VA/DoD Clinical Practice Guideline for Non-surgical Management of Knee and Hip Osteoarthritis

Toolkit

Diagnostic Imaging of Osteoarthritis Tutorial
Diagnostic Imaging of Osteoarthritis

X-Ray

Consider Radiographic Imaging to confirm diagnosis of OA and to rule out other diagnoses.

- History and examination alone are usually sufficient to give a working diagnosis of osteoarthritis (OA) in adults (age > 45 years).
- Radiographic findings in OA are often non-specific, may be absent in the early stages, and often correlate poorly with symptoms and disability.
- Note that the presence of typical radiographic changes of osteoarthritis does not exclude other diagnoses in patients with joint pain. X-rays, particularly of weight-bearing joints, can be used to exclude trauma.
- Although radiographs are not required to make a diagnosis of knee osteoarthritis, they can be used to confirm the diagnosis and to rule out fracture, osteonecrosis, malignancy, or other red flags.
Diagnostic Imaging of Osteoarthritis

- There is no evidence that routine plain radiography in patients with knee or hip pain is associated with a greater improvement in patient outcomes. In addition, exposure to unnecessary ionizing radiation should be avoided.

- Routine advanced imaging (computed tomography [CT] or magnetic resonance imaging [MRI]) is also not associated with improved patient outcomes and identifies many radiographic abnormalities that are poorly correlated with symptoms but could lead to additional, possibly unnecessary interventions.
Typical radiographic changes of OA include:

- (A) Narrowing of cartilage space
- (b) Marginal osteophyte formation
- (C) Subchondral sclerosis
- (d) Subchondral bone cysts
- (e) Joint subluxation
MRI

• Most knee/hip pain can be diagnosed by a focused history and physical examination. MRIs can show soft tissue and bone injuries that may not be visible on traditional x-ray.

• As a tool for routine diagnosis for OA, MRI is not recommended.

• An MRI may be considered in patients **without** radiographic evidence of osteoarthritis, especially in patients with an acute injury and normal radiographs. Meniscal tears are common in the setting of osteoarthritis; however, the osteoarthritis and not the meniscal tear is often the primary source of the pain.

• Magnetic resonance imaging may be considered for evaluating patients with persistent pain who are potential candidates for invasive interventions (surgery). Patients with OA who have concomitant signs and symptoms of loose body, meniscal pathology or an injury or incident with a sudden onset of pain and effusion, MRI may be indicated.
If radiographic imaging is considered in adults with non-traumatic knee pain, obtain the following weight bearing radiographs:

1. AP (Antero-Posterior) view
2. Knee view in 30 degrees of flexion (also known as a tunnel or Rosenberg view)
3. A lateral view
4. A Merchant view (also known as a Sunrise or Skyline view).

Weight bearing radiographs of the knee especially the Rosenberg view are the most sensitive for detecting early joint space narrowing.
OA of the Hip

In adults with non-traumatic hip or groin pain, obtain the following radiographs:

1. Weight bearing (standing) AP pelvis radiograph
2. Non-weight bearing frog lateral of the affected hip

Plain radiographs may be used to confirm the diagnosis and to rule out fracture, osteonecrosis, malignancy, (either primary or metastatic) or other red flags.
Osteoarthritis of the Knee

Normal Knee
- AP view
- Lateral view
- Tunnel view
- Merchant View

Mild-Moderate OA
- AP view
- Lateral view
- Tunnel view
- Merchant View

Moderate -Severe OA
- AP view
- Lateral view
- Tunnel view
- Merchant View

Select (Click) on any of the above view, or click to continue to review all units
Normal Knee - No Weight Bearing

![AP Knee Radiograph]

- **Femur**
- **Patella**
- **Lateral Joint Space**
- **Tibial spine**
- **Fibula**
- **Tibia**

Three beads centered on marker implies cassette flat on table and therefore non weight bearing.
Mild Knee Osteoarthritis
Primarily involving the medial compartment

- Medial femoral osteophyte
- Medial compartment joint space narrowing
- Marginal tibial osteophyte
- Subtle increase radiodensity indicating subchondral sclerosis

Lateral Joint Space preserved
Moderate to Severe Knee Osteoarthritis

Moderate to Severe Radiographic Osteoarthritis involving three compartment

- Increased subchondral sclerosis and bone loss
- Osteophyte and loss of medial joint space

Radiographic findings may not correlate with patient complaint or disability

- Subluxation of femor-tibial joint
- Medial and lateral borders of the joint are incongruous

Three beads at bottom of marker implies weight bearing
Normal Knee

OS fabella often present normal sesamoid bone

Good lateral should have overlap of medial + lateral condyles

Femur

Patella

Joint Space

Tibial tubercle

Fibular head

Tibia
Mild to Moderate Osteoarthritis

Posterior osteophyte

Anterior Distal femoral osteophyte

Patellar osteophyte

Preserved Joint Space however non-bearing radiograph

Posterior osteophyte (tibia)

Not a loose body unless you see a significant change in position on serial lateral radiographs
Moderate to Severe Osteoarthritis

LATERAL KNEE RADIOGRAPH

OA Fabella
Loss of Joint Space with marked subchondral sclerosis
Posterior osteophyte

Femur

Osteophytes

Enthesophyte
abnormal bony projections at the attachment of a tendon or ligament

Osteophyte
Normal Knee

TUNNEL KNEE RADIOGRAPH (Rosenberg View)

- No osteophytes
- Normal medial joint space
- Subtle increased subchondral sclerosis may be normal
- Normal lateral joint space
Mild to Moderate Knee Osteoarthritis

- Non weight bearing
- Osteophytes
- Marginal osteophytes
- Narrow or loss of medial Joint Space
- Tibial spine osteophytes
Moderate to Severe Knee Osteoarthritis

- Complete loss of lateral Joint Space
- Bone on bone

Weight bearing

Osteophytes

TUNNEL KNEE RADIOGRAPH (Rosenberg View)
Normal Patellofemoral Joint

- Medial facet
- Normal overall space
- No osteophytes
- Lateral Facet Flatter
- Normal joint space

Despite the marker, the Merchant View is a non-weight bearing. The marker reflects that the film is vertical in this view.

MERCHANT VIEW RADIOGRAPH (SUNRISE VIEW or SKYLINE VIEW)
Mild Patellofemoral Osteoarthritis

Slight narrowing of lateral patellofemoral joint space

Marginal osteophytes
Moderate to Severe Patellofemoral Osteoarthritis

Complete loss of Joint Space
Bone on bone

Osteophytes

MERCHANT VIEW RADIOGRAPH
(SUNRISE VIEW or SKYLINE VIEW)
Osteoarthritis of the Hip

Pelvis Radiographs

- AP view – normal
- AP Moderate HIP OA
- AP Severe HIP OA

Select (Click) on any of the above view, or click to continue to review all examples
Normal Hip

- Normal joint space
- No osteophytes
- Spherical femoral head
- Greater trochanter
- Fovea capitis for lig. teres
- Lesser trochanter
- Pubis
- Ischium
- Ilio ischial line
- Ilium
- Cotyloid fossa
- No articular cartilage

AP PELVIS RADIOGRAPH
Moderate to Sever OA of Hip  (R >> L)

- Increase subchondral sclerosis
- Joint space narrowing
- Loss of joint space
- Bone on bone
- Acetabular osteophyte
- Medial femoral osteophyte
- More prominent lesser trochanter due to loss of hip internal rotation
Sever OA of Hip (R >> L)

- Complete loss of joint space narrowing
- Bone on bone

- Increase subchondral sclerosis

- Preserved joint space

- Medial femoral osteophyte
- Acetabular osteophyte
- Subtle marginal osteophyte