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Case Report

An Unexpected Twist: Paradoxical Pleural Effusion during Pott's Spine Management

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Abstract

Paradoxical pleural effusion refers to the appearance or worsening of a pleural effusion during anti-tubercular therapy (ATT), despite initial clinical or radiological improvement. It can manifest as a new or enlarging effusion, often contralateral to the primary disease focus. Paradoxical reactions are well-recognized complications of ATT, most commonly described in lymph node and central nervous system tuberculosis. Paradoxical pleural effusion, particularly in extrapulmonary TB such as spinal disease, is rare and under-reported. We describe the case of a 34-year-old female with thoracic spinal tuberculosis who developed a right-sided pleural effusion three weeks after initiation of ATT, despite a normal baseline chest X-ray. The case emphasizes the importance of recognizing this immune-mediated phenomenon to avoid unnecessary changes in therapy or invasive diagnostic procedures.

Keywords: Pott spine, Paradoxical response, Anti-tuberculosis therapy.

Introduction

Paradoxical reactions refer to a temporary clinical or radiological deterioration in tuberculosis (TB) patients after starting treatment, characterized by the emergence of new clinical signs, symptoms, or radiological abnormalities, or the progression of pre-existing lesions. This occurs despite appropriate anti-tuberculosis therapy (ATT) and is not due to treatment failure or another underlying condition.[1] This reaction is a form of paradoxical reaction and is particularly observed in extrapulmonary tuberculosis (EPTB). Paradoxical responses have traditionally been reported in individuals with lymph node TB and intracranial tuberculomas, but they can also happen in pulmonary tuberculosis and other extrapulmonary sites.[2] There have been reports of symptoms including choroidal or cerebral tubercles, freshly developing or gradually growing lymph nodes, persistent fever, and even acute respiratory distress syndrome, which is assumed to have an immunological foundation.[3] The paradoxical response usually appears three to twelve weeks after ATT is started; however, it may be observed even later, i.e., after 4 months of successful chemotherapy for abdominal TB[4] and as late as 6 to 7 months in intracranial tuberculomas.[5] Development of pleural effusion during successful AT'T seems to be just another paradoxical reaction, which is mediated by various cytokines

Case Presentation

A 34-year-old female presented with lower back pain of three months' duration. The dull aching pain started slowly and got worse over time, eventually interfering with daily household activities. This was associated with poor response to non-steroidal anti-inflammatory drugs and other analgesics.

An X-ray of the spine followed by an MRI of the spine was done in this patient. MRI spine revealed abnormal signal intensity areas in D8 and D9 vertebral bodies and the intervening disc with partial wedge collapse, suggestive of Pott's spine (Figure 1). A Mantoux test was also done, which was strongly positive.

The patient was started on ATT. A baseline chest X-ray at the time of treatment initiation showed no significant pathological lesion with clear costophrenic angles (Figure 2).

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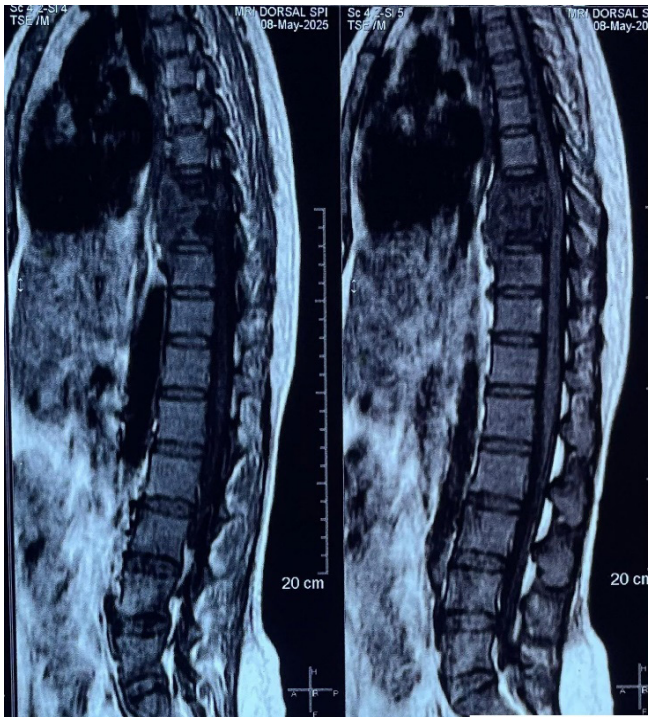

Figure :1 MRI of the dorsal spine revealing an abnormal signal intensity area seen at D8 and D9 vertebrae with adjacent intervertebral disc causing partial wedge collapse with soft tissue component in the pre- and paravertebral region and a small component in the epidural region

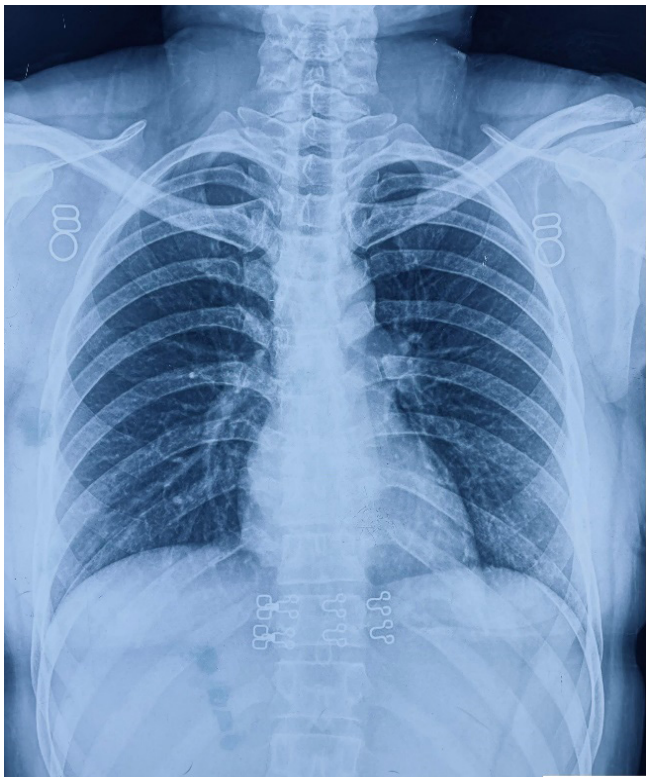

Figure 2: Chest radiograph posteroanterior view at the time of initiating anti-tubercular therapy with no significant pathological lesion and clear costophrenic angles.

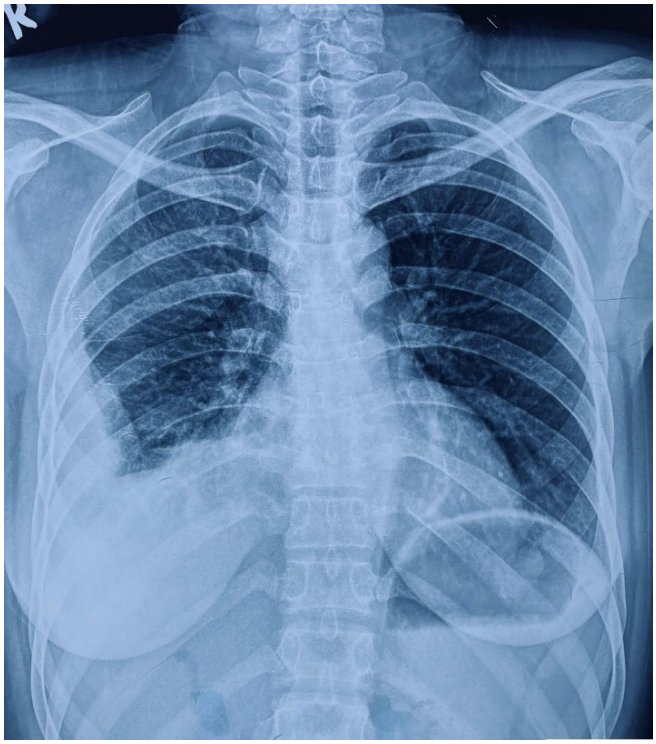

Figure 3: Chest radiograph posteroanterior view after 3 weeks of initiating anti-tuberculosis therapy showing right-sided pleural effusion

However, after 3 weeks of ATT, the patient presented with new-onset breathing difficulties and right-sided chest pain; a follow-up chest X-ray revealed a right-sided pleural effusion and an ultrasound of the chest revealed fluid in the pleural space suggestive of loculated pleural effusion (Figure 3).

A diagnostic pleurocentesis was performed, which revealed an exudative effusion with predominant lymphocytes inflammatory cytology. ADA levels were elevated, while both AFB smear and CBNAAT were negative. The patient was continued on the same ATT and reassured.

Two serial chest radiographs, taken at 1 and 2 months, demonstrated a progressive reduction in the pleural effusion, with near-complete clearing on the most recent X-ray (Figure 4a and b). The patient subsequently took 12 months of ATT with recovery from back pain without further recurrence of pleural effusion.

Discussion

Paradoxical pleural effusion describes the progression or new development of pleural fluid accumulation in patients receiving effective anti-tuberculosis therapy (ATT). This reaction, also known as a paradoxical response, is generally attributed to immune reconstitution rather than failure of treatment. Common manifestations include high-grade fevers, lymph node enlargement (which may be severe), deterioration of chest radiographic findings, such as pre-existing tuberculous lesions, especially those affecting the skin and peritoneum, may deteriorate simultaneously with the development of pleural effusions or miliary infiltrates.[6]

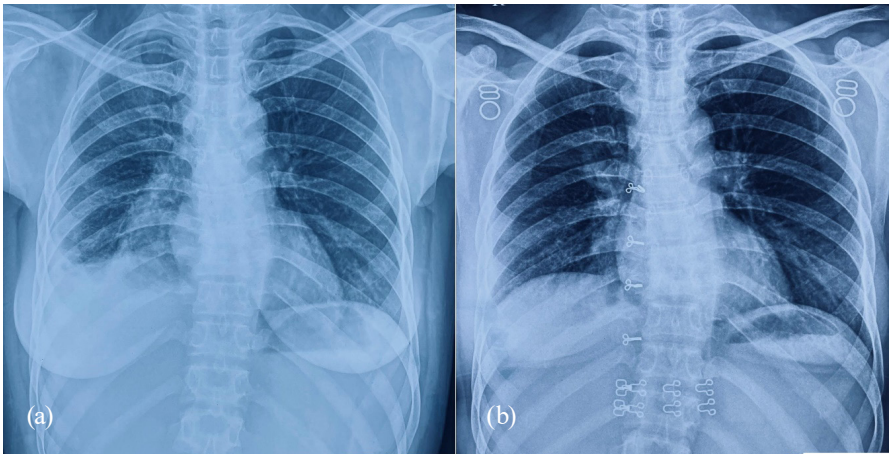

Figure 4: (4a) Chest radiograph posteroanterior view after one month demonstrating interval reduction in pleural effusion, (4b) chest radiograph posteroanterior view after 2 months demonstrating complete resolution in pleural effusion

The clinical presentation often reflects the initial site of *Mycobacterium tuberculosis* infection; however, paradoxical reactions may also involve previously unaffected sites. In extrapulmonary tuberculosis, this may present as there have been reports of worsening lymphadenitis (with imaging showing fresh nodal necrosis), progression or contralateral development of pleural effusion, and expansion of intracranial tuberculomas that cause new or worsening headaches. Although lymph nodes, skin, soft tissues, bones, tendons, and the abdomen may also be impacted, the respiratory and central neurological systems are most frequently afflicted. Drug resistance, adverse drug reactions, subsequent infections, and noncompliance with treatment are examples of differential diagnosis. Given that paradoxical responses are diagnoses of exclusion, investigations should aim to rule out these conditions; microbiological studies such as gram stain, acid-fast staining, and bacterial or mycobacterial cultures from affected sites are typically negative. Alternative diagnoses must be excluded before labeling a case as paradoxical.

For most mild paradoxical reactions, no specific extra treatment is typically needed. A brief course of oral corticosteroids with slow weaning may be employed in some circumstances.[7] Significant clinical deterioration, such as deep-seated abscess formation, huge pleural effusions, and obstructive hydrocephalus from growing tuberculomas, has been documented; it is rare. Systemic corticosteroids and, if necessary, surgical drainage may be necessary for treatment in these situations. In general, conservative treatment or a mix of medical and surgical methods results in the majority of patients recovering without problems, with residual neurological deficits occurring only in a small number of cases involving the central nervous system[8].

In our patient new right-sided pleural effusion developed after three weeks of anti-tuberculosis therapy for Pott's spine. After ruling out all other causes like drug resistance, poor compliance, and treatment failure, the patient was continued on the same initial therapeutic regimen along with reassurance, and responded clinico-radiologically on the same chemotherapy regimen. The pleural effusion also resolved completely with the same therapy.

Clinicians should remain alert to this possibility, and patients suspected of experiencing a paradoxical reaction should undergo thorough evaluation to exclude alternative causes of their clinical presentation, such as treatment failure, before attributing their symptoms and signs to a paradoxical response.[9]

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