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Subcutaneous Tuberculosis Presenting as Recurrent Ankle Swelling in an Immunocompetent Adolescent: A Diagnostic Challenge

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Abstract
Background: *Subcutaneous tuberculosis (ST) is an extremely rare form of extrapulmonary tuberculosis that frequently masquerades as cellulitis or soft tissue parasitosis, resulting in diagnostic delay.*
Case Presentation: *A 16-year-old immunocompetent female from Bihar presented with an 8-month history of recurrent swelling and pain over the anterolateral distal left leg. Three empirical antibiotic courses failed to provide sustained resolution. Ultrasonography revealed thick-walled cystic lesions in the subcutaneous tissue of the anterolateral left distal leg initially attributed to myocysticercosis. USG-guided FNAC demonstrated acute inflammatory changes; Ziehl-Neelsen staining and pus culture were non-contributory. Cartridge-Based Nucleic Acid Amplification Test (CBNAAT) of aspirated pus confirmed Mycobacterium tuberculosis. Chest radiograph showed no pulmonary involvement. Standard four-drug anti-tubercular therapy (ATT) was initiated with clinical improvement.*
Conclusion: *ST should be included in the differential diagnosis of recurrent soft tissue swelling in TB-endemic regions even in immunocompetent individuals. CBNAAT of aspirated pus is invaluable when conventional investigations fail to establish a microbiological diagnosis.*
Keywords: *Subcutaneous tuberculosis; tuberculous gumma; extrapulmonary tuberculosis; CBNAAT; myocysticercosis; anti-tubercular therapy*

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I. INTRODUCTION

Tuberculosis (TB) continues to represent a major public health challenge in India, which bears the highest global burden of the disease. While pulmonary TB predominates, extrapulmonary manifestations are well recognised. Subcutaneous tuberculosis (ST) is an uncommon but clinically significant form of extrapulmonary TB, comprising approximately 1–2% of all TB cases globally.[1,2] ST encompasses a clinically heterogeneous spectrum of entities — including lupus vulgaris, scrofuloderma, tuberculosis verrucosa cutis, and tuberculous gumma — arising through direct inoculation, contiguous spread, lymphatic dissemination, or haematogenous seeding of the skin and subcutaneous tissues.

The resulting clinical presentation is insidious and non-specific, most commonly manifesting as a slowly progressive, painful or painless subcutaneous swelling that closely mimics cellulitis, panniculitis, myocysticercosis, or soft tissue neoplasm. This diagnostic ambiguity frequently results in prolonged empirical antibiotic therapy and significant delays in initiating appropriate ATT.[1]

We report a case of ST presenting as a subcutaneous swelling over the anterolateral aspect of the distal left leg in a 16-year-old immunocompetent adolescent female, in whom the diagnosis was established by CBNAAT of aspirated pus following 8 months of misdiagnosis and three courses of empirical antibiotics. This case highlights the importance of a high index of suspicion for ST in TB-endemic regions and demonstrates the diagnostic utility of CBNAAT when standard investigations are non-contributory.

II. CASE PRESENTATION

Demographics: A 16-year-old female student weighing 38 kg, resident of Majapparpur, Bihar (currently residing in Khandsa, Gurugram, Haryana), presented to the General Surgery Outpatient Department of SGT Medical College, Hospital and Research Institute, Gurugram in March 2026. She had no personal or family history of tuberculosis, diabetes mellitus, hypertension, bronchial asthma, or thyroid disease. There was no history of corticosteroid or immunosuppressive drug use and no known contact with a TB patient.

Chief Complaint: Recurrent swelling and pain over the anterolateral aspect of the distal left leg for 8 months.

History of Present Illness: The patient first developed swelling over the left leg in August 2025, accompanied by swelling of the right leg and sharp pain in the left leg. She consulted a local practitioner who prescribed empirical antibiotics; the pain subsided, but the swelling persisted. A second episode occurred in December 2025, and a third in March 2026, each managed with similar empirical antibiotic courses without sustained benefit. There was no history of fever, night sweats, weight loss, anorexia, or haemoptysis throughout the illness.

Physical Examination: General condition was satisfactory. Vitals were within normal limits. Local examination of the left lower leg revealed a well-circumscribed, dome-shaped, hyperpigmented, raised nodular lesion with peripheral dry desquamation over the lateral aspect of the ankle — consistent with the appearance of a pointing cold abscess. There was no local warmth, erythema, or regional lymphadenopathy. The contralateral limb and upper extremities were unremarkable. Systemic examination was within normal limits.

III. INVESTIGATIONS

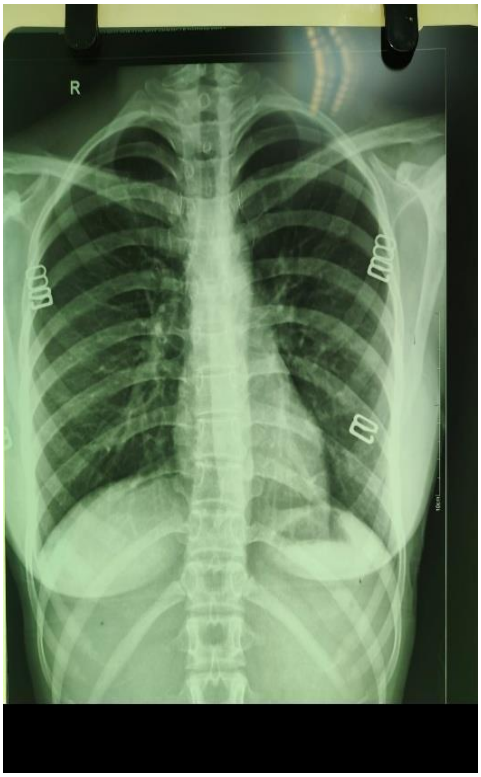
Summary of Investigations

Investigation	Date	Finding / Result
X-Ray Left Ankle (AP, Mortise, Lateral)	27/12/2025	Calcified soft tissue lesion around ankle; no bony erosion or joint destruction
USG Local Part	19/03/2026	Two thick-walled anechoic cystic lesions with eccentric echogenic nodules in tibialis anterior (8.1×6 mm & 5.5×2.1 mm); subcutaneous inflammation. Impression: likely myocysticercosis
CBC, CRP, ESR	19/03/2026	Ordered; inflammatory markers mildly elevated
USG-Guided FNAC	24/03/2026	Blood-pus mixed aspirate from left ankle lesion (18G needle); procedure uneventful
FNAC Cytopathology	27/03/2026	Predominantly acute inflammatory infiltrate (neutrophils, dirty background); ZN stain non-contributory. Impression: acute inflammatory lesion/changes in a lesion
Pus Culture & Sensitivity	31/03/2026	No aerobic growth after 48 hours incubation at 37°C
Chest X-Ray PA View	06/04/2026	Clear lung fields bilaterally; no active pulmonary tuberculosis
CBNAAT of Pus (Specimen 1)	11/04/2026	M. tuberculosis DETECTED; RIF resistance: Indeterminate
CBNAAT of Pus (Specimen 2)	11/04/2026	M. tuberculosis DETECTED; RIF resistance: Not Detected

Radiological Findings

Plain Radiograph — Left Ankle (27/12/2025): Three-view radiograph demonstrated a calcified soft tissue density lesion in the region of the left ankle with no evidence of bony erosion, periosteal reaction, cortical destruction, or joint space narrowing.

Chest Radiograph — PA View (06/04/2026): Postero-anterior chest radiograph showed clear lung fields bilaterally with no evidence of active pulmonary tuberculosis, consolidation, pleural effusion, or mediastinal lymphadenopathy. The cardiac silhouette was normal.



Ultrasonography — Local Part (19/03/2026): USG of the anterolateral left distal leg revealed two thick-walled anechoic cystic lesions with eccentric echogenic nodules in the subcutaneous plane of the anterolateral left distal leg, measuring approximately 8.1 × 6 mm and 5.5 × 2.1 mm. Surrounding inflammatory changes were noted in the subcutaneous plane. Visualised tendons and bursa were normal. Radiological impression: cystic lesions with eccentric echogenic nodules — likely *myocysticercosis*.

Pathological & Microbiological Findings

USG-Guided FNAC (24/03/2026): Under aseptic precautions, USG-guided FNAC was performed from the lesion over the anterolateral left distal leg using an 18-gauge needle. The aspirate yielded blood-pus mixed material. Six unstained smears were prepared. Microscopy showed a predominantly acute inflammatory infiltrate of neutrophils against a dirty background. Ziehl-Neelsen staining using 20% sulfuric acid for acid-fast bacilli was non-contributory. Cytopathological impression: acute inflammatory lesion/changes in a lesion (Cyto Path No. C-2043/26, SGT Medical College Central Laboratory).

Pus Culture & Sensitivity (31/03/2026 – 02/04/2026): Aerobic culture of pus fluid showed no growth after 48 hours of incubation at 37°C.

CBNAAT of Pus (11/04/2026): *M. tuberculosis* was detected on CBNAAT performed on pus aspirated from the left leg lesion. Rifampicin resistance was reported as indeterminate on the first specimen. A second CBNAAT specimen was processed, returning *M. tuberculosis* Detected with RIF resistance Not Detected, confirming drug-susceptible tuberculosis. These findings established the definitive microbiological diagnosis of subcutaneous tuberculosis.

IV. MANAGEMENT

Empirical Phase (August 2025 – March 2026): Across three episodes, the patient received empirical oral antibiotics including amoxicillin-clavulanate 625 mg TDS, ciprofloxacin 500 mg BD, and metronidazole 400 mg TDS. Following the USG impression of myocysticercosis, Tab. Albendazole 400 mg BD was added. None of these regimens produced sustained resolution of the swelling.

Definitive Anti-Tubercular Therapy: Following confirmation of *M. tuberculosis* on CBNAAT, the patient was commenced on standard four-drug ATT in accordance with RNTCP guidelines: Isoniazid (H) + Rifampicin (R) + Ethambutol (E) + Pyrazinamide (Z) for an intensive phase of 2 months, followed by Isoniazid + Rifampicin for a continuation phase of 4 months (total: 6 months). Drug susceptibility was confirmed on the second CBNAAT specimen (RIF Not Detected). Conservative medical management was adopted; surgical excision was not performed given the multifocal nature of the lesion and confirmed sensitivity to first-line agents.

Follow-up: The patient was monitored in the General Surgery and Chest Medicine outpatient clinics for ATT compliance, clinical response, and hepatotoxicity surveillance.

V. DISCUSSION

Subcutaneous tuberculosis is a rare but well-recognised form of extrapulmonary TB, characterised by a diverse spectrum of clinicopathological manifestations and frequent misdiagnosis as more common dermatological or soft tissue conditions — a pattern aptly described as the "great imitator" phenomenon by Chen et al. (2019).[1] The present case, originating from Bihar — one of India's highest TB-burden states — exemplifies this diagnostic challenge: an 8-month pre-diagnosis period, three ineffective empirical antibiotic courses, and an initial sonographic misdiagnosis of myocysticercosis preceded the eventual microbiological confirmation.

A distinguishing feature of the present case is the absence of underlying immunosuppression. While ST is more commonly described in immunocompromised individuals — including those with HIV co-infection, diabetes mellitus, corticosteroid use, or connective tissue disorders — cases in immunocompetent hosts have been documented in the literature.[2,3] The immunocompetent status of this adolescent patient underscores that subcutaneous TB, particularly the gummatous form arising from haematogenous seeding, can manifest without overt immune deficiency, especially in high TB-burden endemic regions such as Bihar.

The initial USG impression of myocysticercosis is a well-recognised diagnostic pitfall. The sonographic features of ST — thick-walled cystic lesions with eccentric internal echogenicity within subcutaneous tissue — closely mimic the appearance of *Taenia solium* cysticerci and have been previously documented as a source of misdiagnosis in endemic zones where both conditions co-circulate.[1]

The failure of ZN staining and conventional pus culture is consistent with the known limitations of standard microbiological methods in extrapulmonary and subcutaneous TB. CBNAAT (Xpert MTB/RIF), a real-time PCR-based assay endorsed by the WHO and RNTCP, simultaneously detects *M. tuberculosis* and rifampicin resistance via rpoB gene interrogation, with a pooled sensitivity exceeding 80% for pus and soft tissue aspirates in extrapulmonary TB.5 Critically, in the present case, CBNAAT of non-pulmonary pus aspirate provided the definitive diagnosis when cytology and culture had both been non-contributory. The indeterminate RIF resistance result on the first specimen — resolved as Not Detected on the second — is a recognised occurrence in CBNAAT, particularly with samples of low bacillary density. This case thus illustrates two important lessons: first, CBNAAT should not be restricted to respiratory specimens in endemic settings; second, an indeterminate RIF result warrants repeat testing before classifying resistance.

The anatomical site — subcutaneous tissue of the anterolateral distal left leg — represents an uncommon but recognised presentation site of cutaneous TB gumma.[1,4] The absence of systemic TB symptoms and pulmonary involvement is characteristic of tuberculous gumma, in which isolated skin and subcutaneous disease predominates; Chen et al. noted that only approximately one-third of cutaneous TB cases are associated with concurrent systemic involvement.[1] Standard six-month first-line ATT is the established treatment for drug-susceptible subcutaneous TB, with surgical drainage reserved for large, fluctuant, or refractory abscesses.

VI. CONCLUSION

Subcutaneous tuberculosis, including its deep gummatous form, is a rare but clinically important diagnosis that should be considered in any patient with recurrent, treatment-refractory subcutaneous swelling in a TB-endemic region, irrespective of immune status or absence of pulmonary disease. The non-specific clinical presentation and the sonographic overlap with myocysticercosis can lead to significant diagnostic delay. When conventional microbiological methods including Ziehl-Neelsen staining and culture are non-contributory, CBNAAT of aspirated lesional material offers a rapid, sensitive, and actionable diagnosis. Early initiation of standard anti-tubercular therapy is the cornerstone of management and carries an excellent prognosis in drug-susceptible disease.

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Declaration

Patient Consent: Written informed consent was obtained from the patient and her guardian for publication of this case report and accompanying clinical data.

Ethical Statement: This case report was conducted in accordance with the Declaration of Helsinki.

Conflict of Interest: The authors declare no conflict of interest.

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