Intrameniscal Gouty Tophi in the Knee

A Case Report

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Case: We report a case of recurrent acute arthritis and restricted range of motion in the knee joint, with magnetic resonance imaging subsequently detecting a nodular lesion within the lateral meniscus. Knee arthroscopy and histology revealed that the lesion was intrameniscal gouty tophi. After arthroscopic synovectomy and excision of the tophi, the symptoms resolved and the patient remained symptom-free at two years of follow-up.

Conclusion: Surgeons should be aware of the presence of such pathology and consider arthroscopic surgery if the mechanical symptoms persist.

Gout is the most common cause of inflammatory arthritis among adult men[1]. The nociceptive pain experienced during an acute attack of gout is related to inflammation caused by the deposition of monosodium urate crystals (tophi) onto the synovial tissues of a peripheral joint, typically a metatarsophalangeal joint.

Although subcutaneous gouty tophi are common late clinical manifestations, symptomatic intra-articular gouty tophi of the knee are rarely reported[2-9]. Furthermore, to our knowledge, there are no reports of intrameniscal gouty tophi of the knee. In this report, we describe a case of limited knee joint range of motion caused by intrameniscal gouty tophi, as well as its successful treatment with arthroscopic surgery.

The patient was informed that data from this case would be submitted for publication, and he provided his consent.

Case Report

A thirty-six-year-old man reported that he had experienced repeated episodes of right knee swelling and pain, without any known trauma, for the preceding two years, and had previously consulted a different hospital. The previous laboratory testing revealed high C-reactive protein (CRP) levels and hyperuricemia, and gouty arthritis was diagnosed. After receiving anti-inflammatory medication and allopurinol, the knee swelling and pain were controlled.

However, he subsequently presented to our hospital because of a week-long history of pain and restricted range of motion in the knee joint. Physical examination of the knee detected swelling and tenderness along the anterolateral joint space. The passive range of knee motion was restricted to between 25° and 110°, and the Watson-Jones (knee extension) test induced knee joint pain at the anterolateral aspect. However, the results of tests for anti-cyclic citrullinated peptide antibodies, rheumatoid factor, and other antibody markers of collagen disease-induced arthritis were all negative. The synovial fluid was turbid, with a substantially elevated cell count and neutrophil fraction, although bacterial cultures were negative. Polarized light microscopy revealed crystals consistent with monosodium urate in the joint fluid, although a roentgenogram of the knee joint did not indicate any abnormalities (e.g., calcification or bone erosion). Noncontrast magnetic resonance imaging (MRI) revealed nodular swelling at the anterior horn of the lateral meniscus, with low intensity on the T1-weighted images and intermediate-high heterogeneous intensity on the fat-suppressed T1 and T2-weighted images (Fig. 1). On the basis of these findings, we suspected gouty arthritis with some pathologic meniscal lesions. As the pain and restricted range of motion persisted for four months and we did not reach a definitive diagnosis, arthroscopic surgery was performed to diagnose and treat the condition. The arthroscopy revealed large deposits of urate crystals on the surface of the synovium and articular cartilage, although there were no erosions or defects in the articular cartilage (Fig. 2-A). The anterior horn of the lateral meniscus was focally swollen, without an obvious meniscal tear, and was

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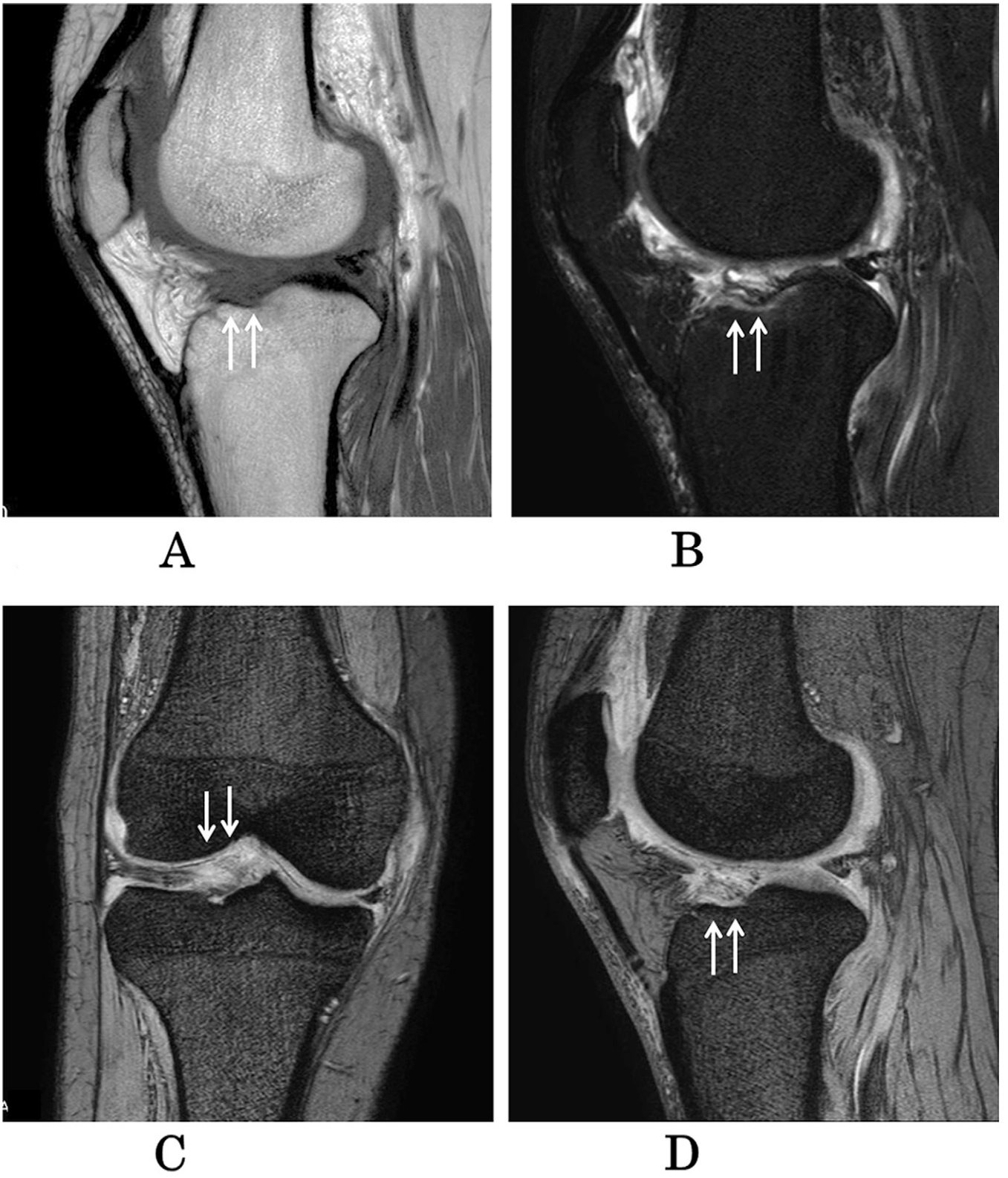


Fig. 1

Noncontrast MRI. Sagittal T1-weighted (TR = 654, TE = 20) image (**Fig. 1-A**), sagittal fat-suppressed T2-weighted (TR = 6383, TE = 80) image (**Fig. 1-B**), and coronal and sagittal (TR = 631, TE = 9.2) fat-suppressed T1-weighted images (**Figs. 1-C and 1-D**) reveal nodular swelling at the anterior horn of the lateral meniscus, with low intensity on T1-weighted images and intermediate-high heterogeneous intensity on fat-suppressed T1 and T2-weighted images (arrows).

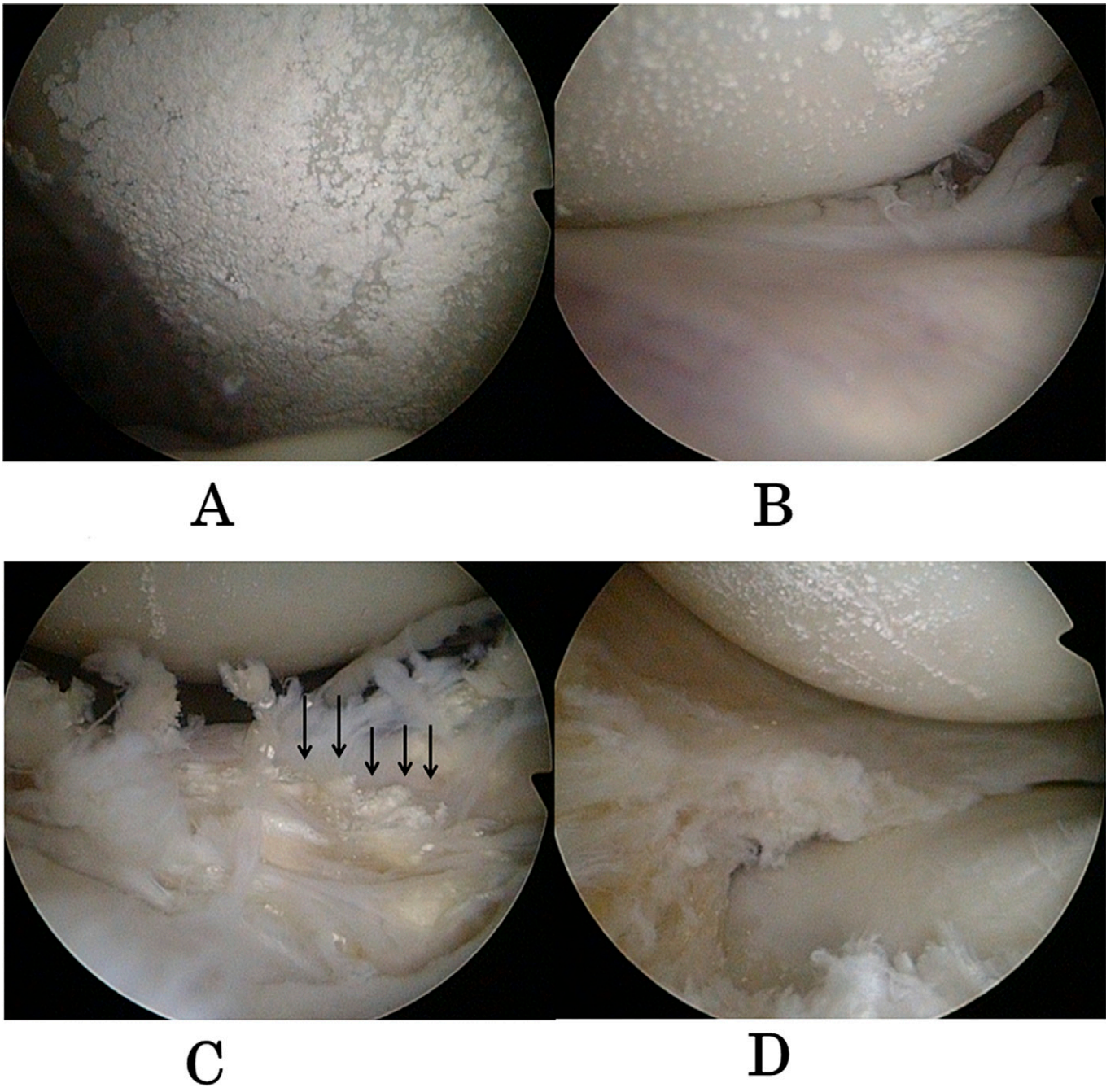
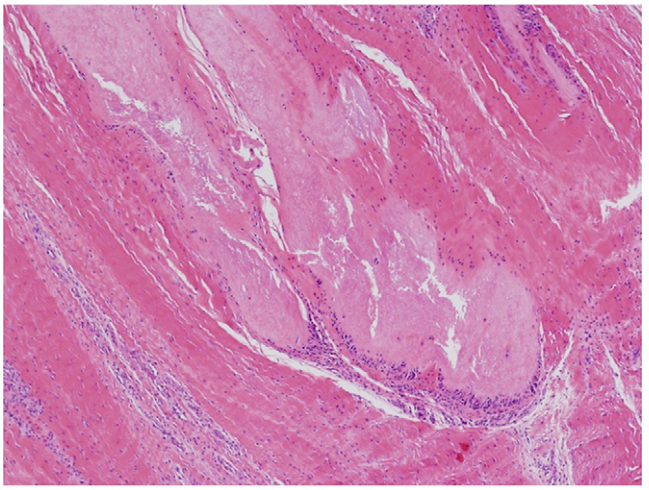


Fig. 2

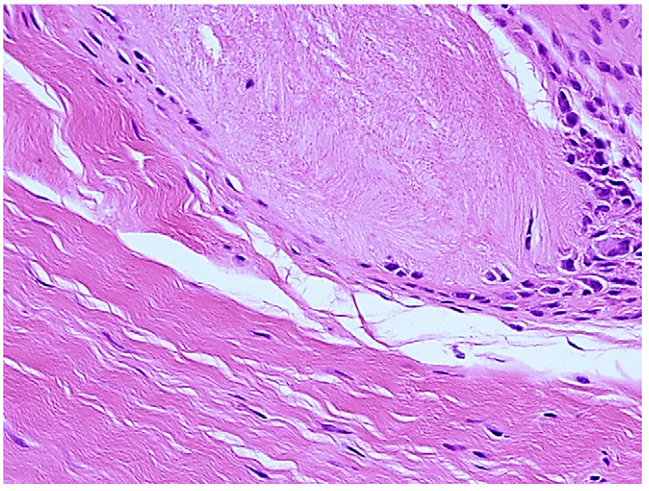
Intraoperative arthroscopic views. **Fig. 2-A** Chalky white deposits on the cartilage of the femoral condyle. **Fig. 2-B** The anterior part of the lateral meniscus is swollen and covered with synovium. **Fig. 2-C** Intrameniscal crystal deposits (arrows) are visible after shaving. **Fig. 2-D** The view after partial meniscectomy.

covered with synovium (Fig. 2-B). The synovium and surface of the lateral meniscus were partially excised using a shaver, and crystal deposits were observed inside the meniscus (Fig. 2-C). Therefore, we performed synovectomy and partial meniscectomy of the lateral meniscus (Fig. 2-D). Histologic results revealed urate deposits in the collagen fibers of the meniscal tissue, which were surrounded by giant and inflammatory cells (Fig. 3).

Pain and knee extension restriction were dramatically alleviated, and early full weight-bearing was allowed; the patient was discharged three days after the surgery. The patient had full active and passive range of motion two weeks after the surgery. Two years after the surgery, he had no symptoms and no further impairment during the follow-up examination, with full range of motion of the knee joint.



A



B

Fig. 3

Histologic results reveal urate deposits in the collagen fibers of the meniscal tissue, which are surrounded by giant and inflammatory cells (hematoxylin and eosin, original magnification ×100 [**Fig. 3-A**] and ×400 [**Fig. 3-B**]).

Discussion

Gouty tophi lesions are rarely detected in the knee joint[2-9]. According to previous reports, when gouty tophi do occur in the knee, they typically arise in the intercondylar notch, suprapatellar bursa, infrapatellar fat pad, lateral gutter, and tibial plateau[1]. Espejo-Baena et al. described a single case of gouty tophi growing from the anterior horn of the lateral meniscus, although they existed outside of the meniscus[3]. To our knowledge, this is the first report of intrameniscal gouty tophi that were successfully diagnosed and treated with arthroscopic surgery.

In the present case, after considering the presence of gouty arthritis and severe nodular swelling of the lateral meniscus on MRI, we suspected intrameniscal gouty tophi. Ko et al. reported that MRI findings of tophi are typically nonspecific, although most lesions exhibit low-intermediate signal intensities on the T1-weighted images and low-intermediate heterogeneous signal intensities on the T2-weighted images[10]. As our MRI findings were slightly different from their observations, the possibility of a degenerative meniscal tear or other causes could not be completely excluded. We eventually reached a definitive diagnosis based on our arthroscopic findings (synovial proliferation with severe deposition on the joint surface and inside the lateral meniscus) and the histology of the intraoperative specimens.

Gouty tophi are formed by the deposition of urate, protein matrix, and inflammatory cells on the tendons, cartilage, bone, or other soft tissues[6,9,11]. Theoretically, gouty tophi can develop in any joint structure, although we could not detect an obvious reason for the gouty tophi formation in the meniscus. Therefore, because of the proliferation of the synovium around the mass and the severe urate deposition, we speculate that the formation of the tophi might have been induced by the formation of a gap or cyst inside the meniscus as a result of a minor meniscal tear or degeneration.

There have been several reports regarding the treatment of intra-articular gouty tophi. Chatterjee and Ilaslan reported one case in which the pain was successfully treated with allopurinol therapy alone for three months, without arthroscopic surgery[4]. In contrast, Espejo-Baena et al. treated gouty tophi on the surface of the meniscus with arthroscopic resection, which alleviated the patient's symptoms[3]. Also, Li et al. reported a rare case of intra-articular gouty tophi that resulted in misdiagnosis for eight years on the basis of the clinical picture and MRI appearance. They stated that a case of gouty tophi is a "great mimic," given its ability to resemble multiple conditions, although they suggested that persistent mechanical symptoms might be an indication for arthroscopic treatment[5]. In the present case, we could not reach a definitive diagnosis of a meniscal lesion on the basis of the physical examination, MRI findings, and persistent restriction of knee motion for four months despite the administration of antiuremic medication, unlike the case reported by Chatterjee and Ilaslan. Therefore, we decided to perform arthroscopic surgery. Because the patient's symptoms and range of motion restriction dramatically improved and no recurrence was observed for two years after the surgery, we concluded that the arthroscopic surgery was effective in the present case.

Surgeons should be aware of the presence of similar pathologies and consider arthroscopic surgery if the mechanical symptoms persist, as this procedure can provide a definitive diagnosis and pain relief promptly. ■

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