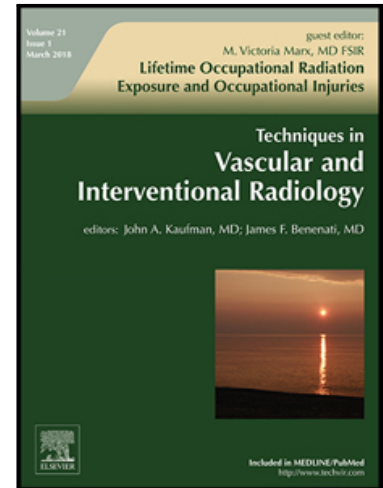


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Abstract

The evaluation of a patient with knee osteoarthritis (OA) has three main components: clinical history, physical examination and radiographic imaging. The clinician should assess for inciting and aggravating factors for the knee pain as well as for the presence of any mechanical symptoms. A history of prior knee injury or surgery can suggest the development of early osteoarthritis. A thorough physical examination of the knee should be performed. Some features of OA includes limited range of motion, crepitus in the patellofemoral compartment, and joint line tenderness. Depending on the severity of OA varus or valgus alignment can develop. Special tests such as the McMurray for meniscal tears may cause increased pain as patients with OA will often have degenerative meniscal tears. Weight bearing radiographs can confirm the diagnosis of OA. Several scales exist to grade the severity of OA with the Kellgren-Lawrence being one that is often used. Radiographic features of OA include joint space narrowing, osteophytes, sclerosis of bone and bone end deformities. If after the above evaluation the diagnosis is still unclear, advanced imaging or laboratory testing can be performed to evaluate for alternative diagnoses.

The evaluation of a patient with knee osteoarthritis (OA) has three main components: clinical history, physical examination and imaging. The clinical history of knee pain is extremely important and can help develop a differential diagnosis to later be narrowed based on physical exam and imaging findings. There are several important factors including the specific location of the pain, what aggravates and relieves the pain, when the onset of pain occurred, as well as any clicking, locking, instability or swelling. A history of anterior knee pain without trauma that is made worse with going up/downstairs, prolonged sitting (also known as the theater sign) and pain that occurs with running is common in patellofemoral pain syndrome. The same presentation can occur in patients with patellofemoral OA. If a patient presents with medial or lateral knee pain with sudden twisting, there is concern for an acute or degenerative meniscal tear and/or possible OA. A patient who presents with a valgus trauma may have suffered a medial collateral ligament (MCL) injury while presenting with a varus trauma may indicate a lateral collateral ligament (LCL) injury. Lastly, posterior knee pain could be from the development of a Baker's cyst that has developed from an acute knee injury or underlying OA.

A history of previous knee injury or surgery may be of significant help in diagnosis. Past anterior cruciate ligament (ACL) injury and reconstruction can lead to anterior knee pain if a patellar tendon or quadriceps tendon graft was used. Those patients also have an increased risk of early OA. Locking of the knee could represent a significant meniscal tear (bucket handle tear), loose body or severe OA. Feeling of instability or the knee

giving away can be due to an ACL tear but also can be due to muscle weakness or inhibition secondary to pain (1).

Physical examination should begin with inspection of the knee with the patient standing and supine. The clinician should look for quadriceps and calf atrophy; quadriceps atrophy is most commonly seen in the vastus medialis oblique. Knee alignment should also be noted, looking for signs of varus or valgus deformity secondary to loss of joint space in the medial or lateral compartment as well as a gross limb length discrepancy. Lastly, observe for signs of an intra-articular effusion which can obscure the natural sulci adjacent to the patella.

The knee should then be palpated to evaluate for focal tenderness, warmth, and effusion. An effusion can be quantified by “milking” the fluid simultaneously from the superior and inferior aspect of the joint capsule and then balloting the knee centrally. Additionally, palpate for the presence of a Baker's cyst in the medial aspect of the popliteal fossa (present in 20-40% of patients with knee OA) (2). In the setting of knee OA, patients will often have point tenderness along the medial and lateral joint line and the patellar facets. The patellofemoral compartment can be further evaluated by placing one hand over the patella and moving the knee through a short arc of motion. During this arc of motion, the clinician should evaluate for pain, crepitus, clicking and locking of the knee. Range of motion should be formally assessed beginning with a fully extended knee and then gradually flexing the knee as far as possible, monitoring for pain during this maneuver. Normal knee range of motion is as

follows: Extension = 0 degrees; Flexion = 135 degrees (3). Range of motion is often limited in knee OA making an accurate evaluation with the aid of a goniometer essential.

Few special tests are indicated in the setting of knee OA. Patients with underlying OA will commonly experience degenerative meniscal tears. Subjecting patients with known OA to provocative meniscal testing (McMurray, Thessaly, Apley maneuvers) may cause unnecessary pain during the examination. Stiffness, rather than laxity, is a hallmark sign of OA making forceful evaluation of the ACL (Lachman and anterior drawer maneuvers) and PCL (posterior drawer maneuver) unnecessary as well.

Weight bearing radiographs are typically the first imaging ordered in the evaluation of a patient suspected of having knee OA as it can confirm the diagnosis. Multiple views of the knee should be obtained – with consideration for AP, lateral, Rosenberg, and sunrise or Merchant views. Bilateral mechanical axis radiographs can demonstrate varus or valgus deformities. In addition to confirming the presence of OA, radiographs show chondrocalcinosis, joint effusions, dislocations, and fractures. Multiple classification systems exist to standardize the description of OA severity including the Kellgren-Lawrence (KL), IKDC, Fairbank, Brandt et al, and Ahlbäck scales (4). The KL classification is the most widely used and has been reported to have good interobserver and intraobserver correlation coefficient (0.83 for both) (4). The KL classification system is outlined in Table 1 and is most frequently determined using the AP or Rosenberg

view of the knee. The Rosenberg view allows for better visualization of the femoral condyles which are a common site of articular cartilage degeneration (4).

Advanced imaging such as magnetic resonance imaging (MRI) or computed tomography can be obtained if the diagnosis remains uncertain based on the above evaluation. MRI can be useful for the diagnosis of early articular cartilage defects not visible on radiographs or insufficiency fractures. Ultrasound (US) can be utilized for evaluation of certain soft tissue pathologies such as tendinopathy, Baker's cysts, bursitis and joint effusions. US is frequently used as well for imaging guidance with interventional procedures such as joint injections used in the treatment of OA.

Laboratory testing, including blood work and synovial fluid analysis, is recommended if the clinical presentation suggests an inflammatory arthritis or infection. Synovial fluid analysis looking for the presence of crystals can confirm a diagnosis of gout or pseudogout. Cell counts and bacterial culture can point towards inflammatory or infectious etiologies of joint swelling and pain respectively. Blood work such as erythrocyte sedimentation rate, c-reactive protein, and specific rheumatologic tests (ie anti-rheumatoid factor, cyclic citrullinated peptide antibody for the evaluation of rheumatoid arthritis) should be obtained if the clinical suspicion for an inflammatory arthritis is high.

In summary, the complete evaluation of a patient with knee pain suspected to have OA includes careful history, thorough physical exam, and radiographs. Radiographic

imaging can confirm the diagnosis of OA or suggest the need for advanced imaging and work up if clinically suspicion for an alternative diagnosis is high.

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Table 1: Kellgren-Lawrence Classification System (4)

Grade	Findings
Grade 0	No joint space narrowing or reactive changes
Grade 1	Doubtful joint space narrowing, possible osteophytic lipping
Grade 2	Definite osteophytes, possible joint space narrowing
Grade 3	Moderate osteophytes, definite joint space narrowing, some sclerosis, possible bone end deformity
Grade 4	Large osteophytes, marked joint space narrowing, severe sclerosis, definite bone end deformity