

CASE REPORT

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Disseminated synovial chondromatosis of the knee treated by open radical synovectomy using staged combined anterior and posterior approaches: a case report

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Abstract

Introduction Synovial chondromatosis is a rare, benign condition characterized by the formation of multiple cartilaginous nodules within the synovial membrane of joints. Despite its rarity, there remains significant uncertainty regarding its optimal management. Early diagnosis and appropriate surgical intervention are essential, yet the literature on best practices remains limited. The anterior compartment of the knee is mostly affected, and widespread illness is quite uncommon. In severe cases, the most effective surgical approach for severe cases is still debated. This report presents a rare case of knee synovial chondromatosis with extensive involvement of both anterior and posterior compartments, treated with a staged surgical approach.

Case presentation A 50-year-old Semitic male presented with a 15-year history of progressively worsening right knee pain and swelling. Physical examination revealed significant swelling, restricted range of motion, and a palpable mass in the anterior and posterior knee, prompting further imaging. Magnetic resonance imaging confirmed the presence of large loose bodies and extensive synovial hypertrophy, leading to the decision for surgical intervention. The patient underwent a staged open radical synovectomy, first targeting the anterior compartment followed by the posterior compartment. Two large loose bodies were removed, and histopathology confirmed synovial chondromatosis with synovial papillary hyperplasia. The patient responded well postoperatively, with improved range of motion following physiotherapy.

Conclusion Generalized synovial chondromatosis of the knee is a rare but significant condition that requires early diagnosis and surgical intervention to prevent joint degeneration. A staged anterior and posterior synovectomy provides effective management of the disease with good clinical outcomes and reduced risk of recurrence.

Keywords Knee, Disseminated, Synovial, Chondromatosis

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Introduction

Synovial chondromatosis, also known as primary synovial chondromatosis, is a rare and benign disorder characterized by the presence of multiple cartilaginous nodules or loose bodies within the synovium of joints [1]. The knee, ankle, hip, elbow, shoulder, and other major joints are among the common places where synovial



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chondromatosis manifests [2]. However, smaller joints, such as the distal radioulnar, tibio-fibular, metacarpophalangeal, and metatarsophalangeal joints, may also be involved [3–6]. Clinical manifestations vary from asymptomatic to discomfort, swelling, and restricted range of motion [7].

Surgical or arthroscopic interventions are typically used to manage the condition [8] to prevent further articular and per-articular damage and alleviate symptoms [9]. Diagnostic techniques include radiography, computed tomography (CT) scans, or magnetic resonance imaging (MRI), with histological analysis confirming the diagnosis [10]. Nonetheless, due to its ability to detect mineralized nodules, radiography is the most widely utilized diagnostic technique [11]. This report aims to add to the limited literature by presenting a rare case of knee synovial chondromatosis with unusual clinical features, offering insight into its diagnostic and therapeutic challenges.

Case presentation

A 50-year-old Semitic male presented with a 15-year history of progressively worsening right knee pain and associated swelling. The pain, initially mild, had intensified to the point where it was present at rest and worsened with weight-bearing activities. The patient reported increased swelling but denied knee locking, giving way, or nighttime pain. Ibuprofen provided partial relief of symptoms. He was otherwise healthy and physically active, with no notable medical or family history.

On examination, there was significant quadriceps wasting in the right lower limb, with visible swelling in the popliteal fossa and anterior knee. Palpation revealed a hard, immobile, well-defined mass in the anterior knee (measuring 4×8 cm) as well as a diffuse mass in the posterior aspect. There were no associated skin changes or tenderness, except for the medial joint line, which was

slightly sensitive to the patient. The patient had a knee flexion of 100 degrees, with full extension. McMurray's test was negative, indicating there was no ligamentous instability.

Magnetic resonance imaging (MRI) revealed a knee effusion, synovial hypertrophy, and a loose calcific body exerting pressure on the popliteal fossa and patellar tendon, anterior to the femoral condyle (Fig. 1A–C), which was suggestive of synovial chondromatosis.

Given the significant involvement and size of the loose body within the knee joint, an open surgical approach was decided. A medial parapatellar approach was utilized following an anterior mid-line incision. Two large loose bodies approximately 4×4 cm and 3×5 cm were removed from beneath the suprapatellar pouch and patellar tendon (Fig. 2). Histopathological analysis confirmed synovial chondromatosis with synovial papillary hyperplasia (Fig. 3A–D).

After 6 weeks, a second procedure was performed for the posterior knee mass using a posterior knee approach, and a 5×4 cm mass was successfully removed (Fig. 4). Postoperatively, the patient began physiotherapy immediately and achieved a knee range motion of 0–125 degrees at 6 months, and there was no recurrence identified at 1 year postoperatively.

Discussion

Synovial chondromatosis occurs due to the metaplastic transformation of synovial cells into chondrocytes, triggered by an unidentified stimulus [12]. Under normal conditions, the synovial membrane does not contain chondrocytes. However, in this condition, the newly formed chondrocytes form nodules within the synovium, eventually becoming pedunculated and calcified, and subsequently are released as loose bodies into the joint [13].

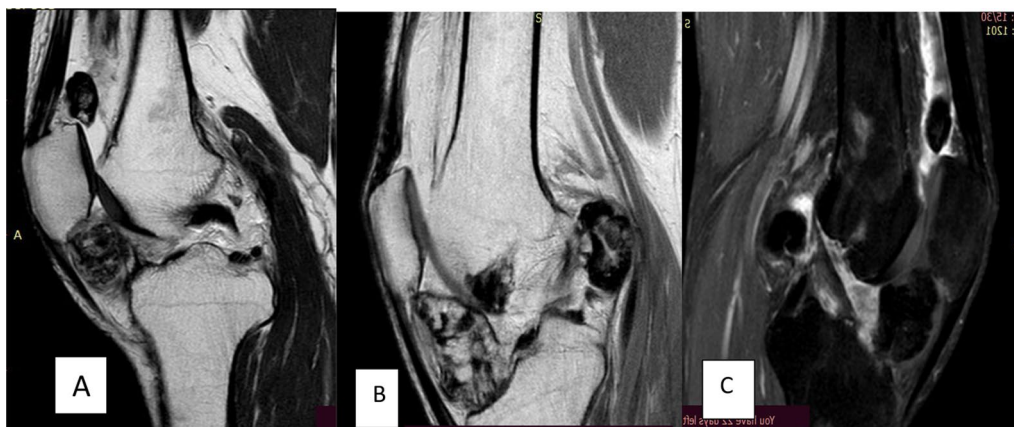


Fig. 1 A–C Magnetic resonance imaging finding of the patient



Fig. 2 Calcified masses excised from anterior compartment of the knee on from suprapatellar and the larger one from infrapatellar compartment

The clinical presentation of synovial chondromatosis is variable and depends on the degree of synovial involvement. Common symptoms include pain, swelling, crepitus, and limited range of motion [12]. Delayed diagnosis and treatment can lead to chronic degeneration of the

joint. While synovial chondromatosis is usually benign, rare cases of malignant transformation into chondrosarcoma have been reported [13]. Clinical diagnosis of this entity requires a high index of suspicion due to its uncommon incidence.

Radiographic imaging is typically sufficient for diagnosis when mineralized loose bodies are present. However, in cases where loose bodies are not calcified, computer tomography (CT) may be required to detect calcification, while MRI remains the preferred modality for early detection and to assess the extent of the disease.

The choice of treatment for disseminated knee synovial chondromatosis depends on several factors. These include whether to use minimally invasive arthroscopic surgery or open surgery and whether to perform a single-stage resection of both anterior and posterior compartments or a staged two-part resection. The decision is guided by the extent of the disease, the hospital's resources and availability of arthroscopic equipment, the surgeon's experience, and the patient's preferences.

In this case, the patient exhibited widespread synovial chondromatosis involving both anterior and posterior compartments of the knee, necessitating a staged surgical approach. Open radical synovectomy combined with the

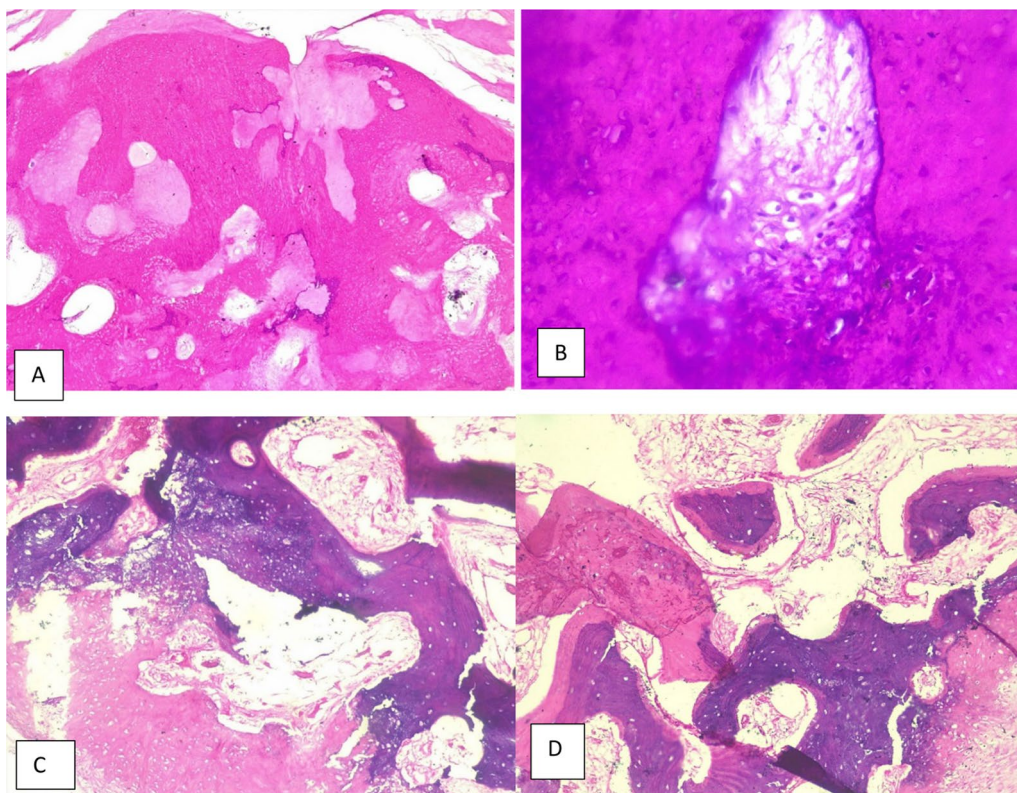


Fig. 3 A–D Histopathology of the sample taken from the patient's knee mass, which has typical characteristics of synovial chondromatosis



Fig. 4 Mass excised from posterior knee compartment 6 weeks after the first surgery and after confirmation of pathology

retrieval of loose bodies resulted in significant symptom relief and a good postoperative range of motion.

Conclusion

Generalized synovial chondromatosis of the knee is a rare condition that can present with significant challenges in management. In severe cases, open retrieval of loose bodies combined with radical synovectomy provides better eradication of the disease and reduces the risk of recurrence. Our case demonstrates the efficacy of a staged anterior and posterior surgical approach for optimal outcomes.

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Author contributions

All authors contributed to the conception, writing, and editing of the case report. All authors are agreed to be accountable for all aspects of it.

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Availability of data and materials

The authors of this manuscript are willing to provide any additional information regarding the case report.

Declarations

Ethics approval and consent to participate

In accordance with our institution's guidelines, ethical clearance is not required for case reports.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal upon request.

Competing interests

The authors declare that they have no competing interests.

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