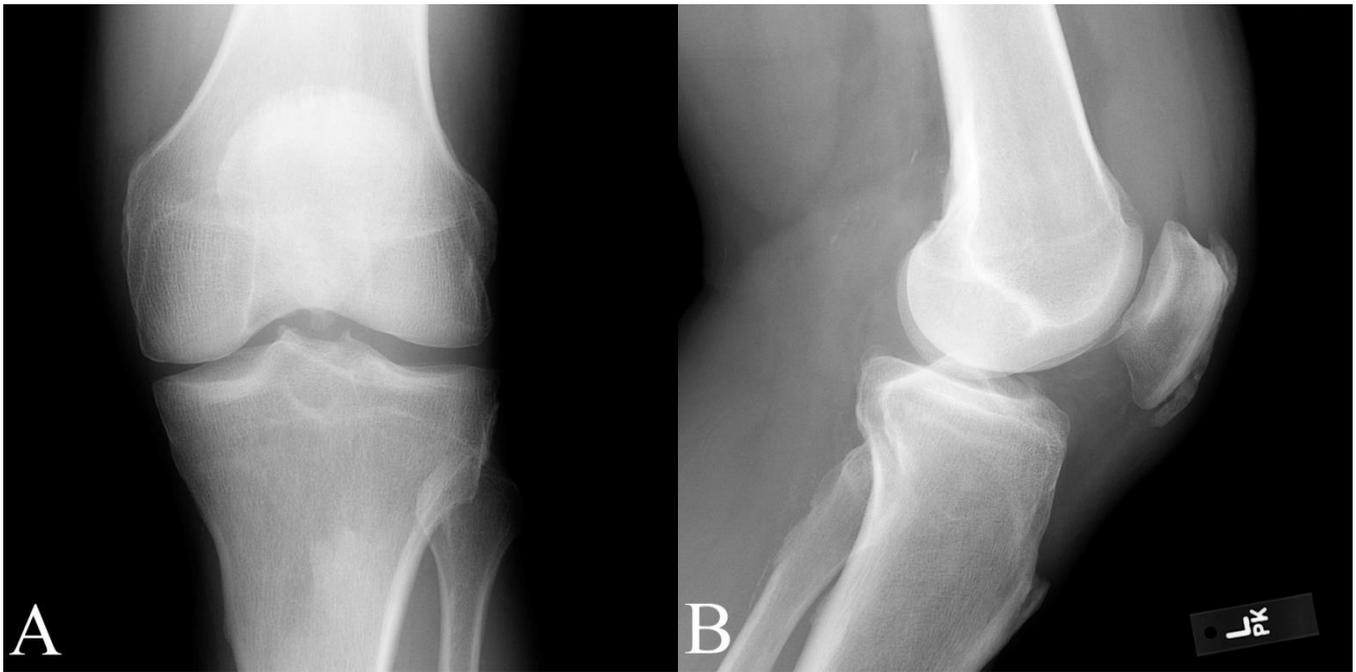


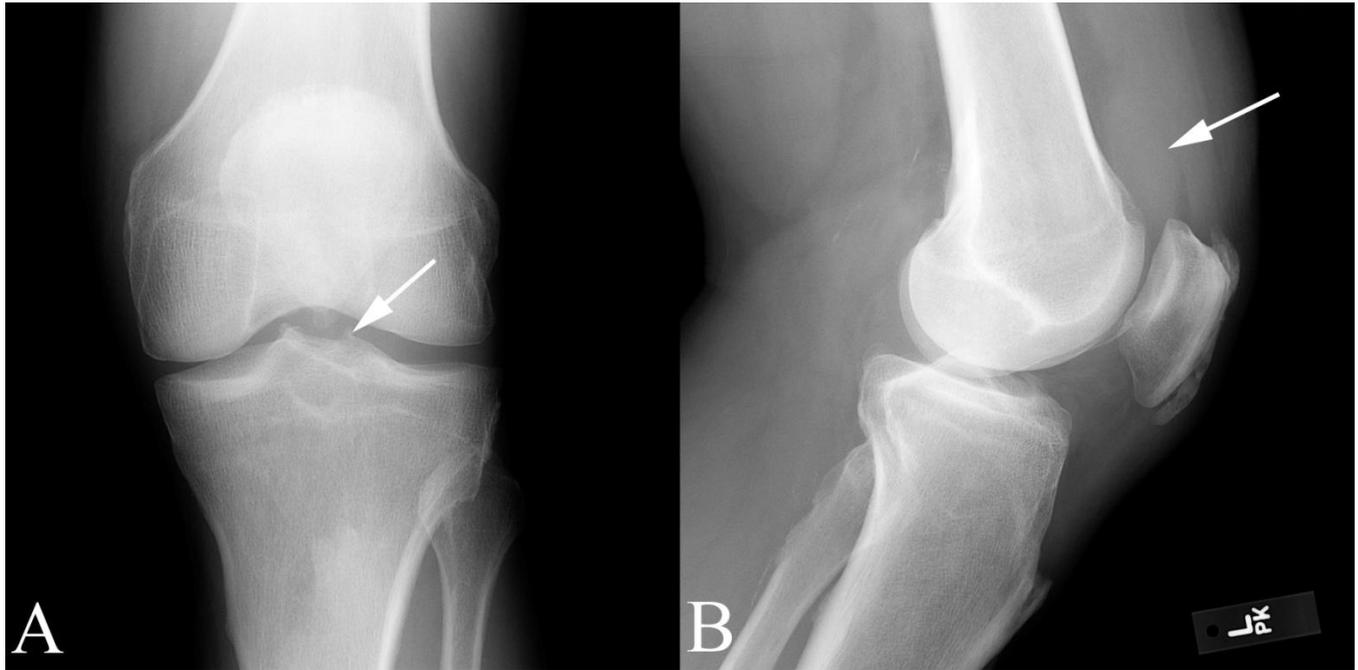
CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 73 year old man presented to clinic with a history of pain of two weeks' duration in the knee. The pain started when the patient stood up after sitting for a period of time. He subsequently found it painful to stand and painful to bear weight, but continued his normal active life. He had a history of osteoarthritis and gout. On the patient's initial visit, the patient's knee was mildly swollen and felt warm. There was crepitus with full extension. There is a negative anterior drawer sign. There was fullness in the suprapatellar joint and there was medial joint line tenderness. Given the patient's prior history, a presumptive diagnosis of a flare of gout was made and the patient was treated with indomethacin and counseled to avoid alcohol. He had transient relief of symptoms but his pain returned. On a return visit two weeks following the first visit the patient had similar complaints and physical exam findings. The patient had a plain film examination of the knee:



Which of the following imaging studies would be *most* helpful in further evaluation of this patient?

- (a) magnetic resonance (MR) imaging of the knee
- (b) nuclear medicine bone scan of the whole body
- (c) computed tomography (CT) of the knee
- (d) ultrasound of the deep venous system of the lower extremity

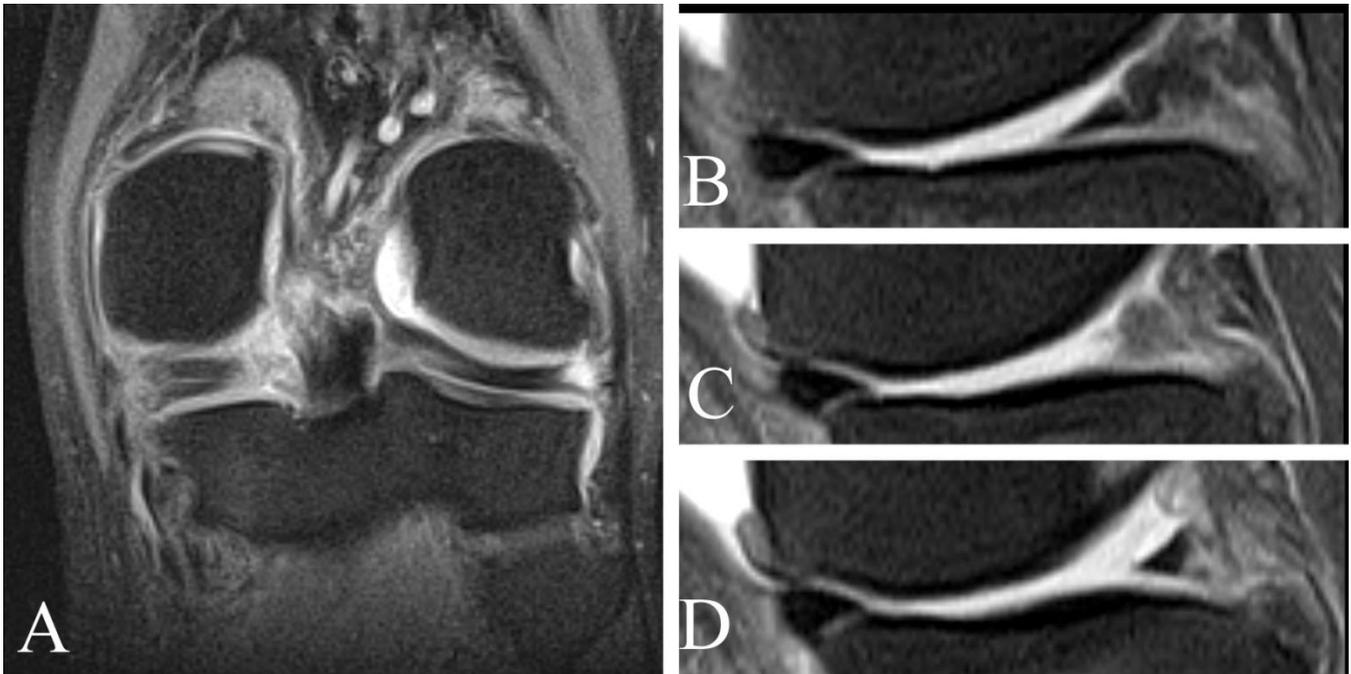
RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

The plain film demonstrates osteophytes of the tibial spine (arrow in A) and a joint effusion (arrow in B). Given his medial knee joint pain, a medial meniscal tear was suspected. MR imaging of the knee (a) would be the most helpful imaging study in further evaluation of possible meniscal tear, and (a) is correct.

Nuclear medicine bone scan of the whole body (b) may be used for evaluation of metastatic malignancy, and shows increased radiotracer localization at the site of increased bone turnover, such as areas of infection, stress or post-traumatic fracture, tumor, and active erosion from inflammation. However, a bone scan is not typically the most helpful in further evaluation in patients suspected of having a meniscal tear, and (b) is incorrect. CT of the knee may be used for evaluation of known widely displaced fractures (see RQW#100), but is not the next study of choice in the setting of chronic knee pain, and (c) is incorrect. Ultrasound of the deep venous system of the lower extremity is useful in the setting of suspected deep venous thrombus, but the patient did not have any leg swelling or warmth and the suspicion was for medial meniscal tear (and not deep venous thrombosis), so (d) is incorrect.

IMAGING STUDY AND QUESTIONS

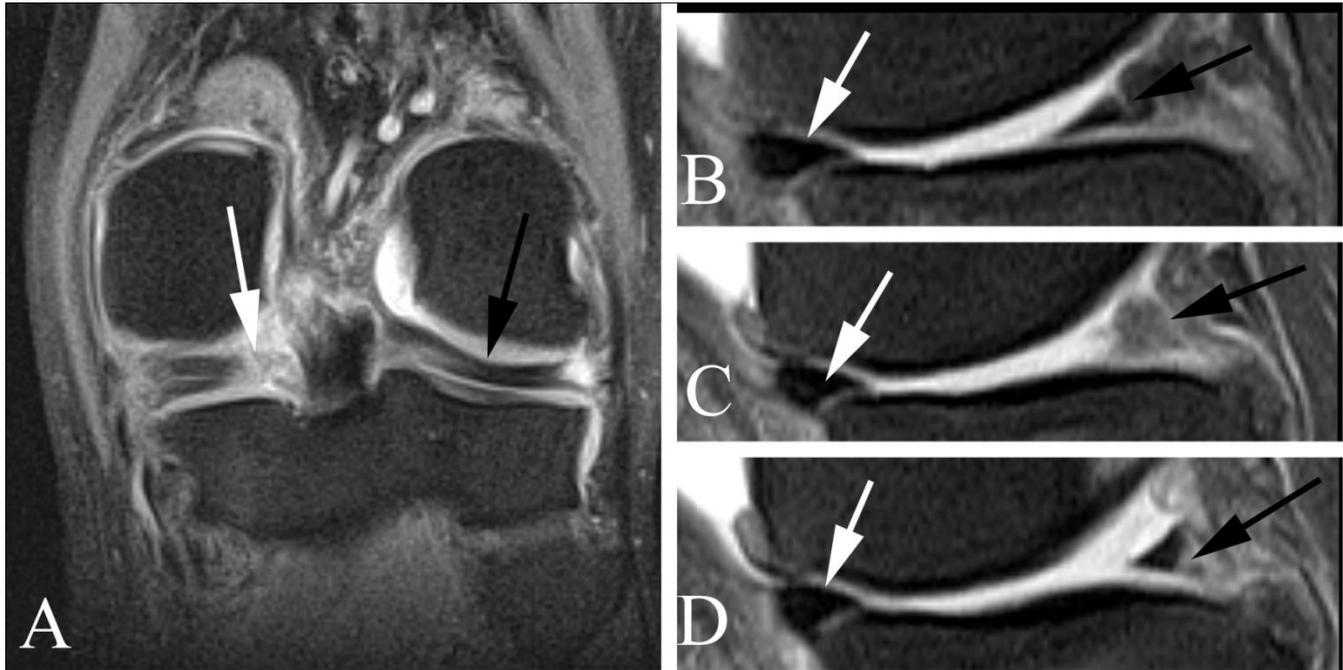
An imaging study was performed:



Imaging questions:

- 1) What type of study is shown?
- 2) Are there any abnormalities?
- 3) What is the most likely diagnosis?
- 4) What is the next step in management?

IMAGING STUDY QUESTIONS AND ANSWER



Imaging questions:

- 1) What type of study is shown? A knee magnetic resonance (MR) imaging study. A is a coronal fat-saturated proton density image, and B through D are sequential medial-to-lateral (cropped) images through the meniscus.
- 2) Are there any abnormalities? Yes. A demonstrates discontinuity of the lateral aspect of the medial meniscus (white arrow). Compare the appearance of the medial meniscus to the intact lateral meniscus (black arrow). B through D demonstrate a normal anterior horn of the medial meniscus (white arrows) and a distorted, torn posterior horn of the medial meniscus (black arrows). Note that there is a “ghost” of a meniscus in C, with grey (instead of the normal black) signal intensity at the location of the tear.
- 3) What is the most likely diagnosis? Radial tear of the medial meniscus.
- 4) What is the next step in management? Counsel the patient regarding potential treatment for meniscal tears; consider orthopedic referral.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

The patient was referred to orthopedics. This was approximately 5 weeks after the initial onset of the patient's pain. The patient was re-examined and found to have swelling of the knee with loss of normal contours, but the patella was not ballotable. The patient had full extension of the knee and could flex his knee such that his foot was within 8 inches of his buttocks. He had no valgus or varus laxity and a negative anterior and posterior drawer test. He had 5 out of 5 knee extension and flexion and 5 out of 5 plantar and dorsiflexion at the ankle, and 5 out of 5 toe flexion and extension. He had full sensation in his toes, as well as normal motion of the toes. He had brisk capillary refill and a 2+ posterior tibial pulse. He had a positive McMurray's sign. The patient had no locking symptoms either spontaneously or on physical examination. The patient did state that the pain was slightly better over the past 2-3 weeks.

The orthopedic consultant told the patient that while his pain was likely coming from a torn meniscus, this was not a medical emergency and that although surgery could be performed, it was reasonable to adopt a "wait and see" course of action given the patient's slight improvement over the prior two to three weeks. The patient was instructed to take NSAIDS and wear a knee brace as needed and return for additional evaluation in 6 weeks.

At a six week follow-up visit he had improved with decreased pain. He did not experience any catching or locking symptoms. His knee pain had actually become overshadowed by hip pain. Whereas his knee pain was at worst about a 4 out of 10 and never bothered him at rest, his hip pain was up to a 6 or 7 out of 10 and bothered him even at night in bed. The patient was subsequently found to have hip osteoarthritis which responded transiently to intra-articular injection of steroids but which eventually required hip prosthesis placement for hip pain and limitation of activities. His knee pain gradually completely remitted.

Note that in cases such as this, it is sometimes difficult to ascertain with certainty whether the meniscal tear is actually the cause of pain. Many older patients may demonstrate asymptomatic meniscal tears, and often have co-existing articular cartilage loss from osteoarthritis, and it may not be possible to say with certainty whether the meniscal tear or osteoarthritis is the cause of medial compartment knee pain.

SUMMARY

Presenting symptoms: The patient presented with non-traumatic knee pain. There is a long list of possible causes of such pain, including osteoarthritis, other types of arthritis, bursitis, infection, stress fracture, tendinitis, meniscal tear, Baker's cyst, and tumor. The first step in evaluation is, of course, a history and physical examination, and the location of the knee pain may be quite helpful. Given the patient's history of gout, the likelihood of a gout attack was relatively high. The patient's pain was predominantly along the medial joint line, favoring osteoarthritis (which generally occurs medially) or a medial meniscal tear.

Imaging work-up: The initial imaging examination in patients with nontraumatic knee pain is typically a plain film study including an anteroposterior (AP) and lateral study. Techniques vary from one radiology department to the next. Many departments will obtain standing radiographs if the patient is ambulatory (this better demonstrates articular cartilage thickness). In addition to the standard AP and lateral exams, an axial (or "sunrise") view the patella and a femoral "notch" view may be obtained. In the setting of trauma, the study may be done with the patient on the table, and oblique views obtained rather than the "notch" examination. Additional imaging is usually done only after the knee plain film, and is predicated on the history, physical examination, laboratory results, and the results of the plain film. MR is usually the next imaging study of choice given the ability to depict a wide range of bone and soft tissue abnormalities which may cause knee pain.

Establishing the diagnosis: The reference standard for meniscal tears is arthroscopic evaluation of the knee. Magnetic resonance is approximately 90% accurate for evaluation of meniscal tears using knee arthroscopy as the reference standard.

Take-home message: The initial imaging study of choice for virtually all patients with nontraumatic knee pain is a plain film examination. Additional studies are based on the history and physical examination, laboratory results, and the results of the plain film study. MR of the knee is generally the next imaging study performed given the ability of MR to depict a wide variety of bone and soft tissue abnormalities that may cause knee pain.

FURTHER READING

Anderson RJ, Anderson BC. Evaluation of the active adult patient with knee pain. UpToDate.com, accessed 5/18/12.

Boden SD, Davis DO, Dina TS et al. A prospective and blinded investigation of MRI of the knee. Abnormal findings in asymptomatic individuals. Clin Orthop 1992;282:177-185

Modarresi S, Jude CM. Radiologic evaluation of the acutely painful knee in adults. UpToDate.com, accessed 11/16/09.

Renfrew DL. Single joint pain. Chapter 14 in *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at www.symptombasedradiology.com.