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# Multidrug-Resistant Tuberculosis Of The Knee Joint With Concomitant Pneumococcal Pneumonia In An Obese Female: A Rare And Complex Clinical Presentation

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**Abstract**

Tuberculosis (TB) is a common infection in India and presents as Pulmonary, Extra -Pulmonary , or combined forms. Osteo articular tuberculosis is a recognised form of extra pulmonary tuberculosis and can co-exist with TB elsewhere in the body. However, Multi drug- resistant tuberculosis (MDR-TB) involving bones and peripheral joints is rarely reported. The coexistence of MDR osteoarticular TB with pneumonia of sub-acute onset further complicates diagnosis and management, particularly in patients with other comorbidities or risk factors with diminished immunity and increased susceptibility to infections. We report a case of MDR tuberculosis of the knee joint in an obese female, presenting as chronic mono arthritis and complicated by concurrent pneumococcal pneumonia(1). This case highlights diagnostic challenges, increased turn-about time, the role of molecular diagnostics, clinical implications and therapeutic considerations in managing dual infections in the setting of obesity.

**Keywords**: NIL

## Introduction

Tuberculosis remains a major public health challenge in developing countries despite advances in diagnosis and treatment. Extra-pulmonary TB accounts for approximately 15–20 per cent of all TB cases, with osteo-articular TB constituting 1–3 per cent. Among peripheral joints, the knee is one of the most frequently involved sites after the spine and hip. Osteo-articular TB typically follows a chronic, indolent course and often presents as monoarthritis, leading to diagnostic delay.

The emergence of multi drug- resistant TB (MDR-TB), defined as resistance to at least isoniazid and rifampicin, with or without resistance to other anti-TB drugs, further complicates disease course, management and prognosis. While pulmonary MDR-TB is well documented, extra pulmonary MDR-TB, particularly involving peripheral joints, remains relatively scarce. Sampling issues, paucibacillary load, , reduced sensitivity of conventional tests and delayed microbiological confirmation contribute to under diagnosis.

Obesity is increasingly recognised as an important modifier of immune function and infection risk. Although traditionally thought to be protective against TB, obesity is associated with chronic low-grade inflammation, impaired cellular immunity, and increased susceptibility to acute bacterial infections such as pneumococcal pneumonia(2). The coexistence of chronic MDR-TB and acute bacterial pneumonia presents unique diagnostic and therapeutic challenges and is rarely described in the literature.

## Case Report

A 25 year-old obese female with body mass index 34.5 kg/m² presented with pain and swelling of the right knee for 5 months. The symptoms were insidious in onset and progressively worsened, leading to difficulty in walking and limitation of daily activities. She reported intermittent low-grade fever, loss of appetite, and unintentional weight loss. There was no history of trauma, intra-articular injections, diabetes mellitus, or previous anti-tubercular treatment.

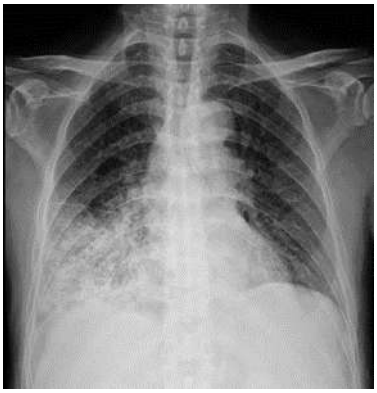
On examination, the patient was afebrile and hemodynamically stable. The right knee was diffusely swollen with mild warmth and tenderness. Active and passive movements were significantly restricted, and quadriceps muscle wasting was noted. No sinus tract or bony deformity was present. Examination of other joints revealed no abnormality.

The patient was admitted for further evaluation. She developed acute onset high- grade fever, productive cough, pleuritic chest pain, and breathlessness over three days. Respiratory examination revealed tachypnea, bronchial breath sounds, and coarse crepitations over the right lower lung field.

Chest radiograph revealed a non homogenous patchy opacity in the right lower zone suggestive of pneumonia.

Laboratory investigations showed elevated erythrocyte sedimentation rate and C-reactive protein. During the acute respiratory illness, leukocytosis with neutrophilic predominance was noted. Chest radiograph demonstrated right lower zone consolidation. Sputum Gram stain revealed Gram-positive diplococci, and sputum culture grew Streptococcus pneumoniae, sensitive to beta-lactam antibiotics, confirming pneumococcal pneumonia. Sputum for Ziehl-Neelsen stain, and Cartridge-based nucleic acid amplification test (CBNAAT) was negative .

Plain radiograph of the right right knee revealed periarticular osteopenia and joint space narrowing. Magnetic resonance imaging showed synovial hypertrophy, joint effusion, and bone marrow edema involving the distal femur and proximal tibia, consistent with infective arthritis. Arthroscopy of the right knee joint was performed under asepsis and local anaesthesia. Synovial fluid analysis revealed a lymphocyte-predominant exudate with CBNAAT detecting Mycobacterium tuberculosis with rifampicin resistance. Synovial fluid first line Line probe assay (FLLPA) confirmed resistance to isoniazid and rifampicin, establishing the diagnosis of MDR tuberculosis of the knee joint. Patient was notified to the NTEP ( National Tuberculosis Elimination program) and enrolled on an appropriate individualised DR-TB regimen consisting Bedaquilline, Levofloxacin, Linezolid, Clofazimine, Cycloserine (weight adjusted).





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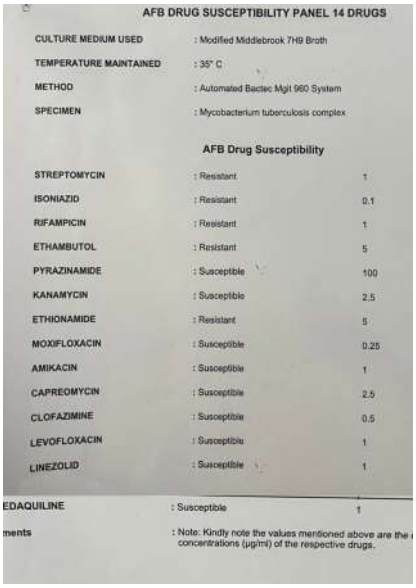
**Xray of Right knee joint**

**14 Drug Susceptibility report is below-**



AFB DRUG SUSCEPTIBILITY PANEL 14 DRUGS

| | | |
|---|---|---|
| CULTURE MEDIUM USED | : Modified Middlebrook 7H9 Broth | |
| TEMPERATURE MAINTAINED | : 35° C | |
| METHOD | : Automated Bactec Mgit 960 System | |
| SPECIMEN | : Mycobacterium tuberculosis complex | |
| | **AFB Drug Susceptibility** | |
| STREPTOMYCIN | : Resistant | 1 |
| ISONIAZID | : Resistant | 0.1 |
| RIFAMPICIN | : Resistant | 1 |
| ETHAMBUTOL | : Resistant | 5 |
| PYRAZINAMIDE | : Susceptible | 100 |
| KANAMYCIN | : Susceptible | 2.5 |
| ETHIONAMIDE | : Resistant | 5 |
| MOXIFLOXACIN | : Susceptible | 0.25 |
| AMIKACIN | : Susceptible | 1 |
| CAPREOMYCIN | : Susceptible | 2.5 |
| CLOFAZIMINE | : Susceptible | 0.5 |
| LEVOFLOXACIN | : Susceptible | 1 |
| LINEZOLID | : Susceptible | 1 |
| EDAQUILINE | : Susceptible | 1 |
| ments | : Note: Kindly note the values mentioned above are the concentrations (µg/ml) of the respective drugs. | |

## Management and Outcome

The patient was initially managed with intravenous antibiotics for pneumococcal pneumonia, resulting in rapid clinical improvement and resolution of respiratory symptoms. After clinical improvement and 14-drug anti-TB DST report , she was initiated on a World Health Organization–recommended all-oral longer MDR-TB regimen comprising bedaquiline, a fluoroquinolone, linezolid, clofazimine, and cycloserine(3) from the NTEP.

Given the patient's obesity, careful dosing and close monitoring for drug-related adverse effects were undertaken, particularly for QT prolongation, myelosuppression, and peripheral neuropathy. The knee joint was immobilized during the acute phase, followed by gradual mobilization and supervised physiotherapy(4).Nutritional counseling and weight-management advice were provided.

Over follow-up, the patient demonstrated progressive improvement in knee pain and swelling, with gradual



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restoration of joint mobility. Inflammatory markers declined steadily, and no major adverse drug reactions were observed.

## Discussion

Osteoarticular TB results from hematogenous dissemination of M. tuberculosis, with the synovium being the initial site of infection due to its rich vascular supply. The disease progresses slowly, leading to delayed presentation and misdiagnosis as inflammatory or degenerative arthritis(5). MDR involvement of peripheral joints is rare but may be increasingly detected with the widespread use of molecular diagnostics.

The coexistence of pneumococcal pneumonia in this patient highlights the vulnerability to acute bacterial infections in individuals with chronic TB and obesity. Obesity is associated with impaired macrophage and T-cell function, altered cytokine responses, and reduced vaccine efficacy, all of which may predispose to severe bacterial infections(6). Acute pneumonia may mask underlying chronic conditions and divert clinical attention from extrapulmonary TB.

Molecular diagnostic tools such as CBNAAT and line probe assays are invaluable in extrapulmonary TB, where smear microscopy has poor sensitivity. Early identification of drug resistance allows timely initiation of effective therapy, which is critical in preventing joint destruction.

Arthroscopy plays an important role in the diagnosis of tuberculosis of the knee joint, especially in patients presenting with chronic monoarthritis and inconclusive clinical or radiological findings. Tubercular arthritis is often paucibacillary and mimics inflammatory or degenerative joint disorders, leading to diagnostic delay. Arthroscopy allows direct visualization of the synovium, cartilage, and intra-articular structures, revealing characteristic findings such as synovial hypertrophy, pale granulation tissue, caseous material, and loose bodies(7).

More importantly, arthroscopy facilitates targeted synovial biopsy from suspicious areas under direct vision, significantly improving diagnostic yield compared to blind needle biopsy. Tissue samples obtained can be subjected to histopathological examination, mycobacterial culture, and molecular tests such as CBNAAT and line probe assay, enabling early confirmation of tuberculosis and detection of drug resistance. Arthroscopy is minimally invasive, associated with low morbidity, and allows simultaneous therapeutic procedures such as synovectomy and lavage(8). Early arthroscopic diagnosis enables timely initiation of appropriate anti-tubercular therapy, helping to prevent joint destruction, deformity, and long-term functional disability.

Management of osteoarticular MDR-TB requires prolonged therapy due to poor drug penetration into bone and synovium. Surgery is reserved for selected cases with abscess formation, severe deformity, or failure of medical therapy. Early diagnosis and multidisciplinary management can result in favorable functional outcomes.

## Conclusion

This case of multidrug-resistant tuberculosis involving a single knee joint with concomitant pneumonia in an obese female underscores several important clinical, diagnostic, and therapeutic challenges relevant to contemporary tuberculosis care. Osteoarticular tuberculosis itself accounts for a small proportion of extrapulmonary TB, and knee joint involvement with documented multidrug resistance is particularly uncommon. The simultaneous presence of pulmonary infection further complicates the clinical picture, often leading to diagnostic delay, misattribution of symptoms to more common bacterial infections or degenerative joint disease, and postponement of definitive therapy.

The case highlights the protean manifestations of tuberculosis and reinforces the need for a high index of suspicion in patients presenting with chronic monoarthritis, constitutional symptoms, and radiological evidence of pulmonary disease, especially in TB-endemic region(9). Obesity, as a comorbid condition, may further obscure clinical findings by masking systemic symptoms, altering pharmacokinetics of anti-tubercular drugs, and contributing to a pro-inflammatory yet functionally impaired immune response. These factors may predispose to severe disease, delayed sputum or tissue conversion, and increased risk of adverse drug reactions.

From a diagnostic standpoint, this report emphasizes the critical role of microbiological confirmation and early drug-susceptibility testing from both pulmonary



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and extrapulmonary sites. Reliance solely on clinical or radiological features can lead to inappropriate first-line therapy, fostering disease progression and further resistance. The use of molecular diagnostic techniques, culture-based methods, and histopathology is essential for establishing the diagnosis and guiding individualized treatment regimens. In cases of osteoarticular MDR-TB, synovial fluid or tissue analysis remains pivotal for definitive diagnosis.

Therapeutically, the management of MDR knee joint tuberculosis with pneumonia requires a comprehensive, multidisciplinary approach. Individualized, all-oral longer MDR-TB regimens, as recommended by current guidelines, combined with careful monitoring for drug toxicity, adherence, and nutritional status, are crucial for successful outcomes. Obesity poses additional challenges in dosing, drug distribution, and metabolic complications, necessitating close clinical and biochemical surveillance(10). Adjunctive orthopedic interventions, including immobilization, physiotherapy, and, when indicated, surgical debridement, play a vital role in preserving joint function and preventing long-term disability.

This case also highlights the importance of coordinated care involving pulmonologists, orthopedicians, microbiologists, radiologists, and rehabilitation specialists. Early integration of physiotherapy and functional rehabilitation is essential to restore mobility and quality of life, particularly in weight-bearing joints such as the knee. Long-term follow-up is required to monitor for relapse, assess functional recovery, and address psychosocial aspects of prolonged MDR-TB treatment.

In conclusion, MDR-TB of the knee joint with concurrent pneumonia in an obese female represents a rare but clinically significant entity that demands heightened clinical vigilance, timely microbiological diagnosis, and individualized multidisciplinary management. Reporting such cases contributes to the limited existing literature, enhances awareness among clinicians, and reinforces the need for early recognition and appropriate treatment strategies to reduce morbidity, prevent disability, and improve overall patient outcomes.

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