

Tubercular Cold Abscess Mimicking Baker's Cyst: A Rare Case of Posterior Knee Swelling

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ABSTRACT

Musculoskeletal tuberculosis is usually not a common form of extrapulmonary tuberculosis which often presents with atypical clinical features, resulting in delayed or missed diagnosis. Tubercular cold abscesses typically lack classical signs of inflammation and may clinically mimic benign cystic conditions. Posterior knee swelling is most commonly attributed to Baker's cyst; however, in tuberculosis-endemic regions, infective aetiologies should be considered when the presentation is atypical or fails to respond to conventional treatment. Hereby, the authors report a case of a 67-year-old female who presented with a chief complaint of swelling over the posterior aspect of the knee since two years which was gradually progressive, associated with pain and restriction of knee normal range of movements. She was initially managed as a Baker's cyst with repeated aspirations and intra-articular steroid injections, which provided only temporary relief. Magnetic Resonance Imaging (MRI) report showing a well-defined cystic lesion suggestive of a Baker's cyst. Due to persistent symptoms and progressive enlargement, surgical excision was performed. Histopathological examination demonstrated granulomatous inflammation, and microbiological examination such as GeneXpert confirmed *Mycobacterium tuberculosis* with rifampicin resistance. The patient was initiated on appropriate antitubercular therapy and showed significant clinical improvement with no recurrence in six-month follow-up. The present case highlights the importance of considering tuberculosis in the differential diagnosis of persistent or atypical posterior knee swellings. Imaging alone will not be enough in arriving at clinical diagnosis, may be misleading, and definitive diagnosis requires histopathological and microbiological confirmation. Early surgical intervention combined with appropriate therapy ensures favourable outcomes and prevents complications.

Keywords: Antitubercular agent, Extrapulmonary tuberculosis, Granulomatous inflammation, Knee joint, Magnetic resonance imaging

CASE REPORT

A 67-year-old female came with chief complaints of swelling over the posterior aspect of left knee since two years. Initially, the swelling was small and painless, but it progressively increased in size over the last one year, with more rapid progression in the preceding six months. The swelling was associated with pain during walking, squatting, and prolonged standing, leading to functional limitation. She was a known hypertensive since 10 years, on regular medication. Her body weight was 58 kg, and she appeared moderately built with no clinical evidence of malnutrition. She belonged to a lower socioeconomic background. There was no history of diabetes mellitus, bronchial asthma, prior tuberculosis, seizures, or previous surgery. She was not immunocompromised, had no history of long-term systemic steroid use, and no known contact with tuberculosis in the past.

The patient had been diagnosed with bilateral knee osteoarthritis three years ago and was managed conservatively with physiotherapy and three intra-articular corticosteroid injections were administered over four months (approximately 8-12 months before presentation), which provided only temporary relief. Despite this, the swelling persisted and gradually enlarged over a period of time. Approximately six months prior to presentation, two aspirations were performed at a government hospital; however, no definitive diagnosis was concluded, and the patient was lost to follow-up thereafter. She also reported intermittent low-grade fever for 10 days prior to presentation, with no history of weight loss or night sweats.

On examination, a diffuse swelling measuring approximately about 20×20 cm was noted over the posterior aspect of the left knee, extending from the popliteal fossa to the upper calf region [Table/Fig-1-3]. The swelling was tense, cystic in consistency, and non mobile. The overlying skin appeared stretched and shiny, with no

local rise of temperature, sinus formation, or discharge. The swelling was non reducible and did not vary with knee flexion or extension. Transillumination test was negative, and there was no evidence of joint effusion, patellar tap test-negative. Knee movements were restricted, with flexion limited to 90° and a fixed flexion deformity of approximately 20°.



[Table/Fig-1]: Preoperative posterior knee swelling extending into upper calf.



[Table/Fig-2]: Medial view of swelling.



[Table/Fig-3]: Intraoperative swelling specimen.

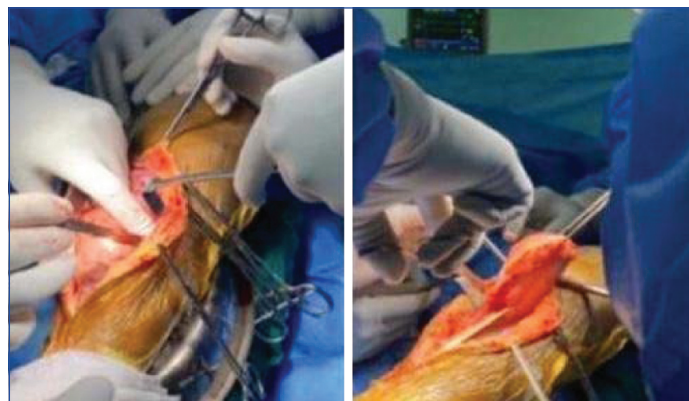
Laboratory investigations revealed elevated C-reactive protein (4.6 mg/dL) and erythrocyte sedimentation rate (58 mm/hour). Complete blood count showed mild anaemia (Hb: 10.2 g/dL) with relative lymphocytosis. Serum albumin was 3.2 g/dL, suggestive of borderline nutritional status. Mantoux test was positive (15 mm induration at 48-72 hours). Sputum examination for acid-fast bacilli was negative, and HIV serology-non reactive. Chest radiograph showed no evidence of pulmonary tuberculosis. Baseline liver and renal function tests were under normal limits.

The MRI of the knee demonstrated degenerative changes consistent with osteoarthritis, with preserved joint space and no significant bony erosions. There were associated bone marrow oedema and meniscal and ligamentous injuries. A large, well-defined cystic lesion was noted extending along the gastrocnemius muscle, appearing hypointense on T1-weighted images and hyperintense on T2-weighted images, consistent with fluid content. No internal septations, debris, or solid components were identified. Post-contrast imaging showed peripheral rim enhancement without significant internal enhancement. These imaging features were suggestive of a Baker's cyst, with no definitive radiological features to indicate infective aetiology such as tuberculosis.

Based on the clinical presentation of a chronic cystic swelling in the popliteal region and corresponding imaging findings, differential

diagnoses included Baker's cyst, which is the most common cause of posterior knee swelling and was strongly suggested on MRI. Other considerations were chronic bursitis involving the gastrocnemius-semimembranosus bursa, synovial or ganglion cyst, and soft-tissue tumours such as lipoma or synovial sarcoma in view of the large size and progressive nature of the swelling. Vascular causes such as popliteal artery aneurysm and conditions like deep vein thrombosis were also considered and clinically excluded. In view of the chronicity and endemic setting, infective aetiologies, particularly a tubercular cold abscess, were included as a differential diagnosis, although not initially favoured based on imaging findings.

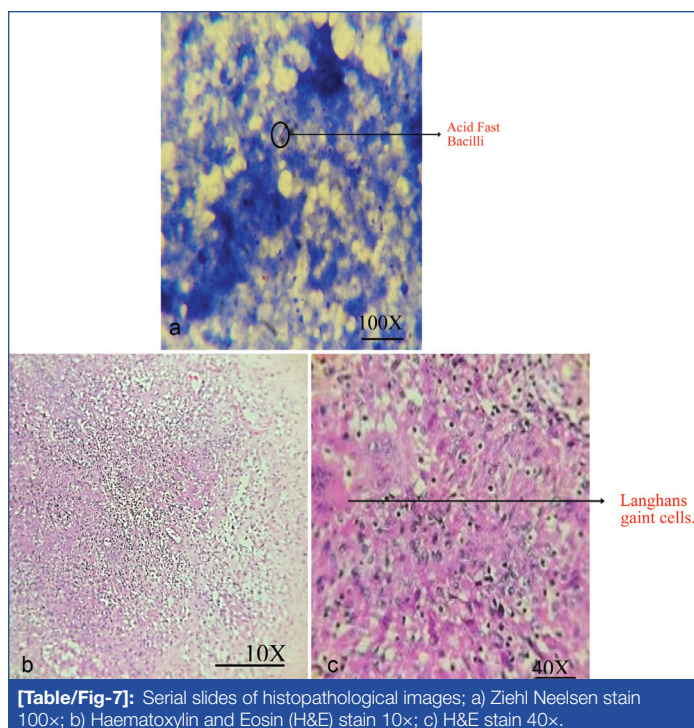
Surgery was performed under spinal anaesthesia with tourniquet control. A thick-walled cyst was identified in the popliteal fossa following surgical exposure [Table/Fig-4]. Careful dissection was performed to separate the lesion from surrounding soft-tissues using retractors [Table/Fig-4,5]. On incision of the cyst, thick caseous material mixed with turbid fluid was encountered, suggestive of a chronic infective pathology [Table/Fig-6]. The cyst wall was completely excised along with its pedunculated attachment. Thorough wound lavage was performed, and the cavity was inspected for any residual tissue. No intraoperative complications were encountered. The wound closed in layers, and a suction drain was placed. Histopathological examination revealed areas of caseous necrosis with granulomatous inflammation and multinucleated giant cells, consistent with tuberculosis. Intraoperative specimens, including cyst contents, were sent for microbiological analysis. Smear examination was positive for acid-fast bacilli [Table/Fig-7a-c]. GeneXpert Mycobacterium tuberculosis / Rifampin (Rifampicin) (MTB/RIF) detected *mycobacterium tuberculosis* with rifampicin resistance. Mycobacterial culture using the Mycobacteria Growth Indicator Tube (MGIT) system subsequently confirmed the growth of *Mycobacterium tuberculosis*. Drug susceptibility testing demonstrated resistance to rifampicin, while susceptibility to isoniazid, ethambutol, pyrazinamide, and tested second-line drugs was preserved.



[Table/Fig-4,5]: Intraoperative images with retractor (from left to right).



[Table/Fig-6]: Intraoperative pus.



Following microbiological confirmation, the patient underwent evaluation for concomitant pulmonary tuberculosis. Clinical respiratory assessment revealed no respiratory symptoms, chest radiography showed no evidence of active pulmonary tuberculosis, and sputum examination for acid-fast bacilli was negative. The findings were therefore consistent with isolated extrapulmonary musculoskeletal tuberculosis. In view of the ongoing global burden of tuberculosis and the increasing recognition of drug-resistant forms of the disease, the patient was classified as having Rifampicin-Resistant Tuberculosis (RR-TB) and managed according to current WHO recommendations [1,2].

The patient was initiated on a World Health Organisation (WHO)-recommended longer all-oral regimen for RR-TB, comprising Bedaquiline, Levofloxacin, Linezolid, Clofazimine, and Cycloserine, along with Pyridoxine supplementation. The planned duration of therapy was 18-20 months, with close monitoring of treatment response, drug tolerance, and adverse effects in accordance with current WHO recommendations for the management of drug-resistant tuberculosis [2].

The postoperative period was uneventful. Serial postoperative wound assessments demonstrated satisfactory healing with progressive improvement in the appearance of the surgical scar on postoperative day 2 [Table/Fig-8a], postoperative day 5 [Table/Fig-8b], postoperative day 9 [Table/Fig-8c], and postoperative day 12 [Table/Fig-8d]. At six-month follow-up, the patient remained asymptomatic with no evidence of recurrence. Functional outcome assessment showed significant improvement, with Visual Analogue Scale (VAS) pain score improving from 7/10 preoperatively to 1/10 postoperatively. Knee range of motion improved to 0-120°, with no residual fixed flexion deformity. The patient continues on antitubercular therapy with planned long-term follow-up for treatment completion and surveillance for recurrence.

DISCUSSION

Musculoskeletal tuberculosis continues to pose a significant diagnostic challenge because of its indolent clinical course and ability to mimic a variety of benign and malignant musculoskeletal conditions. Despite advances in diagnostic modalities, delayed diagnosis remains common, particularly in cases presenting without constitutional symptoms or classical radiological findings [1,2].

Lidder S et al., reported a patient with knee tuberculosis who presented with chronic pain, swelling, and progressive restriction



of joint movements, initially leading to diagnostic uncertainty because of the non-specific presentation [3]. Similar to their findings, this patient had a prolonged history of swelling for two years with progressive pain and restriction of knee movements. However, unlike the case reported by Lidder S et al., this patient presented predominantly as a large posterior cystic swelling clinically and radiologically suggestive of a Baker's cyst rather than classical tuberculous arthritis. In both cases, definitive diagnosis was ultimately established through histopathological and microbiological evaluation rather than imaging alone [3]. Mahajan NP et al., described an aggressive form of knee tuberculosis characterised by extensive synovial involvement, persistent symptoms, and progressive functional impairment requiring open subtotal synovectomy followed by antitubercular therapy [4]. Their patient demonstrated substantial symptomatic improvement after surgical intervention. Similarly, this patient had persistent symptoms despite repeated aspirations and intra-articular corticosteroid injections and eventually required complete surgical excision of the lesion. In both cases, surgery served not only a therapeutic role but also provided tissue for definitive diagnosis. Unlike the synovial disease described by Mahajan NP et al., this patient had a large cold abscess occupying the popliteal region with no obvious preoperative evidence of extensive articular destruction [4].

Kotikalapudi S et al., reported latent reactivation of osteoarticular tuberculosis of the knee in a patient presenting with chronic monoarthritis without evidence of active pulmonary tuberculosis [5]. The authors emphasised the ability of *Mycobacterium tuberculosis* to remain dormant for prolonged periods before reactivation. Similar findings were observed in our patient, who had no evidence of pulmonary tuberculosis on chest radiography and sputum examination. Furthermore, repeated intra-articular corticosteroid injections may have contributed to local immunosuppression and disease progression, a mechanism that has also been implicated in reactivation of latent tuberculous infection [5].

The radiological findings in the present case were particularly deceptive. Abid W et al., highlighted that musculoskeletal tuberculosis may demonstrate highly variable MRI appearances and frequently mimics inflammatory, degenerative, or cystic conditions [6]. In the patient of present case, MRI demonstrated a well-defined cystic lesion extending along the gastrocnemius muscle with imaging characteristics strongly suggestive of a Baker's cyst. The absence of classical features such as extensive synovial thickening, bone erosions, or marked joint destruction contributed significantly to the initial misdiagnosis. This observation is consistent with the findings of Abid W et al., who emphasised

that imaging findings should always be interpreted in conjunction with clinical and microbiological data [6]. A systematic review by Marais LC et al., demonstrated that tuberculous arthritis of native joints frequently presents with nonspecific symptoms and imaging findings, resulting in substantial delays in diagnosis and treatment [7]. The review further highlighted that chronic monoarthritis, pain, swelling, and progressive limitation of movement are the most common presentations. The patient of present case shared several of these characteristics; however, the unusual manifestation as a giant posterior knee swelling mimicking a Baker's cyst makes the present case particularly uncommon [7].

Pinto I et al., reported a case of tuberculosis presenting as chronic monoarthritis in which extensive investigations were required before the diagnosis was established [8]. Similar diagnostic difficulties were encountered in the patient of current case, who underwent repeated aspirations and conservative treatment before tuberculosis was considered. These observations reinforce the need to maintain a high index of suspicion for tuberculosis in patients with chronic, unexplained musculoskeletal lesions, especially in endemic regions [8]. In a retrospective study evaluating patients with musculoskeletal tuberculosis, Ozdemir M et al., found that delayed diagnosis was associated with prolonged symptoms, increased tissue destruction, and poorer functional outcomes [9]. Fortunately, despite a delay in diagnosis, our patient achieved an excellent postoperative outcome following complete surgical excision and institution of appropriate antitubercular therapy. At six-month follow-up, pain improved markedly from a VAS score of 7/10 to 1/10, knee range of motion improved to 0-120°, and no recurrence was observed.

Although osteoarticular tuberculosis is well described in adults, Herdea A et al., emphasised that delayed recognition remains a major challenge even in contemporary clinical practice and may adversely affect treatment outcomes [10]. Their observations further support the importance of early diagnosis, microbiological confirmation, and prompt initiation of appropriate therapy. In the present case, GeneXpert and MGIT culture not only confirmed the diagnosis but also identified rifampicin resistance, allowing timely initiation of a WHO-recommended drug-resistant tuberculosis regimen. The identification of RR-TB adds further clinical significance to the present report. While most published cases of knee tuberculosis involve drug-sensitive disease, our patient required prolonged treatment with a WHO-recommended all-oral regimen because of confirmed rifampicin resistance [2]. The combination of complete surgical excision, microbiological diagnosis, and appropriate drug-resistant tuberculosis therapy resulted in a favourable outcome without recurrence during follow-up.

Overall, the present case expands the spectrum of musculoskeletal tuberculosis by demonstrating an unusual presentation as a large tubercular cold abscess masquerading as a Baker's cyst. Comparison with previously published reports highlights both the diagnostic challenges and the importance of maintaining clinical suspicion in atypical posterior knee swellings, particularly in tuberculosis-endemic regions.

CONCLUSION(S)

Tubercular cold abscess around the knee can closely mimic a Baker's cyst, particularly in elderly patients and in patient at tuberculosis-endemic regions, leading to potential diagnostic delay. Atypical or persistent posterior knee swellings that do not respond to conventional management should raise suspicion for infective aetiologies, including tuberculosis. Imaging findings may be misleading; hence, definitive diagnosis requires histopathological and microbiological confirmation. Early surgical excision combined with appropriate antitubercular therapy, especially in drug-resistant cases, ensures favourable outcomes and prevents recurrence and long-term complications. The present case shows the importance of a high index of clinical suspicion and comprehensive evaluation in managing unusual presentations of musculoskeletal tuberculosis.

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