Case Report

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Pathology Section

Case of Isolated Sacral Tuberculosis Diagnosed by Histopathological Examination in a Patient with End-stage Renal Disease: A Pathologist's Perspective

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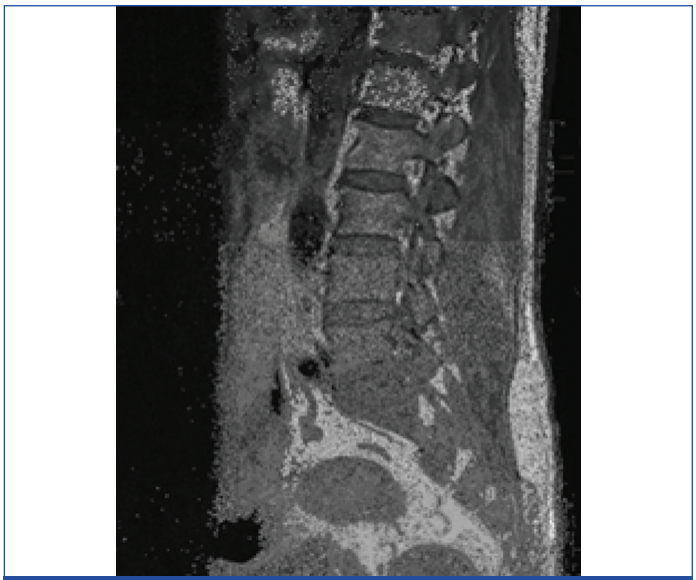
ABSTRACT

Isolated sacral Tuberculosis (TB) is an exceptionally rare presentation of osteoarticular TB, often overshadowed by more common spinal involvements and frequently misdiagnosed due to its non specific clinical and radiological features. The authors present a case of a 43-year-old male with End-Stage Renal Disease (ESRD) on maintenance haemodialysis, who developed progressive low back pain and sacral tenderness without systemic symptoms. MRI of the lumbosacral spine revealed lytic lesions in the sacral vertebrae with surrounding soft-tissue oedema, raising concerns for malignancy or fungal osteomyelitis. Laboratory investigations revealed elevated Erythrocyte Sedimentation Rate (ESR) and C-Reactive Protein (CRP) but were otherwise inconclusive. Due to the patient's immunocompromised status and atypical imaging findings, a Computed Tomography (CT)-guided sacral bone biopsy was performed. Histopathological examination demonstrated multiple well-formed epithelioid granulomas with central caseation necrosis and Langhans-type multinucleated giant cells, consistent with tuberculous granulomatous inflammation. Ziehl-Neelsen staining revealed Acid-Fast Bacilli (AFB), confirming the diagnosis. Fungal stains and immunohistochemistry for malignancy were negative. The present case highlights the diagnostic dilemma posed by isolated sacral lesions in immunosuppressed patients and underscores the critical role of histopathology in establishing a definitive diagnosis. To the authors knowledge, this is among the few reported cases of isolated sacral TB in a haemodialysis-dependent patient, emphasising its novelty. Early pathological diagnosis enabled timely initiation of anti-tubercular therapy, leading to significant clinical improvement. The present report aims to raise awareness among clinicians and pathologists about considering TB in the differential diagnosis of sacral lesions, especially in high-risk groups advocates for early tissue diagnosis to avoid delayed or inappropriate treatment.

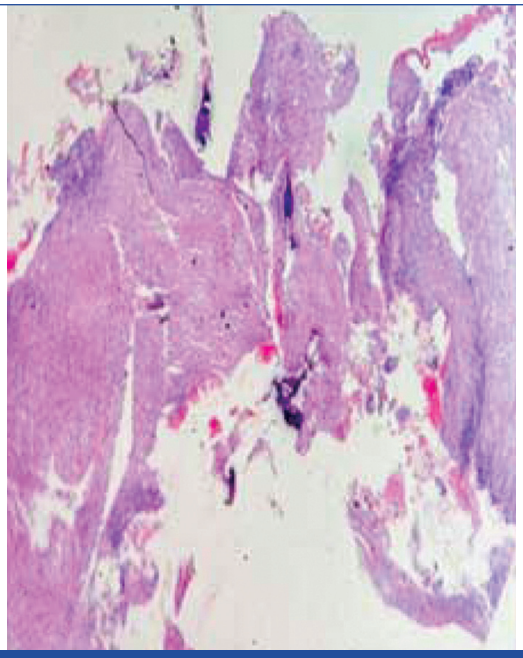
Keywords: Chronic kidney disease, Histopathology, Osteoarticular, tuberculosis

CASE REPORT

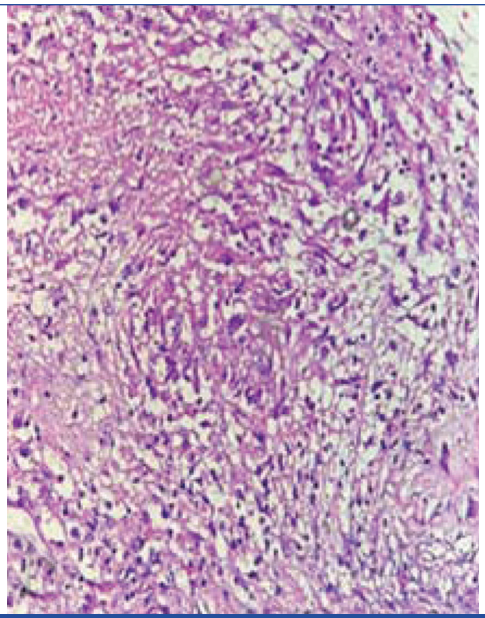
A 43-year-old male with ESRD on maintenance haemodialysis presented with progressively worsening low back pain of three months' duration. He had no history of fever, weight loss, trauma, or neurological deficits. There was no significant medical history. On physical examination, localised tenderness was noted over the lower back, especially in the sacral region. In view of his immunocompromised status, a provisional diagnosis of infective sacral osteomyelitis was made and differential diagnoses considered included tuberculous osteomyelitis, fungal osteomyelitis and metastatic malignancy. Laboratory investigations revealed normocytic anaemia (haemoglobin: 8.9 g/dL), elevated Erythrocyte Sedimentation Rate (ESR) 88 mm/hr and C-Reactive Protein (CRP) 64 mg/L. Renal function tests were consistent with his known chronic kidney disease, while serum calcium, phosphorus and alkaline phosphatase were within normal limits. Magnetic Resonance Imaging (MRI) of the lumbosacral spine [Table/Fig-1] demonstrated an ill-defined Short Tau Inversion Recovery (STIR) hyperintense signal involving the S1 vertebral body and the adjacent left sacral ala, indicative of marrow oedema. No evidence of sacroiliac joint erosion or paraspinal abscess was observed. A CT-guided biopsy of the sacral lesion was performed in view of probable infective aetiology. Microscopic examination of the decalcified, formalin-fixed, Haematoxylin and Eosin (H&E)-stained tissue sections revealed multiple well-formed epithelioid granulomas with Langhans-type multinucleated giant cells and peripheral lymphocytic cuffing. Prominent central caseous necrosis was seen [Table/Fig-2,3]. A final diagnosis of isolated sacral tuberculous osteomyelitis was established. The patient was initiated on Category I anti-tubercular therapy (isoniazid, rifampicin, pyrazinamide and ethambutol) with renal dose adjustments under the guidance of the nephrology team. At three-month follow-up, the patient showed marked clinical improvement, with reduction in pain and improved mobility. Inflammatory markers showed a declining trend and there was no radiological progression.



[Table/Fig-1]: Sagittal T2-weighted MRI demonstrates hyperintense signal changes involving the S1 vertebral body and adjacent left sacral ala, suggestive of bone marrow oedema. There is preservation of vertebral height and no obvious vertebral collapse or paraspinal abscess.
These findings are indicative of an infective aetiology



[Table/Fig-2]: Low-power view of the biopsy sample demonstrating widespread necrotising granulomatous inflammation involving trabecular bone (H&E, 100x).



[Table/Fig-3]: High-power view showing multiple well-formed epithelioid granulomas with central caseous necrosis and peripheral lymphocytic cuffing. Scattered Langhans-type multinucleated giant cells are evident (H&E, 400x).

DISCUSSION

The sacral tuberculosis (TB) is an exceptionally rare manifestation of skeletal TB, comprising a minute fraction of spinal TB cases. Its rarity, protean clinical manifestations and non specific imaging findings often result in diagnostic delay or misdiagnosis. Classical peripheral skeletal TB typically involves the spine, hips, or knees; sacral involvement, particularly when isolated, is far less common. Tuli SM first emphasised the challenges in diagnosing osteoarticular TB in immunocompromised hosts, noting that signs such as fever, weight loss and abscess formation may be blunted or absent, especially in those with impaired cellular immunity such as Human Immunodeficiency Virus (HIV) or chronic renal failure [1]. In our case, the patient was on haemodialysis for ESRD—a state associated with impaired granulomatous response and reduced immune surveillance.

Comparison with Published Cases [Table/Fig-4] [1-8]: In a landmark series, Patankar AP et al., analysed 15 cases of sacral TB, all of whom were immunocompetent and presented with back pain and radiological lytic lesions involving S1–S2 [2]. Surgery was needed in selected cases with neurological compromise. Vohra R et al. described two immunocompetent individuals with isolated S2 involvement, where the lesion mimicked a tumour and was managed conservatively [3]. Ontsi R et al. reported a case of sacral TB with imaging resembling neoplastic pathology; their literature review emphasised the diagnostic challenge and delay in such atypical locations [4]. Lazrak A et al. documented three patients with sacral TB—all presented with nonspecific symptoms like pain and soft-tissue swelling and were misinterpreted radiologically as tumours or metastases [5]. Similarly, Khalil M et al. and Hussain A et al. published single-patient reports where the sacral lytic lesions mimicked chordoma or metastasis and histopathology revealed granulomatous inflammation [6,7]. Notably, Ziehl–Neelsen staining for AFB was negative in most of these cases, making histopathology the cornerstone of diagnosis.

By contrast, the patient was elderly, dialysis-dependent and immunocompromised, lacking systemic symptoms like fever or weight loss. Imaging revealed a lytic lesion with ill-defined margins and marrow oedema without soft-tissue abscess—findings mimicking primary sacral tumours such as chordoma, lymphoma, or chronic fungal osteomyelitis. Summarised in [Table/Fig-4] [1-8].

Histopathology and Diagnostic Strategy

The hallmark of tubercular osteomyelitis remains the presence of epithelioid granulomas with central caseation necrosis and Langhans-type multinucleated giant cells. Our case demonstrated

S. No.	Author (Year)	Age/Sex	Immune status	Symptoms	Imaging	Histopathology	AFB	ATT Duration	Surgery
1.	Tuli SM (1982), [1]	(age/ sex not specified)	Immunocompetent	Pain, abscess	Lytic, abscess	Granulomas	Rare	9-18 months	In patients with deformity/abscess
2.	Patankar AP et al., (2001), [2]	15 pts	Immunocompetent	Pain ± neurodeficit	S1–S2 lysis	Granulomas	Not reported	9-12 months	Only in patients with neurodeficit/ abscess
3.	Vohra R et al., (2002), [3]	2 pts	Immunocompetent	Pain only	S2 lytic	Granulomas	Neg	12 months	No
4.	Ontsi R et al., (2015), [4]	40y/M	Immunocompetent	Back pain	Mimicked tumour	Granulomas	Neg	12 months	No
5.	Lazrak A et al., (2017), [5]	3 pts	Immunocompetent	Pain ± swelling	Lytic + ST extension	Granulomas	Neg	9-12 months	One
6.	Khalil M et al., (2020), [6]	35y/M	Immunocompetent	Pain, radiculopathy	Lytic, marrow oedema	Granulomas	Neg	9 months	No
7.	Hussain A et al., (2021), [7]	29y/F	Immunocompetent	Pain, thigh numbness	S2 lesion, mimic chordoma	Granulomas	Pos	12 months	No
8.	Present case (2025)	43 year	ESRD, dialysis	Local pain only	Lytic + STIR hyperintensity	Granulomas + caseation	Neg	9 months	No

[Table/Fig-4]: Comparison of present case with published cases in the literature [1-8].

these features along with AFB positivity, which helped exclude differentials such as sarcoidosis non caseating granulomas) or fungal osteomyelitis {Periodic Acid Schiff (PAS) and Grocott Methenamine Silver (GMS)}. Given the diagnostic ambiguity on imaging, early CT-guided biopsy was critical to confirm the pathology and initiate treatment without delay.

Treatment and Outcome

World Health Organisation (WHO) guidelines for drug-susceptible TB recommend at least six months of treatment for most extrapulmonary TB, with prolonged therapy (9-12 months) for osteoarticular TB based on clinical and radiological response, particularly in immunocompromised individuals [8]. The present patient received renal-dose-adjusted first-line therapy for nine months, with good symptomatic improvement and no evidence of relapse or instability. Surgery was avoided as there were no indications such as neurological compromise or deformity.

CONCLUSION(S)

The present case reinforces the importance of a thorough histopathological work-up in evaluating lytic sacral lesions, especially when clinical and radiological features are non specific. Recognition of classical tuberculous granulomas with caseation and confirmation by acid-fast staining are key to diagnosis. In resource-limited and high-burden settings, the pathologist's acumen in diagnosing sacral TB plays a critical role in initiating timely treatment and improving patient outcomes.

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