Top 5 tips: Osteoarthritis

Arthritis Subcommittee
Tip#1: Role of imaging modalities in osteoarthritis

• Radiography is the imaging modality of reference for the diagnosis of osteoarthritis.
• Radiography allows the diagnosis of osteoarthritis and enables the grading of its severity (classically done using the Kellgren-Lawrence system).
• Cross-sectional imaging methods are usually not needed. They are required for the assessment of focal cartilage lesions and for the preoperative setting of prosthetic surgery.
• Compositional MRI techniques are mainly used in research and currently have no routine clinical application.
Tip#2: Main findings at radiographs

NARROWING OF THE JOINT SPACE (dotted squares in Figure 1)

- Bilateral PA weight-bearing radiographs in flexion are the reference for the knee (Lyon-Schuss or Rosenberg views).
- Due to the great interindividual variability, the application of a threshold to detect joint space narrowing is difficult.
- Comparison between the medial and lateral femorotibial compartments is not possible. The medial femorotibial joint space is physiologically narrower than the lateral.
- Comparison to the contralateral asymptomatic site is useful.
- Comparison to previous radiographs is useful but should only been performed on similar views.

SUBCHONDRAL BONE SCLEROSIS/HYPEROSTOSIS (arrowheads on figure 1)

OSTEOPHYTES (arrowheads on Figure 1)

SUBCHONDRAL CYSTS (arrows on Figure 2)

- Their pathogenesis is controverted with 2 theories:
  1. Bony contusion theory → high loads or trauma lead to trabecular microfractures, necrotic bone, and focal bone resorption, resulting in cysts development
  2. Synovial fluid intrusion theory → alteration of the calcified barrier between cartilage and subchondral bone which enables the entrance of fluid into the subchondral bone, causing a fluid-filled cyst lesion.
Tip#3: Focal cartilage lesions

- Modified Outerbridge classification (MR)

0. Homogeneous cartilage
1. Areas of hyperintensity with preserved contours
2. Fraying of the articular cartilage extending to the surface
3. Partial thickness cartilage loss with focal ulceration
4. Full-thickness cartilage loss with reactive changes of the exposed bone

- It is useful to measure size/diameter of the cartilage defect

- Cartilage lesions usually are high in signal intensity, but may have variable signal.

- Bone marrow edema-like lesions are usually associated with full-thickness cartilage defects.
Osteoarthritis is a whole-organ disease, with involvement of cartilage but also of other structures such as the synovium, menisci, and bone.

MRI definition of osteoarthritis (Hunter et al. 2011):
- OA is defined by the presence of 2 Group A criteria or 1 Group A + 2 Group B criteria
- **Group A criteria:**
  - Definite osteophyte
  - Full-thickness cartilage loss
- **Group B criteria:**
  - Partial-thickness cartilage loss
  - Meniscal tear/extrusion>3mm
  - BML
  - Bone attrition

*Tip#4: Focal cartilage lesions do not always represent OA*
Tip#5: Bone marrow edema-like lesions (BMELs)

- Edema-like signal in the subchondral bone.
- BMELs correlate with pain in patients with osteoarthritis and are often seen in patients with progressive disease. Nevertheless, BMELs can also be detected in healthy asymptomatic patients.
- The pathogenesis of BMELs is not fully understood, they are probably an early stage of subchondral cysts.
References


• Peterfy CG et al. MRI protocols for whole-organ assessment. OsteoArthritis and Cartilage 2006;14:A95-A111.


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