Ankle and Foot

- Erosions
  - Earliest bone pattern is loss of cortical distinctness, followed by dot-dash pattern of cortex loss
  - Marginal erosions tend to start in marginal "bare areas" not covered by cartilage
  - Direct subchondral erosions follow
  - Late aggressive disease: pencil-in-cup appearance in phalanges
- While considered purely erosive and nonproductive, may show ulnar styloid capping and ankylosis of intertarsal or intercarpal joints
- Malalignment due to ligament/tendon disruption

Diagnostic Checklist

- Earliest RA may be monostotic or asymmetric
  - » Must differentiate from septic arthritis
- Use sites of focal soft tissue swelling to guide you to subtle bone findings on radiography
- Assess for cortex indistinctness and dot-dash pattern for earliest radiographic signs of erosion

Imaging

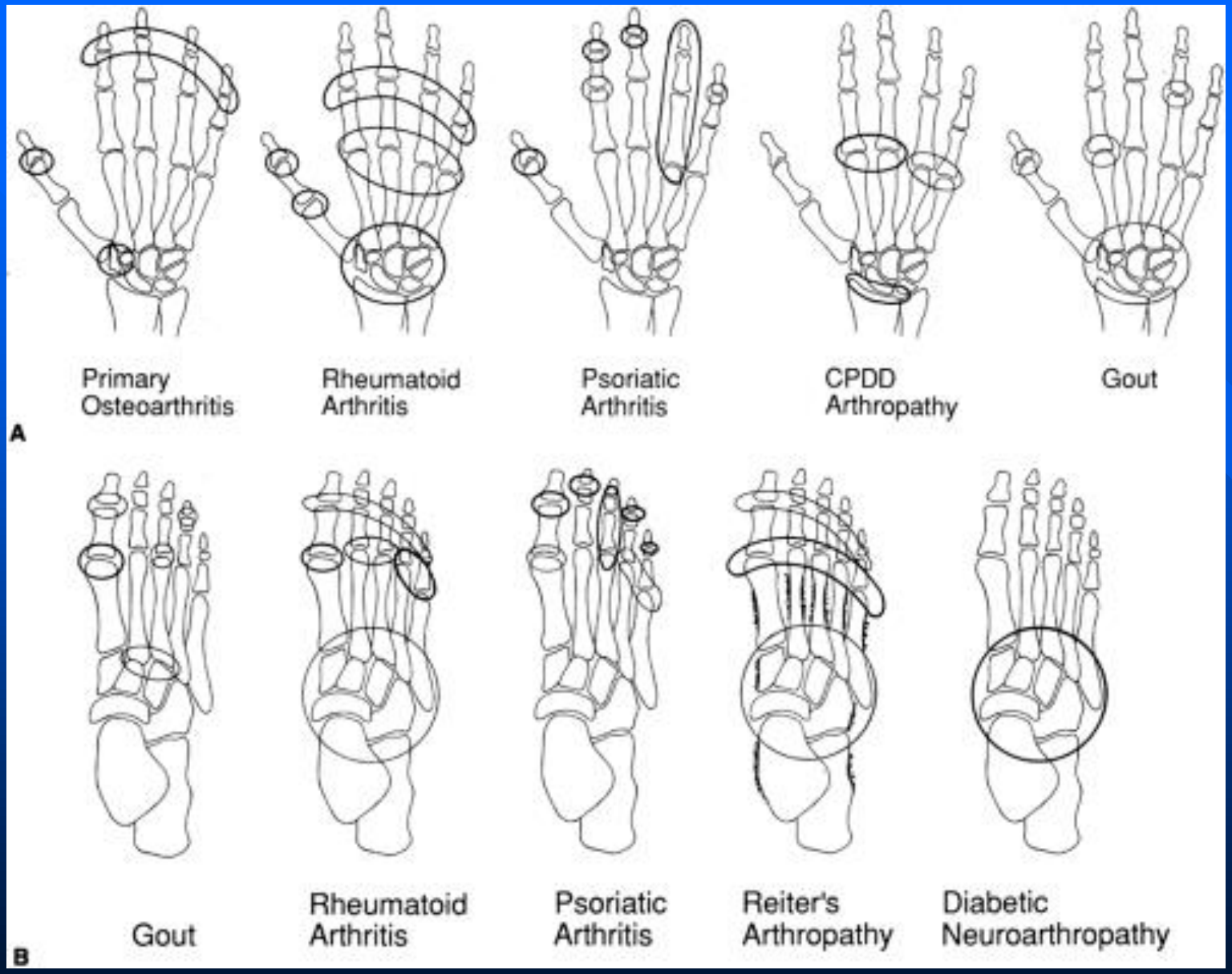
- Osteopenia
  - Initially juxtaarticular
  - Eventually diffuse
  - Sclerotic insufficiency fracture line, related to osteopenia
    - » Distal fibula and tibia, posterior calcaneus, metatarsal neck
    - » May follow initiation of therapy, leading to rapid return of mobility
- Soft tissue swelling
  - Effusion and synovitis, especially tibiotalar and MTP joints
  - Pre-Achilles and other sites of bursitis
- Cartilage destruction
  - Uniform, seen on radiograph as joint space narrowing

Imaging

- Erosions
  - Forefoot affected in 80-90%; purely erosive; DIP joints spared
    - » May be initial presentation in 10-20%
    - » Location of earliest erosion is MTPs, particularly 5th
  - Midfoot: may have diffuse joint space loss; can develop tarsal ankylosis
  - Hindfoot: erosions of posterior calcaneal tubercle
  - Later erosions may be severe, with subchondral destruction
    - » Pencil-in-cup deformity may be seen in RA [not specific for psoriatic arthritis (PsA)]
    - » Progression of erosions greater in feet than hands
    - » May uncommonly lead to ankylosis of tarsals

Imaging

- Deformity
  - Metatarsus primus varus, hallux valgus
  - Pes planovalgus
  - Collapsed midfoot
  - Lateral deviation of toes, claw toe
  - Splaying of forefoot
- Ankylosis
  - Osseous or fibrous ankylosis may occur (late) and exceptionally involve all tarsal bone


A
Primary Osteoarthritis
Rheumatoid Arthritis
Psoriatic Arthritis
CPDD Arthropathy
Gout
B
Gout
Rheumatoid Arthritis
Psoriatic Arthritis
Reiter's Arthropathy
Diabetic Neuroarthropathy

View Full Screen Image

AP radiograph shows focal osteopenia at the 4th and 5th MTPs with cortical indistinctness at the 4th metatarsal head →. True erosions and subchondral cysts are visible at the 5th metatarsal head ↗, the most frequent location for RA in the foot. MR will show the full extent of disease, which is often underestimated on radiography.

View Full Screen Image

AP view in a 50-year-old man with newly diagnosed rheumatoid arthritis (RA) shows erosions ↗, joint space narrowing, and soft tissue swelling → at the 5th MTP joint. This was the only site of involvement in the foot and is often the earliest finding in RA.

View Full Screen Image

Oblique view in a 73-year-old woman with longstanding RA shows severe osteopenia and uniform narrowing of multiple intertarsal and tarsometatarsal joints. Note subchondral sclerosis and osteophyte formation of secondary osteoarthritis →.

View Full Screen Image

Lateral radiograph shows erosion ↗ at the posterior calcaneal tubercle. This is a nonspecific finding of inflammatory arthropathy; RA is just as likely a diagnosis as psoriatic or chronic reactive arthritis.

View Full Screen Image

AP radiograph in the same patient shows numerous prominent erosions of the 2nd-5th MTP joints → and the 1st IP joint ↗. There is no bone deposition to suggest psoriatic or chronic reactive arthritis. The distribution is typical for RA and confirms the diagnosis.

View Full Screen Image

Lateral radiograph in a 37-year-old woman with known RA and foot pain shows tibiotalar and subtalar joint effusions → and mild tibiotalar joint space narrowing ⇒.

View Full Screen Image

Sagittal STIR MR in the same patient shows joint effusions with intermediate- to low-signal areas within the joint capsule →, likely synovitis. Note the extensive marrow edema about the posterior subtalar joint ⇒. This severe inflammation was not appreciated on the radiograph.

View Full Screen Image

AP radiograph in a 45-year-old woman shows a soft tissue mass → separating the 1st and 2nd MTP joints. There is a tiny marginal erosion at the base of the 1st proximal phalanx ↗. This, along with the patient's age and sex, should suggest RA, but the mass needs further evaluation.

View Full Screen Image

Short-axis T1 C+ FS MR in the same patient shows enhancing synovium at the 1st MTP ⇨. The mass is shown to be low-signal fluid with a thick enhancing rim →, consistent with intermetatarsal inflammatory bursitis in a patient with RA.

View Full Screen Image

Ankle radiograph in a 44-year-old woman with RA shows chronic erosion at the talofibular and tibiofibular joints and severe narrowing and erosion at the tibiotalar joint. There is subchondral sclerosis, consistent with secondary osteoarthritis.

View Full Screen Image

Lateral radiograph of a patient with RA shows deossification and an early erosion at the posterior calcaneal tubercle with associated soft tissue swelling.