

## CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 66 year old woman comes in for a Medicare annual wellness examination. The patient is 5' 1" tall and weighs 259 lbs. Her temperature is 98.1, pulse 72, respirations 16, and blood pressure 130/80. Ongoing issues include anxiety, asthma, depression, hypercholesterolemia, hypothyroidism, and irritable bowel syndrome. She has been on a weight reduction diet and has lost 30 pounds. She describes gradually increasing bilateral knee pain which is worse with activity and which remits with rest. She has no morning stiffness. She has occasional right knee clicking. On physical examination, she has full extension of both knees with bilateral medial greater than lateral joint line tenderness. There is no joint warmth and there is no instability with varus or valgus stress. The patient does not have knee symptoms with hip rotation.

Which of the following imaging studies is the best first step for imaging evaluation?

- (a) bilateral plain film examination of the knees
- (b) ultrasound study of both lower extremities
- (c) computed tomography (CT) examination of both knees
- (d) magnetic resonance (MR) imaging of both knees

## RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

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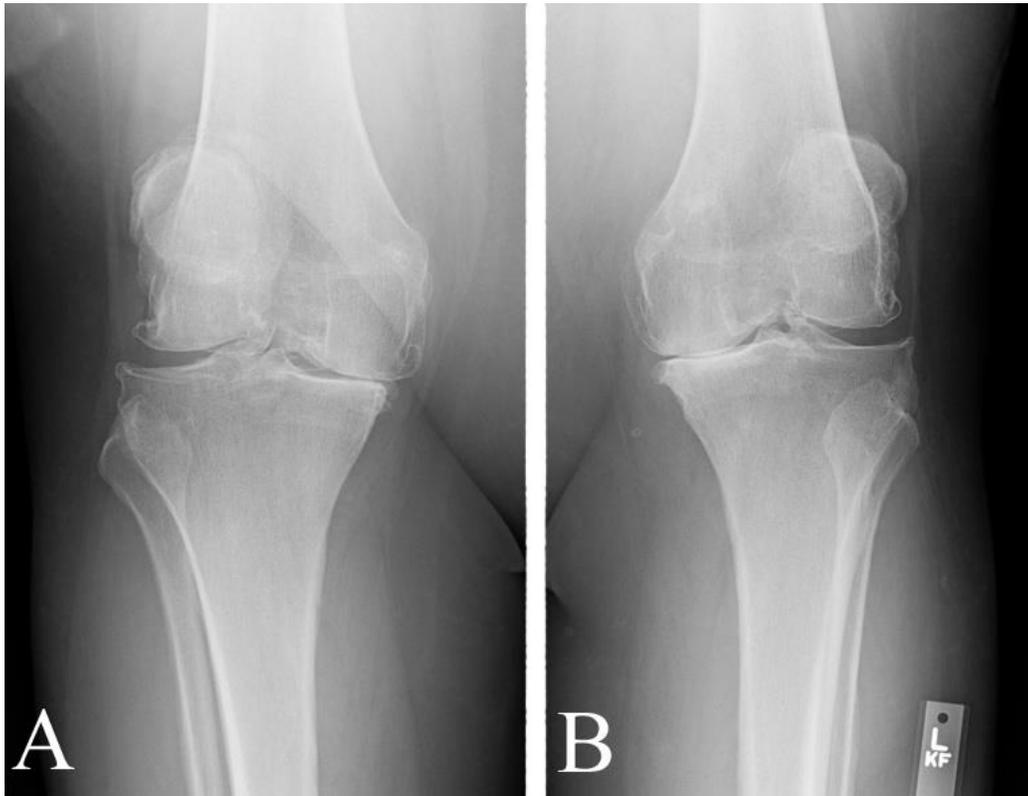
- (a) bilateral plain film examination of the knees
- (b) ultrasound study of both lower extremities
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Bilateral plain film examination of the knees (a) is the correct answer. In general, if imaging of the extremities is done, the best first step is usually a plain film examination. The patient's clinical symptoms suggest arthritis, specifically osteoarthritis also known as degenerative joint disease, and plain films offer an excellent first imaging study in the evaluation of this process.

Ultrasound of both lower extremities (b) may be helpful in the case of bilateral leg swelling especially if there are risk factors (recent surgery, prolonged immobilization, pulmonary embolism, prior history) for deep venous thrombosis, but is not the best first step in imaging evaluation in patients with suspected osteoarthritis, and (b) is incorrect. CT is generally used in evaluation of known or suspected fractures (in the setting of normal or equivocal plain films) or when MR is contraindicated (in which case CT may be performed after intra-articular contrast material injection). CT is generally performed only *after* plain film examination, however, and (c) is incorrect. MR may also be used to evaluate for radiographically occult fractures and also may be used for evaluation of suspected soft tissue injuries (meniscal tears, cruciate ligament tears, musculotendinous tears) and tumors. However, as with CT, MR is generally performed only *after* plain film evaluation, and (d) is incorrect.

## IMAGING STUDY AND QUESTIONS

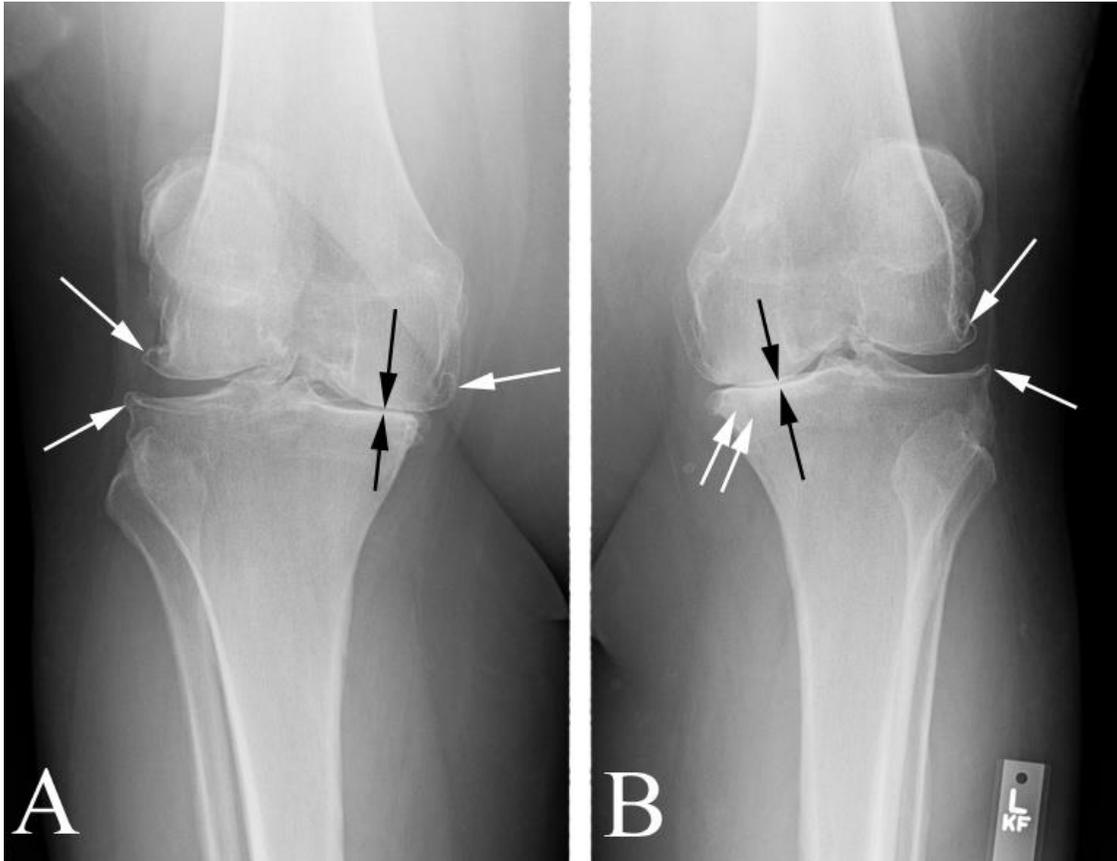
The patient underwent an imaging study:



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

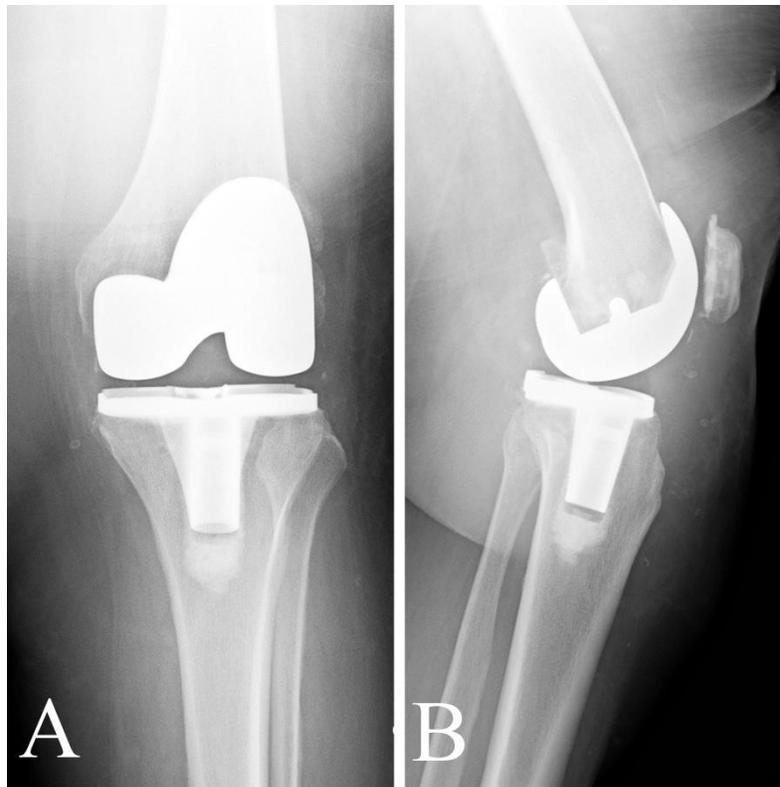


### Imaging questions:

- 1) What type of study is shown? An antero-posterior (AP) plain film examination of the right (A) and left (B) knee. These studies were performed with the patient standing. Additional plain films taken at the same time (not shown) included lateral, sunrise, and notch views of both knees.
- 2) Are there any abnormalities? Yes. There is osteophytic spurring (single white arrows), medial compartment joint space narrowing (black arrows), and subchondral sclerosis (double white arrows).
- 3) What is the most likely diagnosis? Given the patient's age (greater than 50 years), lack of morning stiffness, crepitus, joint tenderness, lack of palpable warmth of the joint, and radiographic findings, the most likely diagnosis is osteoarthritis.
- 4) What is the next step in management? In general, nonpharmacologic interventions and acetaminophen, progressing to nonsteroidal anti-inflammatory oral medications, intra-articular steroid injection, and adjunctive therapy, either before or after referral to an orthopedic surgeon for further evaluation.

## PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

The patient was treated with prn acetaminophin for over two years with gradually increasing knee pain. She was successful in losing some weight but remained obese. The patient was referred to an orthopedic surgeon who performed a history and physical examination, and reviewed the radiographs. The surgeon performed sequential left followed by right intra-articular joint injections with steroids and the patient underwent instruction in “joint class” which included discussion of the disease, physical limitations, therapeutic options, and risk and benefits of different approaches to management. The patient achieved excellent but transient pain relief with intra-articular steroid injection. Her knee pain was inhibiting her activities of daily living. Staged left (see figure) and right knee arthroplasties were performed. The patient had excellent pain relief following knee prosthesis placement and was able to perform activities of daily living following rehabilitation therapy after surgery.



67 year old woman with left total knee prosthesis for disabling, painful osteoarthritis following failure of conservative management. A. AP knee exam demonstrating the knee prosthesis. B. Lateral knee exam demonstrating the knee prosthesis.

## SUMMARY

**Presenting symptoms:** The patient had typical features of osteoarthritis including an age of greater than 50, minimal morning stiffness, crepitus, and bone tenderness. The other main considerations for these features would be calcium pyrophosphate crystal deposition (CPPD) disease and rheumatoid arthritis (although RA would typically be accompanied by morning stiffness and joint warmth, which the patient did not have).

**Imaging work-up:** Plain films of the knee add to diagnostic accuracy in the diagnosis of osteoarthritis. The finding that is most useful in establishing the diagnosis of osteoarthritis is osteophyte formation. Joint space narrowing may be seen in other arthropathies (for example, in rheumatoid arthritis). The *lack* of chondrocalcinosis argues against CPPD.

**Establishing the diagnosis:** The “classic criteria” method of the American College of Rheumatology bases the diagnosis of osteoarthritis on the presence of knee pain plus at least three of the following six clinical characteristics: age greater than 50 years, morning stiffness for less than 30 minutes, crepitus on active motion of the knee, bony tenderness, bony enlargement, and no palpable warmth. The presence of osteophytes on radiographs increases the diagnostic accuracy of the criteria.

**Take-home message:** Plain films of the knees increases the diagnostic accuracy of the diagnosis of osteoarthritis. Plain films are the first step in imaging of bilateral knee pain in a patient suspected of having osteoarthritis, and should be performed prior to other imaging studies.

### FURTHER READING

Kalunian KC. Diagnosis and classification of osteoarthritis. UpToDate, accessed 3/13/12.

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Martin GM, Thornhill TS. Total knee arthroplasty. UpToDate, accessed 3/13/12.

Renfrew DL. Polyarthritits, musculoskeletal masses, and osteoporosis. Chapter 13 in *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at [www.symptombasedradiology.com](http://www.symptombasedradiology.com).