

Simultaneous presentation of membranoproliferative glomerulonephritis and tuberculous spondylitis: a case report

Senanayake HP¹, De Silva ST²

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Abstract

Genitourinary tuberculosis is not uncommon. Skeletal tuberculosis with tuberculous spondylitis is also a well-known entity. However, spinal tuberculosis presenting with nephrotic syndrome due to glomerular involvement is rare. We report a patient with tuberculous spondylitis and membranoproliferative glomerulonephritis. A 40-year-old man presented with bilateral lower limb swelling of two weeks duration, a non-inflammatory type of back pain of one year duration, and constitutional symptoms. He had nephrotic range proteinuria and hypoalbuminemia, with normal renal function and normal size kidneys on ultrasound scanning. MRI spine revealed tuberculous spondylitis involving T12 and L1 vertebrae with associated para-spinal and psoas abscess formation. Renal biopsy revealed membranoproliferative glomerulonephritis. Aspirate from psoas abscesses was positive for *Mycobacterium tuberculosis*. The patient was treated with anti-tuberculous therapy and required spinal fixation. With treatment both proteinuria and other symptoms improved.

Key words: tuberculous spondylitis, nephrotic syndrome, renal tuberculosis, membranoproliferative glomerulonephritis

Introduction

Tuberculosis (TB) remains a leading cause of death due to infectious diseases globally, particularly when undiagnosed and untreated.¹ *Mycobacterium tuberculosis*, a slow-growing aerobic bacillus, can affect

bones, the central nervous system, lymph nodes, and almost any other organ, although it primarily causes pulmonary TB.^{2,3}

Skeletal TB accounts for 10% of extrapulmonary tuberculosis. The spine is the most common site of skeletal TB, a destructive form of tuberculosis.^{3,4} Pott disease or tuberculous spondylitis is more common in the lower thoracic and upper lumbar spine, causing spinal deformity, instability, and neurological deficit which may lead to paraplegia due to spinal cord compression.³ Urogenital tuberculosis accounts for 27% of extrapulmonary TB and occurs mainly in the urinary collecting system. Renal parenchymal involvement occurs less commonly and can lead to interstitial nephritis and glomerulonephritis.⁵ Renal TB and proteinuria usually respond to anti-tuberculous treatments. Spinal TB also responds to treatment. However, when advanced neurological deficits are present or when neurological deficits occur while on treatment, surgery is warranted.^{3,4,6}

World literature reports only a few cases of renal TB associated with Pott disease.⁵ In a Sri Lankan man, we report a case of tuberculous spondylitis with membranoproliferative glomerulonephritis.

Case report

A 40-year-old man presented with bilateral lower limb swelling of two weeks' duration. Initially, he had developed periorbital oedema with genital swelling which resolved over time. He then gradually developed lower limb oedema. He had cloudy urine but no haematuria, oliguria, or dysuria. There were no features of heart failure, chronic kidney disease, or cirrhosis.

¹University Medical Unit, Colombo North Teaching Hospital, ²Department of Medicine, Faculty of Medicine, Ragama, Sri Lanka.

Correspondence: HPS, e-mail: hasinipisenanayake@gmail.com

 <https://orcid.org/0009-0004-9251-6959>

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He had a background history of non-inflammatory type lower back pain without other joint involvement or neurological manifestations. There was an associated significant loss of appetite and weight loss, without fever, chronic cough, or contact or history of TB. He did not suffer from diabetes or other non-communicable diseases.

On examination, he was afebrile, not pale, or icteric, and had no lymphadenopathy. There was bilateral pitting ankle edema, a pulse rate of 80 bpm, and blood pressure of 120/80 mmHg. There was a left-sided moderate pleural effusion. Cardiovascular, abdominal, neurological, and musculoskeletal examinations were unremarkable.

Laboratory investigations revealed neutrophil leukocytosis without anaemia or thrombocytopenia. CRP was 43mg/dL and ESR was 117mm/first hour. The blood picture showed marked rouleaux formation. Renal function remained normal throughout. Liver biochemistry showed hypoalbuminemia of 1.8g/dL with

a total protein of 5.7g/dL. Urinalysis revealed albumin of 3+, white cells 1/high power field, and red cells 3/high power field. The urine protein to creatinine ratio was 7.32 mg/mg, indicating nephrotic range proteinuria. There were no dysmorphic red cells in the urine. An ultrasound scan of the abdomen showed acute parenchymal changes in both kidneys with renal size of 12.8cm each. Chest radiography revealed a left-sided encysted pleural effusion (Figure 1B) which was confirmed ultrasonically. Pleural fluid aspirate was negative for acid-fast bacilli (AFB) and TB PCR. The Mantoux test was positive with 18mm induration. X-ray of thoraco-lumbar spine showed destructive lesions with the collapse of T12 and L1 vertebrae (Figure 1A).

MRI scan of thoraco-lumbar spine showed TB spondylitis involving T12 and L1 vertebral levels with associated para-spinal and psoas abscess formation and spinal canal narrowing (Figure 2). Psoas abscess aspirate fluid revealed a field full of organisms and *Mycobacterium tuberculosis* was detected on TB PCR.



Figure 1. 1A and 1B – X-ray lumbosacral spine with collapsed T12 and L1 vertebrae and chest X-ray with left side encysted pleural effusion.

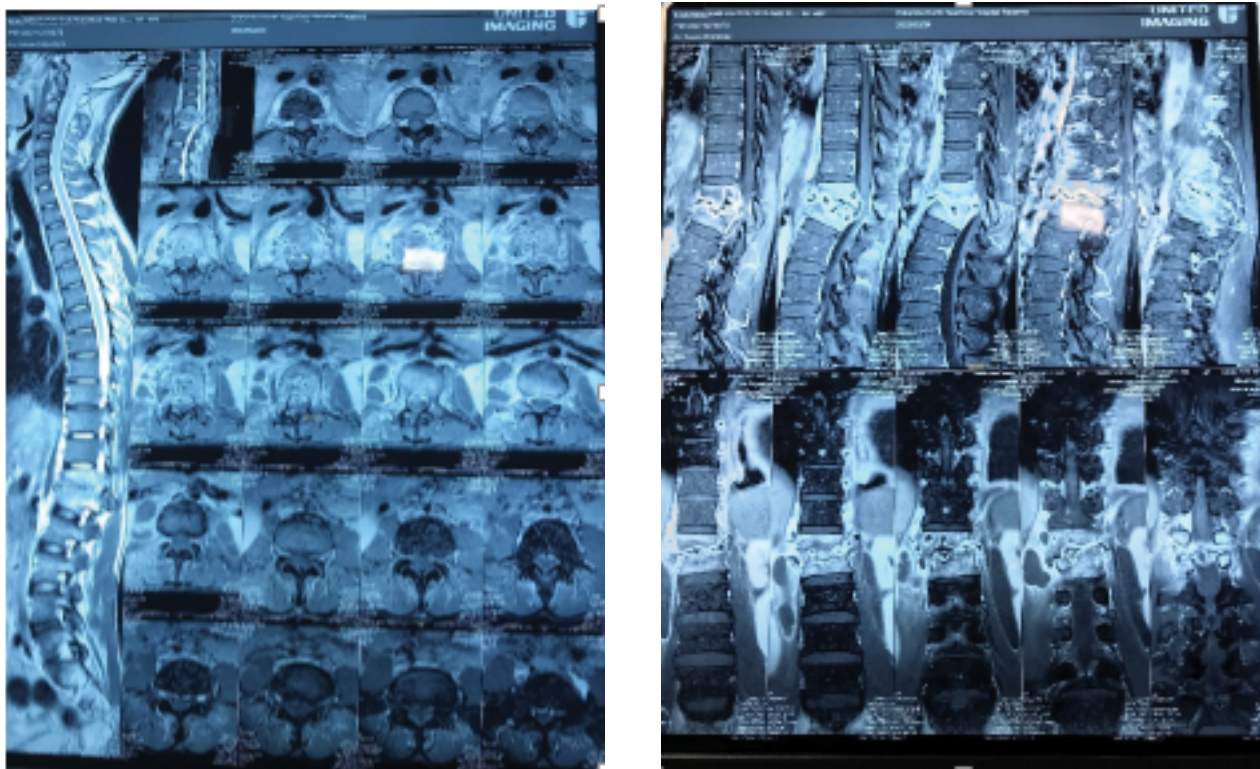


Figure 2. MRI spine showing TB spondylitis at T12 and L1 vertebral level with para-spinal and psoas abscess formation.

ANA and ANCA were negative. Retroviral studies, hepatitis B surface antigen and hepatitis C antibody studies were nonreactive. Urine for Bence Jones protein was negative and serum protein electrophoresis pointed to a chronic inflammatory process. Echocardiogram was normal. Renal biopsy showed basement membrane thickening with focal endocapillary hypercellularity. Some glomeruli showed fibrous crescents. Mild tubular atrophy and interstitial fibrosis was also noted, but there was no evidence of vasculitis. On immunofluorescence, glomeruli stained positive for deposition of IgM and C3. The biopsy report was suggestive of membranoproliferative glomerulonephritis (MPGN).

In this patient, tuberculous spondylitis and membranoproliferative glomerulonephritis were diagnosed simultaneously. The patient was commenced on anti-tuberculous therapy (ATT) of isoniazid, pyrazinamide, rifampicin, and ethambutol together with prednisolone. Despite treatment for one month, he continued to complain of severe back pain with numbness in the right lower limb. The symptoms did not respond to multiple analgesics. He then underwent fixation of the thoracolumbar spine, which improved the pain considerably. With continued anti-tuberculous treatment, proteinuria gradually settled with improved

oedema, reduced albumin on urinalysis, and normalized urine protein to creatinine ratio.

Discussion

Sir Percival Pott first described TB spondylitis in a patient with paraplegia and kyphosis.³ Primary pulmonary TB is initiated by the deposition of *Mycobacterium tuberculosis* containing aerosol in the lung alveolar surfaces. Bacilli tend to remain dormant and multiply whenever conditions become favorable.² Spinal infection is always secondary and due to haematogenous dissemination.³ Infection of the spine causes destruction of intervertebral disc space and adjacent vertebral bodies. The formation of a cold abscess around the lesion is also characteristic. Thoracic vertebrae are frequently affected.⁴ Neurological complications can occur during the active stage due to compression by abscess, inflammatory tissue, or sequestrum and, in later stages, due to mechanical stretch of the cord over an internal gibbus.³

Reports of glomerular lesions of the kidney associated with TB are rare.⁷ Renal TB can occur via direct invasion by bacilli, chronic interstitial nephritis, and renal amyloidosis. Histopathological changes may be consistent with IgA nephropathy, collapsing

glomerulopathy, mesangioproliferative (MPGN), mesangiocapillary, and membranous glomerulonephritis.⁶ MPGN may be immunoglobulin-mediated (with immunoglobulin and complement deposition) or complement-mediated (with only complement deposition). Our patient had both IgG and C3 deposition suggesting an immunoglobulin-mediated origin. Infection is the most common association with MPGN. Antibody-mediated immunity in *Mycobacterium tuberculosis* infection has been demonstrated in pathogenesis. The formation of antigen-antibody complexes and stimulation of the classical complement pathway is a possible mechanism that leads to MPGN.⁷ MPGN may result from multiple other causes and may also be idiopathic.⁸ Determining the exact cause of MPGN was challenging in our patient, since it was not practically possible to rule out all possible causes. However, the concurrent occurrence of TB of the spine with MPGN and improvement of both spinal and renal manifestations with anti-tuberculous therapy made TB the most likely cause of the renal pathology.⁹

The risk of developing extrapulmonary TB is high in patients with reduced immunity associated with HIV, diabetes, smoking, alcohol, and malignancy.¹⁰ However, our patient had none of these risk factors. Screening tests for autoimmune disorders and other infections were negative, excluding most other common causes of MPGN. MRI imaging and psoas abscess aspirate fluid microscopy confirmed the diagnosis of

TB spondylitis with a rifampicin-sensitive organism. Histology of renal TB typically reveals tubercle granuloma but this was not seen in our patient.¹¹ The pleural effusion of this patient was negative for AFB and TB PCR. Pleural effusions which are negative for AFB, RT-PCR, and TB culture have been reported in the literature. Diagnosis can then be attempted by analysis of bronchoalveolar lavage, fourth sample assay for sputum AFB or a repeat sampling of the pleural effusion for AFB and RT-PCR. A lung biopsy may also be done for histological confirmation and evidence of radiological improvement with anti-TB therapy.¹²

The patient's nephrotic syndrome responded well to anti-tuberculous treatment. Some patients can have persistent proteinuria despite anti-tuberculous treatment.¹³ Resolution of proteinuria with anti-tuberculous treatment without further impairment in renal function suggests that MPGN was most likely to be due to renal TB, although coincidental primary glomerulonephritis cannot be completely ruled out. However, treatment responsiveness strongly suggests the causal relationship of TB.⁹

There are several cases of MPGN associated with TB reported in the literature. These are summarized in Table 1. In these case reports most patients presented with fever and had nephrotic range proteinuria. Only a few had elevated serum creatinine on presentation.

Table 1. Case reports of MPGN associated with tuberculosis

Reference	Age (years) /Gender	Clinical features	Serum creatinine $\mu\text{mol/L}$	Proteinuria g/dL	Tuberculous lesion	Treatment	Response
1.(14)	45/Male	Fever, weight loss	256.6	1.3	Miliary tuberculosis	ATT and CS	Responded
2.(9)	48/ Male	Hematuria, oedema	114.9	8	Positive sputum AFB	ATT	Responded
3.(15)	63/ Male	Nephrotic syndrome	-	3.9	Right upper lobe cavity	ATT	Responded
4.(6)	31/ Female	Fever, fatigue, uraemia	503.9	9.8	Positive sputum AFB	ATT and corticosteroids	Responded

ATT – anti-tuberculous therapy, AFB – acid fast bacilli, NSAIDs – non-steroidal anti-inflammatory drugs, ESRD – end stage renal disease

Conclusion

TB has heterogeneous presentations. We report a rare case of MPGN associated with tuberculous spondylitis. Delayed diagnosis of TB leads to worse outcomes, sometimes requiring invasive procedures. Clinicians should have a high degree of clinical suspicion as early diagnosis and treatment results in better prognosis.

Author declarations

Consent

Consent for publication was obtained from the patient.

Competing interests

The authors have no conflicts of interest.

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None.

Author contributions

PHPS and ST DeS contributed equally to managing the patient and writing the case report. Both authors reviewed medical records, collected data, and collaborated in writing editing, and revising the manuscript.

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