

Case Resolution

Fabián Caruso, Natalia Promizio, Diego Korol

Orthopedics and Traumatology Service, Hospital Interzonal General de Agudos "Eva Perón", San Martín, Buenos Aires, Argentina

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Synovial Chondromatosis of the Knee

ABSTRACT

Imaging studies showed intra-articular loose bodies, suggesting synovial chondromatosis. This rare, benign condition is characterized by the formation of cartilaginous loose bodies within the joint as a result of metaplasia of the synovial membrane.

Keywords: Chondromatosis; synovial tissue; cartilage.

Level of Evidence: IV

Condromatosis sinovial de rodilla

RESUMEN

Los estudios por imágenes mostraron cuerpos libres intrarticulares, esto sugiere condromatosis sinovial. Se trata de un cuadro raro y benigno caracterizado por la formación de cuerpos libres cartilaginosos intrarticulares, producto de una metaplasia de la membrana sinovial.

Palabras clave: Condromatosis, tejido sinovial, cartílago.

Nivel de Evidencia: IV

DIAGNOSIS: Synovial chondromatosis of the knee.

DISCUSSION

Coronal fat-suppressed proton density (PD)-weighted MRI of the knee showed magnetic susceptibility artifacts related to the ACL reconstruction. The graft had normal signal intensity and morphology. Well-defined low-signal lesions were visible, including a rounded 6-mm lesion anterior to the proximal third of the graft and another rounded 9-mm lesion posterior to its proximal third (Figure 2).

Axial images showed well-defined intra-articular low-signal lesions posterior to the patella and along the intercondylar line, together with increased joint fluid (Figure 3). Sagittal images showed an intact posterior cruciate ligament with normal orientation and an anterior intra-articular low-signal lesion (Figure 4).

Coronal fat-suppressed T2-weighted MRI showed a well-defined intra-articular low-signal lesion, joint effusion, and apparently intact collateral ligaments (Figure 5).

Nine loose bodies were removed arthroscopically and submitted for histopathological examination. The report stated: "Synovium with a villous configuration, increased vascularity, areas of edema and vascular congestion, and active fibroblasts. No significant inflammatory infiltrate is seen. Mature cartilage with foci of mineralization. Diagnosis: synovium with reactive changes and morphological findings consistent with an intra-articular loose body."

Received on July 3rd, 2026. Accepted after evaluation on July 7th, 2026 • Dr. FABIÁN CARUSO • Fabianpabloc@gmail.com  <https://orcid.org/0009-0000-7210-2725>

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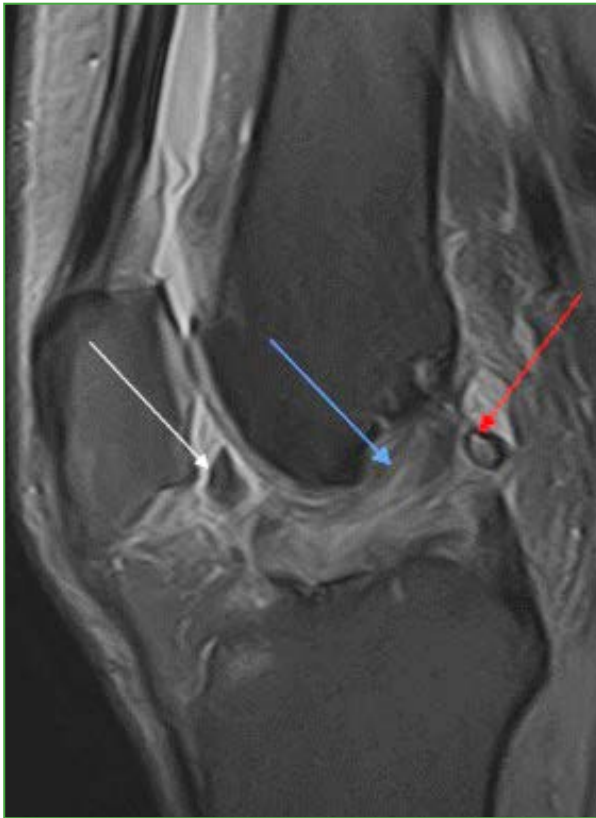


Figure 2. Sagittal fat-suppressed proton density-weighted MRI of the knee showing magnetic susceptibility artifacts related to the anterior cruciate ligament reconstruction. The graft has normal signal intensity and morphology (blue arrow). Well-defined low-signal lesions include a rounded 6-mm lesion anterior to the proximal third of the graft (white arrow) and a rounded 9-mm lesion posterior to its proximal third (red arrow).



Figure 3. Axial fat-suppressed proton density-weighted MRI of the knee showing well-defined intra-articular low-signal lesions posterior to the patella and along the intercondylar line (white arrows), together with increased joint fluid (red arrow).



Figure 4. Sagittal fat-suppressed proton density-weighted MRI of the knee showing an intact posterior cruciate ligament with normal orientation (red arrow) and an anterior intra-articular low-signal lesion (white arrow).

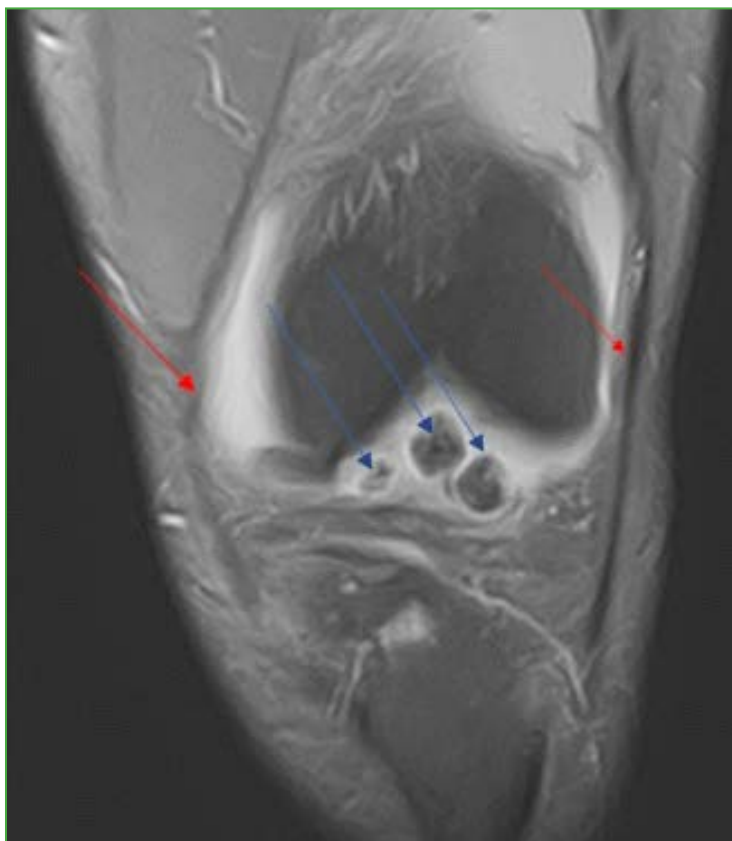


Figure 5. Coronal fat-suppressed T2-weighted MRI of the knee showing well-defined intra-articular low-signal lesions (blue arrows), joint effusion, and apparently intact collateral ligaments (red arrow).

The patient returned to physical activity without complications, with full knee range of motion and no limitations or locking.

Vasudevan et al. describe synovial chondromatosis as a rare, benign condition characterized by metaplastic transformation of the synovial membrane, resulting in multiple intra-articular cartilaginous bodies.¹

The condition predominantly affects men aged 20–50 years and has a prevalence of 1 in 100,000 people.¹ Although considered nonaggressive and self-limiting, synovial chondromatosis can cause substantial joint damage if not adequately treated.¹ According to Yin-Tsi Palma and Gómez, MRI can identify complications associated with ACL repair and distinguish between complete and partial tears in cases of graft failure, helping guide treatment decisions.² It is also the imaging modality of choice for identifying anterior arthrofibrosis and helps rule out intra-articular collections and soft tissue infection after surgery.² Alvarez-Lopez et al. note that the many advantages of arthroscopy make it the most effective surgical approach for diagnosing and treating patients with intra-articular loose bodies.³ Diagnosis rests on clinical, imaging, and arthroscopic findings, and treatment involves several successive stages.³ Diagnosing synovial chondromatosis of the knee requires a thorough clinical assessment and diagnostic imaging.⁴ Plain radiographs may reveal intra-articular calcifications, although these are not always visible in the early stages.⁴ MRI is useful for detecting intra-articular loose bodies, assessing cartilage condition, and determining the extent of synovial involvement.⁴

Treatment of synovial osteochondromatosis is surgical and involves excision of the nodules, with or without total synovectomy. An open or arthroscopic approach is chosen according to fragment size, location, and the surgeon's experience. Surgery should be performed early when the condition is clinically suspected to prevent progressive joint deterioration and even malignant transformation into chondrosarcoma.⁵ MRI findings vary with the degree of mineralization. The most common pattern, present in 77% of cases, consists of low-to-intermediate signal intensity on T1-weighted images and very high signal intensity on T2-weighted images, with low-signal calcifications.⁶ These MRI signal characteristics and the low attenuation of nonmineralized regions on CT reflect the high water content of cartilaginous lesions.⁶ In the early stages, bone scintigraphy is positive, while CT and MRI may help locate loose bodies.⁷

Synovial chondromatosis is characterized by the formation of metaplastic chondroid nodules in the subsynovial connective tissue of the synovial membrane lining joints, tendon sheaths, and bursae.⁸ These nodules often protrude into the joint cavity, become pedunculated, and detach to form loose bodies.⁸ They may continue to grow within the synovial fluid, which supplies their nutrients. The knee is the most frequently affected joint.⁸ Radiographically, the condition is characterized by calcified bodies associated with the joint cavity. Pathological examination shows characteristic gross findings: areas of synovial membrane with sessile or pedunculated nodules of varying sizes and loose bodies ranging from 1 mm to several centimeters in diameter.⁸ Comba et al. evaluated 10 patients who underwent hip arthroscopy between 2007 and 2011. None had other relevant medical history or disease at another site.⁹ Six were athletes, including three engaged in high-demand sports: two cyclists and one marathon runner. Diagnosis followed a protocol of clinical examination, radiographs, and MRI and was confirmed in all cases by subsequent histological examination. MRI showed findings characteristic of synovial chondromatosis in every case.⁹ MRI is also recommended for detecting synovial abnormalities, including nodules or thickening that may suggest the diagnosis.¹⁰ Nevertheless, the most effective diagnostic method is histopathological examination of a synovial biopsy, which reveals nodules of mature hyaline cartilage in the subsynovial layer of the synovial membrane, as well as mature cartilage nodules with central ossification and osteoblastic rimming.¹⁰

In our case, the patient's history and clinical presentation prompted MRI to establish the diagnosis and guide management, as described by Yin-Tsi Palma and Gómez. Following the approach described by Alvarez-Lopez et al., we proceeded with surgical exploration and removal of nine small loose bodies of synovial origin (1 cm x 0.6 cm and 0.9 cm), which were submitted to the pathology department. The patient continued rehabilitation and returned to his usual activities without complications.

Conflicts of interest: The authors declare no conflicts of interest.

N. Promizio ORCID ID: <https://orcid.org/0009-0009-4296-7395>

D. Korol ORCID ID: <https://orcid.org/0009-0004-7973-1144>

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