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Dr. Vikas Bachhal
Department of Orthopaedic Surgery, Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India

Dr. Utkarsh Kumar Reddy Gopavaram
Department of Orthopaedic Surgery Post Graduate Institute of Medical Education and Research (PGIMER) Chandigarh, India

Dr. Sai Surya Dinesh Pydi
Department of Orthopaedic Surgery, Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India

Dr. Vilash Raj Singh
Department of Orthopaedic Surgery, Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India

Corresponding Author:
Dr. Utkarsh Kumar Reddy Gopavaram
Department of Orthopaedic Surgery Post Graduate Institute of Medical Education and Research (PGIMER) Chandigarh, India

Isolated tuberculosis of the patella mimicking a benign tumor: A case report and review of literature

Vikas Bachhal, Utkarsh Kumar Reddy Gopavaram, Sai Surya Dinesh Pydi and Vilash Raj Singh

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Abstract
Background: Isolated tuberculosis (TB) of the patella is an extremely rare presentation of osteoarticular TB, often misdiagnosed as benign or neoplastic lesions.
Case Report: We describe a 21-year-old male college student with a solitary expansile lytic lesion of the patella mimicking a giant cell tumor. Core needle biopsy was inconclusive, leading to open curettage with bone cement filling. Histopathology and CBNAAT confirmed Mycobacterium tuberculosis. The patient had no systemic or pulmonary involvement and was successfully managed with antitubercular therapy (ATT) and physiotherapy.
Conclusion: Even in the absence of systemic features, isolated skeletal TB should be considered in any lytic lesion of the patella in endemic regions. Cement reconstruction after curettage can provide stability and aid local control.

Keywords: Patella, tuberculosis, lytic lesion, CBNAAT, bone cement

Introduction
Osteoarticular tuberculosis constitutes 1-3% of all cases of TB, with the knee being the third most common site of involvement after the spine and hip [1]. Patellar TB is exceedingly rare, with an estimated incidence of 0.09-0.15% of skeletal TB cases [1-3]. The first documented case was reported by Aitken in 1933 [4], and only isolated case reports and small series have since been described worldwide. Because of its rarity and nonspecific presentation, the diagnosis is frequently delayed or mistaken for other conditions such as prepatellar bursitis [5-7], chronic osteomyelitis [8], Synovitis [9] or osteolytic lesions [10] as in present case. In TB-endemic regions such as India, clinicians must maintain a high index of suspicion, even when constitutional symptoms and pulmonary findings are absent [1, 11]. We report a rare case of isolated patellar TB presenting as a benign-appearing lytic lesion compare it with previously published cases.

Case Report
A 21-year-old male college student and daily soccer player presented with dull aching anterior knee pain for 11 months. The pain was insidious, non-radiating, and aggravated by activity. There was no swelling, redness, fever, or constitutional symptom. A twisting knee injury had occurred a year earlier. Clinical examination revealed localized anterior tenderness without effusion or ligamentous laxity. Plain radiographs revealed a well-circumscribed expansile lytic lesion with intact cortex involving the patella [Figure 1-A, B]. Systemic examination and chest X-ray were normal [Figure 1D]. MRI demonstrated a hyperintense lesion on T2-weighted and fat-suppressed sequences, suggestive of a lytic fluid filled lesion [Figure 2-A, B]. Differential diagnoses included GCT and chondroblastoma. A core needle biopsy was non-diagnostic; therefore, an open curettage was planned and performed after anesthesia clearence. Intraoperatively, the lesion contained friable brownish tissue resembling that of GCT. After complete curettage, punctate bleeding confirmed viable bone, and the defect was reconstructed with polymethylmethacrylate (PMMA) bone cement. Histopathology revealed epithelioid granulomas with central caseous necrosis and Langhans giant cells. Ziehl-Neelsen staining showed acid-fast bacilli, and CBNAAT confirmed

Mycobacterium tuberculosis. The patient was started on ATT (isoniazid, rifampicin, pyrazinamide, and ethambutol for 2 months, followed by isoniazid + rifampicin for 10 months) as per WHO guidelines [11]. Physiotherapy was initiated for knee mobilization. At 6 months, the patient was asymptomatic with full range of motion [figure 3-A, B] and radiological evidence of healing [figure 3-C,D].

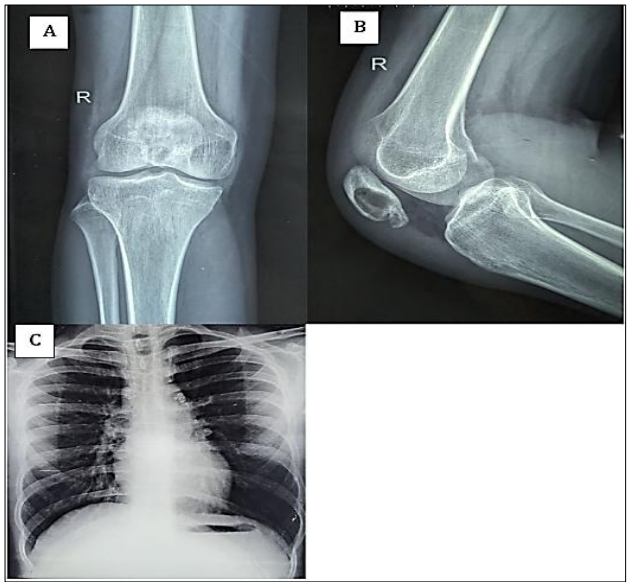

Fig 1: (A) Preoperative anteroposterior (AP) radiograph of the knee showing the patellar lytic lesion.
(B) Preoperative lateral radiograph demonstrating the extent of lesion.
(C) Chest radiograph showing no evidence of pulmonary tuberculosis or other active thoracic pathology.

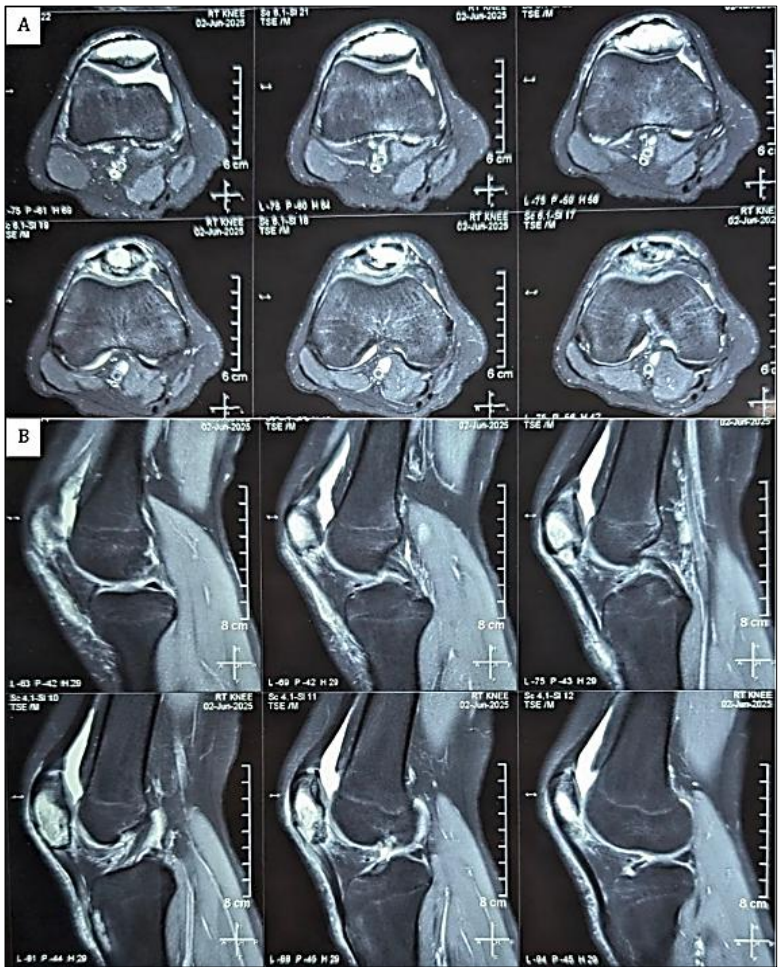

Fig 2: (A) Sagittal MRI (T2-weighted, fat-suppressed) image illustrating the hyperintense lesion within the patella with surrounding marrow edema. (B) Axial MRI section confirming the well-defined cavity and its isolation from the articular surface and surrounding soft tissues.

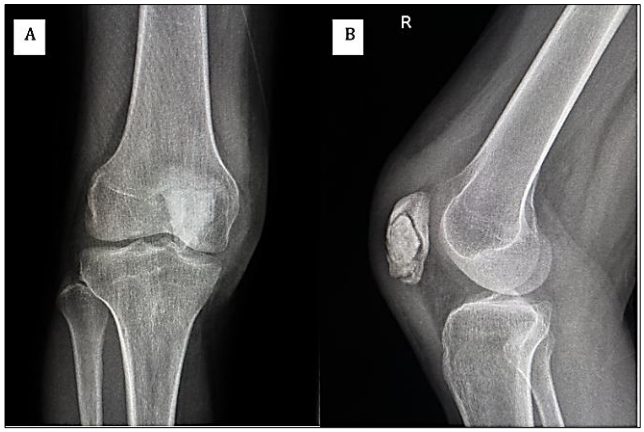

Fig 3: (A) Postoperative anteroposterior (AP) radiograph showing complete curettage and cavity reconstruction. (B) Postoperative lateral radiograph demonstrating adequate filling of the defect and restoration of patellar contours.

Table 1: Reported cases of isolated patellar tuberculosis (1987-2025)

Author (Year)	Age / Sex	Presentation	Radiological findings	Diagnostic modality	Management	Outcome / Follow-up
Hernández Giménez *et al*. 1987 [14]	8 M	Pain + effusion	Lytic lesion with sequestrum	Biopsy + HPE	Curettage + ATT	Healed, full ROM
Dhillon *et al*. 1998 [2]	18 F	Pain + sinus	Central lytic defect with sequestrum	Biopsy + culture (+)	Debridement + 4-drug ATT (12 mo)	Complete bone healing (14 wk)
Mittal *et al*. 2006 (Knee) [3]	20-33 yrs (5 pts)	Anterior knee pain ± swelling	Well-defined lytic lesion ± sequestrum	Histology (+)	ATT (18 mo) + physiotherapy	All recovered, full ROM
MacLean & Kulkarni 2013 [5]	25 F	Painful swelling (bursitis mimic)	Lytic lesion + soft-tissue swelling	Sequestrectomy + AFB (+)	Curettage + ATT (12 mo)	Full recovery (6 mo FU)
Prakash & Vijay 2014 [15]	11 M	Sinus + pain	Lytic + sclerotic area ± sequestrum	Biopsy + AFB (+)	Curettage + ATT (12 mo)	Healed, full ROM
Sellami *et al*. 2020 [8]	48 F	Pain + swelling	MRI - osteolytic upper patella	Biopsy + HPE	ATT (12 mo)	Healed
Khezami *et al*. 2021 [12]	49 F	Chronic pain, no systemic symptoms	CT/MRI - osteolysis superior patella	HPE + caseous necrosis	Curettage + ATT (12 mo)	Healed (18 mo FU)
Khan *et al*. 2022 [9]	27 F	Chronic synovitis	MRI - lytic cavities + effusion	Biopsy + AFB (+)	Arthrotomy + ATT	Pain-free ROM (4 mo FU)
Anjum *et al*. 2024 [6]	30 F	Bursitis mimic	Lytic proximal pole, intact cortex	PCR + HPE	ATT (4 mo IP + 8 mo CP)	Complete healing (2 y FU)
Patil *et al*. 2024 [7]	47 M	Pain + recurrent swelling (bursitis mimic)	MRI - anterior cortex erosion	HPE + granulomas	Curettage + bio-composite + ATT	Healed (6 y FU)
Ariyaratne *et al*. 2025 [13]	54 M	Pain, gout mimic	MRI - inferior pole erosion + tendon involvement	USG-guided biopsy AFB (+)	ATT (12 mo)	Healed
Present case (2025)	21 M	Anterior knee pain (no swelling, no systemic signs)	Expansile lytic lesion with intact cortex (GCT mimic)	HPE + CBNAAT (+)	Open curettage + PMMA cement + ATT (12 mo)	Healed, full ROM (6 mo FU)

Abbreviations: ATT - antitubercular therapy; AFB - acid-fast bacilli; HPE - histopathological examination; CBNAAT - cartridge-based nucleic acid amplification test; FU - follow-up; ROM - range of motion; PMMA - polymethylmethacrylate.

Discussion

Tuberculosis of the patella is an exceptionally uncommon entity owing to the relatively avascular nature of the bone and its limited cancellous component. In the largest review of skeletal tuberculosis, Tuli reported only one case of patellar involvement among 1,074 lesions, giving an incidence of merely 0.09% [1]. Because of its rarity and the subtlety of early symptoms, the diagnosis is often delayed or missed altogether. Most patients present with vague anterior knee pain, sometimes accompanied by mild swelling or effusion, but usually without constitutional features such as fever, malaise, or weight loss [2, 3, 5, 6, 10, 12]. These characteristics were also observed in the present case, where the patient had isolated anterior knee pain with an unremarkable systemic evaluation.

Radiologically, lesions of tuberculous origin in the patella may present as well-defined lytic areas with or without sequestrum formation, often leading to diagnostic confusion with benign tumors such as giant cell tumor, chondroblastoma, or simple bone cyst [7, 8, 10]. In our case, the imaging showed an expansile lytic lesion with intact cortex and no surrounding sclerosis, closely resembling a benign tumor. Similar diagnostic dilemmas have been reported previously, but in most of those cases the lesions simulated prepatellar bursitis or chronic osteomyelitis rather than a tumor [6, 7, 12] and even as inflammatory conditions like gout [13]. The absence of constitutional symptoms, intact cortex, and nonaggressive appearance further contributed to the benign impression.

Histopathological confirmation remains the gold standard for diagnosis. Older reports relied on biopsy and Ziehl-Neelsen staining, whereas more recent literature emphasizes

the role of polymerase chain reaction and cartridge-based nucleic acid amplification testing (CBNAAT), which provide rapid and sensitive detection even in paucibacillary lesions [11]. In our case, the core needle biopsy was non-diagnostic, which necessitated open curettage. The final diagnosis was established only after histopathology and CBNAAT confirmed Mycobacterium tuberculosis. This highlights the importance of tissue sampling and molecular testing, especially when imaging and initial biopsies are inconclusive.

A review of published cases from 1987 to 2025 shows that the majority presented with pain and swelling, some with sinus formation, and were treated successfully with curettage or antitubercular therapy alone [Table 1]. None of these, however, reported management involving bone cement reconstruction. The current case is unique in that respect; the defect was filled with polymethylmethacrylate (PMMA) bone cement following complete curettage. This approach, common in tumor surgery, offered immediate structural stability and may also have contributed to local sterilization of the cavity through its exothermic polymerization. The use of cement has not been previously described for isolated patellar tuberculosis, and its successful outcome in our case suggests that it can be a safe option when the cortical shell is preserved and the cavity is well-contained.

The pathogenesis of isolated patellar tuberculosis is thought to involve hematogenous dissemination from a latent focus that becomes reactivated under favorable conditions such as local trauma or transient immunosuppression [1]. Our patient's history of twisting injury prior to the onset of symptoms may have acted as a precipitating event, as described by several authors. The paucibacillary nature of osteoarticular lesions often explains the lack of systemic manifestations and the difficulty in isolating organisms by culture [1].

The mainstay of management for osteoarticular tuberculosis remains multidrug antitubercular therapy as recommended by the World Health Organization and the Centers for Disease Control and Prevention. The regimen includes isoniazid, rifampicin, pyrazinamide, and ethambutol for two months followed by isoniazid and rifampicin for ten months, amounting to a total of twelve months of therapy [11]. Surgical intervention is reserved for diagnostic confirmation, debridement of sequestra, and reconstruction of large osseous cavities. When initiated promptly, such a combined approach results in excellent functional outcomes, as evidenced by complete pain relief and full knee mobility in the present case.

In summary, isolated tuberculosis of the patella is a diagnostic challenge due to its rarity and nonspecific clinical features. The current case underscores that, in TB-endemic regions, even solitary benign-appearing lytic lesions should prompt consideration of an infective etiology. Our experience further demonstrates that open curettage with PMMA cement reconstruction can be a reliable and function-preserving surgical option when the diagnosis is established postoperatively, and the structural integrity of the patella must be maintained.

Conclusion

In endemic regions, clinicians must suspect tuberculosis in any lytic patellar lesion, even when systemic features and pulmonary involvement are absent. This case is unique because of its tumor-like appearance, biopsy-negative presentation, and successful cement reconstruction after curettage. Early surgical intervention combined with appropriate ATT ensures full functional recovery.

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