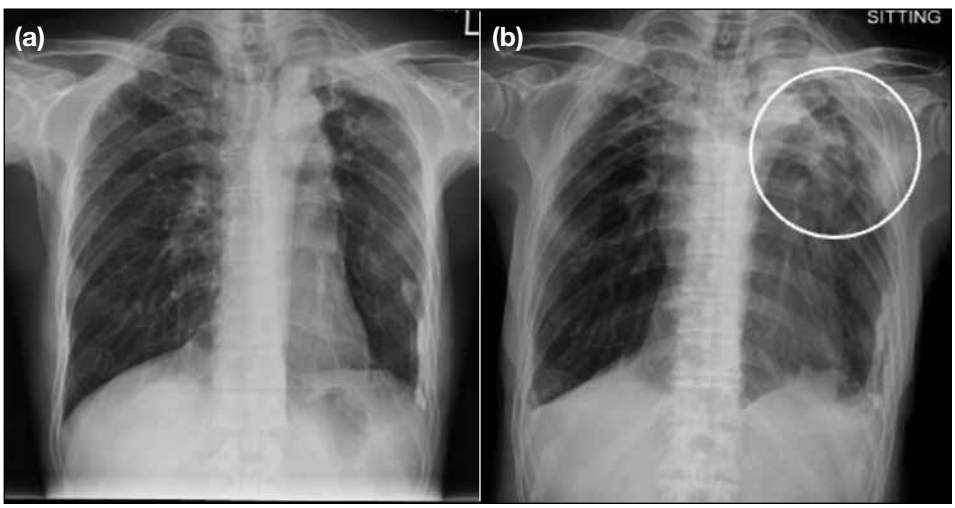

Figure 5. (a) Chest radiograph of the patient 6 years previously. (b) Current chest radiograph showing progression of left upper zone opacification (circle) compared with that 6 years ago.

CT-guided biopsy of the enhancing soft tissue lesion posterior to the right L4/5 facet was performed (Figure 6) using a co-axial system with a 17-gauge coaxial introducer (Merit Medical, South Jordan [UT], United States) and an 18-gauge Temno needle (Merit Medical, South Jordan [UT], United States). A total of four passes of biopsy were performed. Pathology results showed focal epithelioid granuloma formation. Scant acid-fast bacilli were highlighted by Ziehl-Neelsen stain but no fungal organisms were detected by periodic acid–Schiff or Grocott's methenamine silver stains. There was no evidence of malignancy. Overall features suggested mycobacterial infection.

Microbiology consultation suggested pulmonary tuberculosis with bone and joint involvement. The patient was commenced on antitubercular therapy of isoniazid, rifampicin, pyrazinamide, and ethambutol. A course of at least 9 to 12 months was planned in view of bone involvement.

The patient's neurological symptoms improved after 1 month of treatment. Laboratory tests also showed erythrocyte sedimentation rate reduced to 35 mm/h and C-reactive protein level reduced to 6.2 mg/L. CT of the lumbosacral spine after 2 months showed no further destruction or erosion of the right L4/5 facet joint and

interval reduction in size of the granulomatous soft tissue nodule posterior to the right L4/5 facet (Figure 7).

DISCUSSION

Mycobacterium tuberculosis is a slow-growing fastidious, aerobic bacillus. The primary site of infection is usually the lungs with spinal infection always secondary and occurring by hematogenous dissemination.[1] Spinal tuberculosis accounts for approximately 10% of extrapulmonary tuberculosis.[2] It is disseminated through the intercostal arteries, lumbar arteries and the vertebral venous plexus (Batson's plexus).[3]

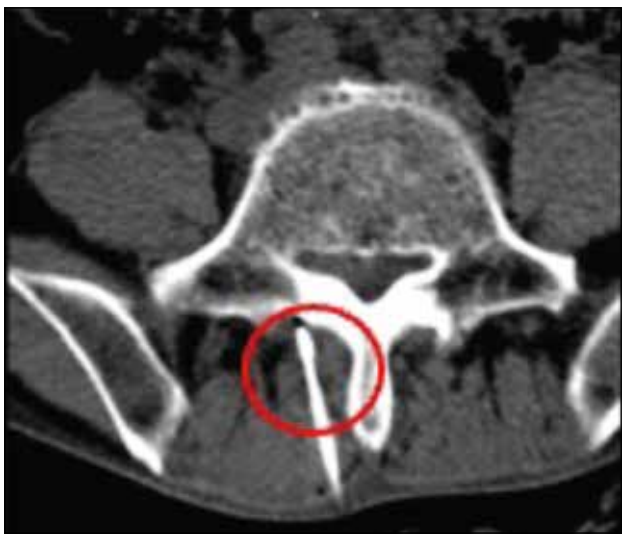

Figure 6. Computed tomography–guided biopsy of the enhancing soft tissue (circle) posterior lesion at the right L4/5 facet.

Tuberculosis causes the development of granulomatous inflammation that is characterised by the infiltration of lymphocytes and epithelioid cells. These cells may combine to form large Langhans-type giant cells and ultimately lead to caseating necrosis of the affected tissue, resulting in cold abscess formation.[1] Typical histopathological features of spinal tuberculosis include presence of tubercles, caseous necrosis, and tuberculous granuloma, while occasional atypical features may be encountered due to complex osteoclast development via dysregulation of cytokines and chemokines.[4,5] In our case, pathology revealed granuloma formation, one of the typical features, together with acid-fast bacilli highlighted by Ziehl-Neelsen stain, confirming the diagnosis of spinal tuberculosis.

Spinal tuberculosis most commonly manifests with vertebral body involvement (anterior element) and is seen in 90% to 95% of cases.[6] Posterior element involvement is relatively rare and occurs by spread of infection via the posterior vertebral venous plexus.[6] According to a study by Narlawar et al[7] of patients with spinal tuberculosis, only 3.06% (33/1076) showed isolated involvement of posterior elements in the absence of any associated involvement of anterior elements. Even more rare, only 1.3% (14/1076) showed isolated unilateral articular process involvement.[7]

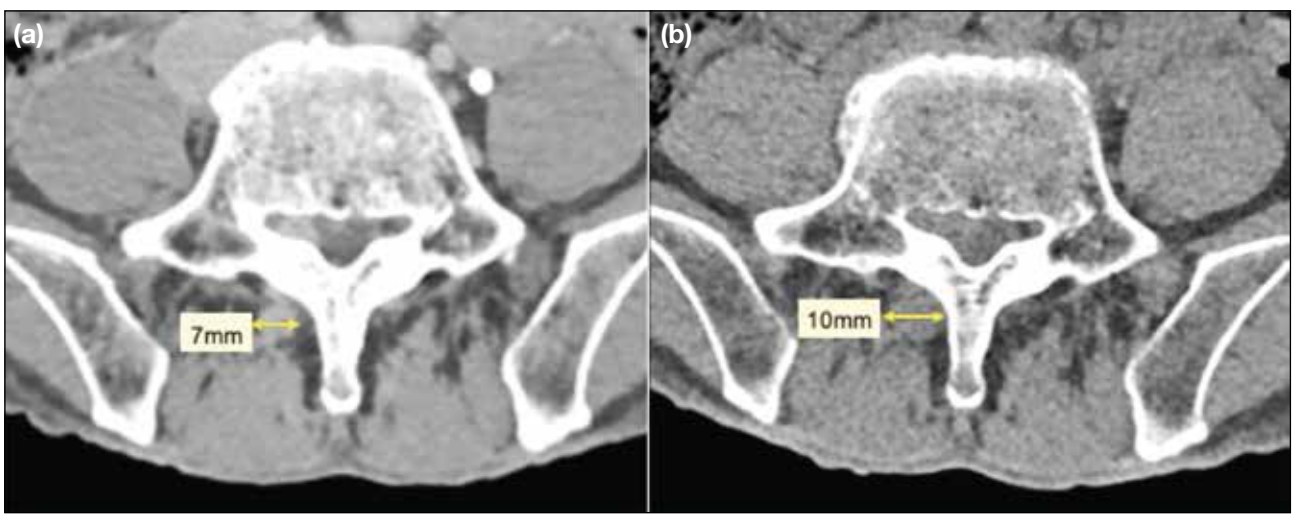

Figure 7. (a) Computed tomography (CT) of the lumbosacral spine of the patient after 2 months showing no further destruction or erosion of the right L4/5 facet joint and interval reduction in size of the granulomatous soft tissue nodule posterior to the facet, measuring 7 mm in transverse dimension, compared with 10 mm on CT 2 months previously (b) [double arrows].

Posterior spinal tuberculosis is usually associated with extradural granuloma and granulation tissue that form near the dural sac with intraspinal extension of tubercular granulation tissue or epidural abscess, causing spinal canal stenosis.[8] The diagnosis of posterior spinal tuberculosis can be challenging. The presenting symptoms include localised back pain, radiating pain or varying grades of paraplegia, along with other symptoms related to primary tuberculosis such as weight loss and chronic cough.[8] In our case, the patient presented with right sciatica that is rather non-specific and can mimic other musculoskeletal disorders (e.g., prolapsed intervertebral disc). Nonetheless the history of weight loss, chronic dry cough, and elevated inflammatory markers prompted further investigation.

Imaging studies including MRI and DECT revealed abnormal bone marrow oedema at the articular processes, focal bony erosion, rim-enhancing epidural tissue and a rim-enhancing nodular soft tissue lesion posterior to the right L4/5 facet. These findings supported a diagnosis of spinal tuberculosis,[9] later confirmed by histopathological examination of the biopsy specimen.

The differential diagnoses of isolated unilateral facet arthritis may include pyogenic arthritis, but no bacteria were detected in the culture of the facet biopsy. Gouty arthritis was also possible, but biopsy showed no gouty deposit and DECT detected no urate deposit.

The treatment of spinal tuberculosis depends on the severity of the disease and the presence of any neurological deficits or spinal instability. In general, antitubercular therapy is the mainstay of treatment. Surgery may be required in cases where there is neurological deficit, paravertebral abscess, spine instability or resistance to antitubercular medications.[10]

The American Thoracic Society, the Centers for Disease Control and Prevention, and the Infectious Diseases Society of America recommend antitubercular therapy for spinal tuberculosis comprised of an intensive phase of 2 months of isoniazid, rifampicin, pyrazinamide, and ethambutol, followed by a continuation phase for 7 to 10 months of isoniazid and rifampicin, with a total treatment duration of 9 to 12 months.[11] This is longer than the usual 6-month regimen for pulmonary tuberculosis. The decision to use longer treatment for spinal tuberculosis is because it is often associated with a higher risk of relapse and treatment failure compared with other forms of tuberculosis. The prolonged therapy is thought to reduce the risk of relapse and improve treatment outcomes.[12]

CONCLUSION

Isolated unilateral facet tuberculosis of the lumbar spine is a rare form of spinal tuberculosis that poses diagnostic challenges. Clinical and radiological features are atypical. Diagnosis is usually based on a combination of clinical, laboratory, and imaging findings, along with a high index of suspicion. A multidisciplinary approach involving orthopaedic surgeons, radiologists, and microbiologists is necessary for optimal management of spinal tuberculosis. Antitubercular therapy is the mainstay of treatment, with surgery reserved for cases with neurological deficits or spinal instability.

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