



Tumor or Metaplastic disorder Synovial Chondromatosis of the Knee: A Case Report

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Received: January 19, 2026

Revised: January 23, 2026

Accepted: February 09, 2026

Published: February 25, 2026

Abstract

Introduction: Synovial chondromatosis is a rare benign metaplastic disorder of the synovium characterized by the formation of multiple cartilaginous nodules within the joint cavity. The knee joint is most commonly affected. Delayed diagnosis may result in mechanical symptoms and secondary degenerative changes. **Case Presentation:** A 48-year-old female presented with progressive right knee pain and swelling for six months without history of trauma or systemic symptoms. Clinical examination revealed diffuse swelling and painful restriction of movement. Radiographs demonstrated multiple intra-articular calcified loose bodies. The patient underwent open synovectomy with removal of loose bodies under spinal anesthesia. Histopathology confirmed primary synovial chondromatosis. The postoperative course was uneventful with excellent functional recovery. **Conclusion:** Synovial chondromatosis should be considered in patients presenting with chronic monoarticular swelling and mechanical symptoms. Complete synovectomy with removal of loose bodies provides good outcomes and reduces recurrence risk.

Keywords: Synovial chondromatosis, Knee joint, Loose bodies, Synovectomy, Cartilaginous metaplasia



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INTRODUCTION

Synovial chondromatosis is an uncommon benign proliferative disorder of synovial tissue characterized by cartilaginous metaplasia of the synovial membrane leading to the formation of multiple intra-articular nodules [1]. These nodules may detach from the synovium and become loose bodies within the joint cavity, frequently undergoing calcification or ossification over time. The condition predominantly affects large synovial joints, with the knee accounting for approximately 50–65% of reported cases [2].

The disorder is classified into primary and secondary types. Primary synovial chondromatosis is idiopathic and results from metaplastic transformation of synovial cells, whereas secondary synovial chondromatosis occurs in association with degenerative joint disease, trauma, or inflammatory arthropathies [3]. The disease typically affects individuals in the third to fifth decades of life, with a slight male predominance, although females are also affected.

Milgram described three histopathological stages of synovial chondromatosis: (1) active synovial disease without loose bodies, (2) transitional phase with active synovium and loose bodies, and (3) multiple loose bodies without active synovial proliferation [3]. Clinically, patients present with chronic joint pain, swelling, stiffness, crepitus, and mechanical symptoms such as locking or catching due to intra-articular loose bodies [4].

Radiographs in advanced disease demonstrate multiple calcified bodies, whereas early disease may require MRI for diagnosis [5]. If left untreated, the condition may lead to secondary osteoarthritis due to persistent mechanical irritation of articular cartilage. Rare cases of malignant transformation into chondrosarcoma have been documented [10].

We present a case of primary synovial chondromatosis of the right knee managed successfully with open synovectomy at our institution.

Case Presentation

This case was managed in the Department of Orthopaedics, Mamata Medical College, Khammam. A 48-year-old female presented with complaints of progressive right knee pain and swelling for six months. The onset was insidious with no preceding trauma. The pain was dull aching, gradually progressive, aggravated by walking, climbing stairs, and squatting, and partially relieved by rest.

She reported increasing stiffness and painful restriction of movements over the preceding two months. There was no history of fever, weight loss, inflammatory arthritis, tuberculosis, or previous knee surgery.

Examination Findings

On general examination, the patient was afebrile and vitally stable.

Local examination of the right knee revealed diffuse swelling without erythema or sinus formation (Figure 1). Mild joint effusion and tenderness along the joint line were noted. There was no local rise of temperature.

Range of motion was restricted:

- Flexion limited beyond 90°
- Terminal extension restriction present

Ligamentous stability tests were negative. Distal neurovascular status was intact.



Figure 1: Clinical photograph demonstrating diffuse swelling of the right knee.

Radiological Evaluation

Plain radiographs (AP and lateral views) revealed multiple well-defined rounded calcified intra-articular loose bodies. Joint space was relatively preserved with no evidence of acute fracture or advanced osteoarthritis (Figure 2).



Figure 2: Preoperative AP and lateral radiographs showing multiple calcified loose bodies within the joint cavity.

Based on clinical and radiological findings, a diagnosis of primary synovial chondromatosis of the right knee was made.

Surgical Management

The patient underwent open synovectomy with removal of loose bodies under spinal anesthesia. Through a medial parapatellar approach, the joint capsule was opened. Multiple lobulated cartilaginous loose bodies were identified within the joint cavity. The synovium appeared hypertrophied. Complete synovectomy was performed, and all visible loose bodies were removed (Figure 3).



Figure 3: Intraoperative image showing multiple cartilaginous loose bodies being extracted from the joint.

Gross and Histopathological Findings

Gross examination of the excised specimen revealed multiple lobulated whitish cartilaginous nodules of varying sizes (Figure 4).

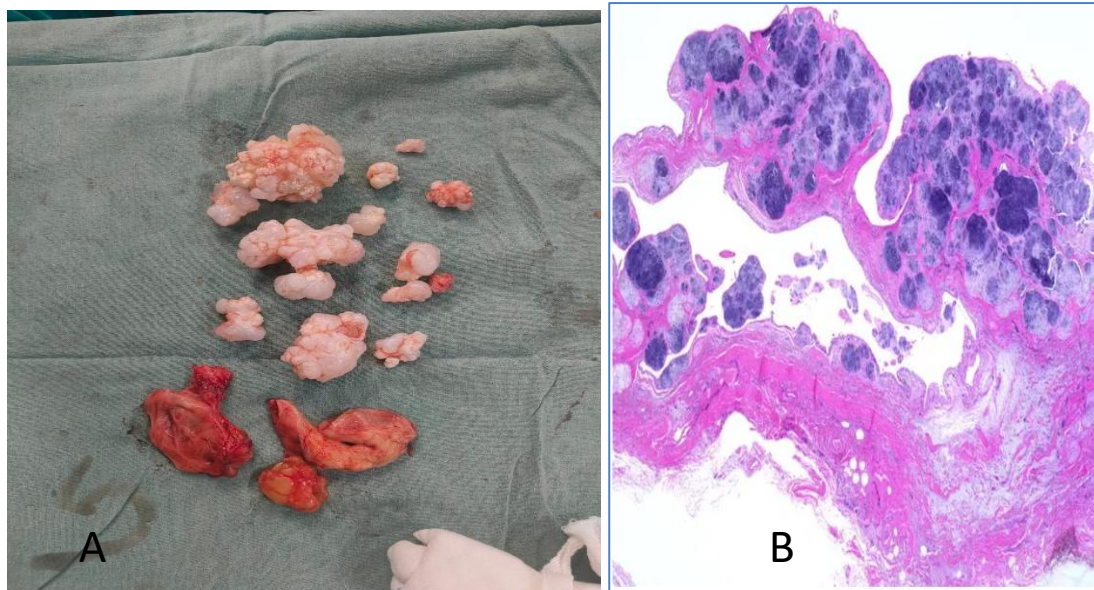


Figure 4A & 4B: Gross specimen showing multiple cartilaginous loose bodies removed from the knee joint.

Microscopic examination demonstrated nodules composed of mature hyaline cartilage with synovial lining hyperplasia. No cellular atypia or malignant transformation was noted, confirming primary synovial chondromatosis.(Figure 4B).



Figure 6: Postoperative radiographs showing successful excision of intra-articular loose bodies in synovial chondromatosis.

Postoperative Course

The postoperative period was uneventful. Early mobilization and physiotherapy were initiated. Sutures were removed on postoperative day 12.

At six-month follow-up:

- Significant pain reduction
- Restoration of near-full range of motion
- No clinical evidence of recurrence
- Patient resumed daily activities without limitation

DISCUSSION

Synovial chondromatosis is a rare benign disorder characterized by synovial metaplasia with formation of multiple cartilaginous nodules that may detach and become intra-articular loose bodies [1,2]. The knee is the most commonly involved joint, likely due to its extensive synovial lining and repetitive biomechanical stress [2]. Clinically, the condition presents with chronic monoarticular pain, swelling, stiffness, and mechanical symptoms such as locking or catching, which result from loose bodies interfering with joint motion and associated synovial hypertrophy [4]. Imaging and histopathological evaluation are central to confirming diagnosis and excluding mimicking conditions as well as rare malignant transformation [1,10].

In the present case, the patient had a 6-month history of progressive knee pain and swelling without trauma or systemic symptoms, which is consistent with primary synovial chondromatosis [2,4]. Plain radiographs demonstrated multiple well-defined calcified loose bodies with relatively preserved joint space (Figure 1), a classical finding in advanced disease when nodules undergo calcification or ossification [1]. Although MRI is emphasized for early-stage disease where nodules are

non-calcified, many cases are diagnosed radiographically once mineralization has occurred [5]. MRI remains particularly useful in detecting synovial proliferation and non-mineralized nodules and in assessing posterior compartment involvement [5].

Milgram's pathological staging—active synovial disease without loose bodies (Stage I), transitional disease with active synovium and loose bodies (Stage II), and quiescent synovium with multiple loose bodies (Stage III)—remains clinically relevant [3]. Recurrence risk correlates with persistent metaplastic synovium. In our case, intraoperative findings of hypertrophied synovium along with multiple loose bodies (Figure 3) and gross lobulated cartilaginous nodules (Figure 4) suggest a transitional phase of disease, supporting the rationale for synovectomy in addition to loose body removal [3,7].

The differential diagnosis includes osteoarthritis with secondary loose bodies, pigmented villonodular synovitis, osteochondritis dissecans, chronic infective arthritis including tuberculosis, and other synovial proliferative disorders [4]. In this patient, absence of systemic features, preserved joint stability, and

characteristic radiographic findings favored synovial chondromatosis. Histopathology is essential to confirm diagnosis and exclude low-grade chondrosarcoma, particularly in recurrent or aggressive cases [10]. Features such as rapid progression, repeated recurrence, bone invasion, and soft tissue infiltration raise suspicion for malignant transformation, although such transformation remains rare [10].

Surgical intervention remains the definitive management for symptomatic disease [7,8]. Contemporary evidence distinguishes between loose body removal alone and combined loose body removal with partial or total synovectomy. Studies have demonstrated higher recurrence rates when only loose bodies are removed, particularly in arthroscopic “washout” procedures, compared with approaches that include synovectomy [7,11]. A recent systematic review evaluating surgical options for primary synovial chondromatosis of the knee reported variable recurrence rates across techniques but emphasized that complete synovial excision significantly reduces recurrence risk [11]. Similarly, another systematic review focusing on arthroscopic management highlighted clustering of recurrence in patients managed without adequate synovectomy, particularly in advanced disease [12].

The choice between open and arthroscopic surgery should be individualized based on disease extent, anatomical distribution, and surgeon expertise [7,8]. Arthroscopy offers less morbidity and faster rehabilitation but may be technically challenging in cases with extensive posterior compartment involvement or numerous loose bodies. Open synovectomy allows direct visualization and more complete removal in extensive disease [7]. In the present case, the extensive loose bodies and synovial hypertrophy favored an open approach, allowing thorough clearance and potentially reducing recurrence risk.

Recurrence remains a recognized concern, with reported rates varying from 3% to 23%, largely dependent on completeness of synovectomy and disease stage [7,9,11]. Long-term follow-up is essential, as recurrence may occur years after initial treatment. In our patient, there was significant clinical improvement with no evidence of recurrence at 6-month follow-up, although continued surveillance is recommended.

Overall, this case reinforces classical clinical and radiological features of knee synovial chondromatosis and supports a management strategy of loose body removal combined with synovectomy in extensive disease, along with mandatory histopathological confirmation to exclude malignant transformation.

CONCLUSION

Synovial chondromatosis should be suspected in patients presenting with chronic knee swelling and mechanical

symptoms without systemic signs. Radiographic evaluation is crucial for diagnosis. Open synovectomy with complete removal of loose bodies remains an effective treatment modality, offering good functional outcomes and minimizing recurrence risk when performed thoroughly.

Patient Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Conflict of Interest

None declared.

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