

# ARTHRITIS IMAGING

SIGNS | FIGURES | DRAWINGS | PATTERNS

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### GRAPHIC DIFFERENTIAL DIAGNOSIS

Hand	
Foot	
Knee	
Ankle	
Shoulder	
Hip	
Spine	
Sacroiliac joint	
Sternoclavicular joint	

### ALPHABETIC INDEX

## Semiology

### Chapter 1: Rheumatoid arthritis



#### Soft tissue swelling

Thickening and increased density of soft tissue, usually fusiform around the inflamed joint.



#### Periarticular osteoporosis

Decrease of bone density due to hyperemia, leaching calcium from bone.



#### Erosion

Cortical interruption with exposure of cancellous bone.



#### Bare area

Intra-articular bone surface without cartilage coverage adjacent to the insertion of the capsule.



#### Subchondral cyst

Well-defined fluid-filled cystic lesion at the periparticular surfaces.



#### Pencil-in-cup deformity

Pencil-like bone resorption of the proximal portion of the joint, and cup-like erosion of the distal portion.



#### Boutonniere deformity

Flexion of the PIP joint with hyperextension of the DIP joint of the fingers.



#### Swan neck deformity

Hyperextension in the PIP joint with secondary flexion in the DIP joint.



#### Z-thumb deformity

MCP joint flexion and DIP joint extension, or MCP joint extension and DIP joint flexion of the thumb.



#### Wrist collapse

Carpal zone destruction, radial deviation of the metacarpals, radioulnar joint dissociation.



#### Ulnar deviation and volar subluxation

The phalanx in the MCP joint subluxates to the palmar and ulnar side.



#### Synovitis

Thickening and inflammation of synovium in the joints, may cause adjacent erosions.



#### Tenosynovitis

Inflammation and thickening of the synovium lining the tendon sheath.



#### Bursitis

Inflammation of synovial-lined bursa.



#### Rice bodies

Detached synovial villi, with low signal on fluid-sensitive MRI sequences.



#### Hallux valgus

Valgus of the first MTP joint > 12°



#### Hammer toe deformity

Flexion of the PIP joint and extension of the DIP joint of the toes.



#### Hindfoot valgus

Increased talocalcaneal angle lateral talocalcaneal angle > 10°



#### Midfoot collapse

Sagging of the midfoot, with impingement of the small midfoot joints at the top.

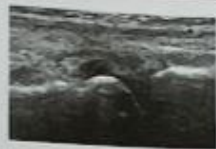


#### Metatarsus primus varus

> 10° angle between 1<sup>st</sup> and 2<sup>nd</sup> metatarsals.

DIP: distal interphalangeal joint, PIP: proximal interphalangeal joint, MCP: metacarpal-phalangeal, MTP: metatarsal-phalangeal

## Ultrasound



### INFLAMMATION

Joint effusion

Synovitis

Doppler hypervascularity

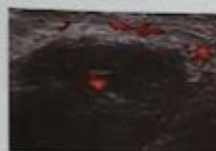
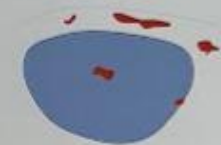
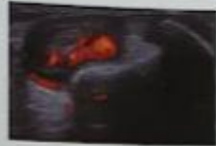
Tenosynovitis and Tendon tear

Bursitis

Intermetatarsal bursa  
Pre-Achilles bursa

### JOINT DAMAGE

Cartilage damage  
Joint space narrowing  
Secondary osteoarthritis



## MRI



### INFLAMMATION

Soft tissue edema

Joint effusion

Synovitis

Synovial thickening | enhancement  
Tenosynovitis and tendon tear

Bursitis

Intermetatarsal bursa  
Pre-Achilles bursa

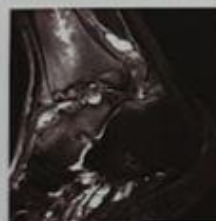
Subchondral bone marrow edema

### JOINT DAMAGE

Loss of cartilage  
Erosions  
Subchondral cysts  
Joint space narrowing  
Secondary osteoarthritis

### OTHER FINDINGS

Insufficiency fracture



References:  
1. Kettner J, Kersch MM, Kocera T. Ultrasound findings in rheumatoid arthritis. Radiol Clin North Am. 2011;53(4):633-641.

2. Jensen G, Bakland M, Halse G. The relevance of ultrasonography of the foot and ankle in patients with rheumatoid arthritis. A review of the literature. Med Clin (Barc). 2014;102:106-111.

## CHAPTER 3 Psoriatic arthritis

Psoriatic arthritis (PsA) is the most prevalent coexisting condition in 70%-80% patients with psoriasis.

Five clinical subtypes of PsA are:  
Polyarticular, oligoarticular (<4 joints), distal, axial, arthritis mutilans

### Clinical key points

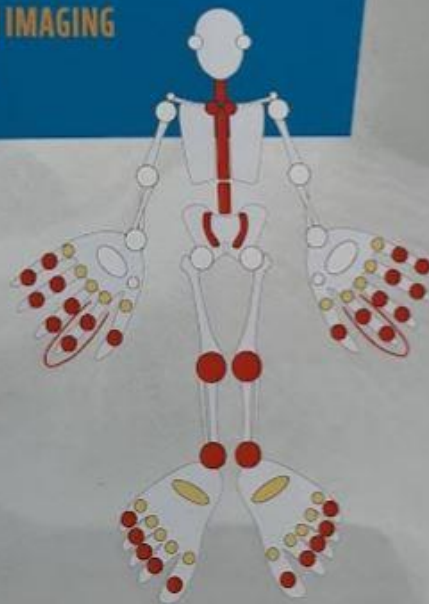
- SKIN PSORIASIS AND PSORIATIC NAIL LESIONS: NAIL PITS AND ONYCHOLYSIS.
- DACTYLITIS: 'SAUSAGE' DIGIT
- TYPICAL PATTERN: INFLAMMATORY ASYMMETRIC POLY- OR OLIGOARTHRITIS.

### Key imaging findings

- EARLY STAGE: NORMAL.
- INTERMEDIATE STAGE: MARGINAL EROSIONS WITH PERIOSTITIS AND MARGINAL NEW BONE FORMATION.
- LATE STAGE: EROSIONS; SCLEROSIS RESULTING IN IVORY PHALANX, JOINT DEFORMITY (PENCIL-IN-CUP), ARTHRITIS MUTILANS, ANKYLOSIS, AND JOINT DESTRUCTION WITH LUXATION AND POTENTIAL ACRO-OSTEOLYSIS.

### GOLDEN BULLET POINT IN IMAGING

SLOWLY PROGRESSING EROSIONS IN THE INTERPHALANGEAL JOINTS WITH NEW BONE FORMATION.



## CHAPTER 12 POLYMYALGIA RHEUMATICA

Polymyalgia rheumatica (PMR) is an inflammatory disease that affects the shoulder, the pelvic girdles and the neck, usually in individuals older than 50 years, especially in elderly women. It can be isolated or concomitant with giant cell arteritis.

In view of the prominent inflammatory involvement of bursae, PMR might be considered a disorder predominantly of the extra-articular synovial structures.

### Clinical key points

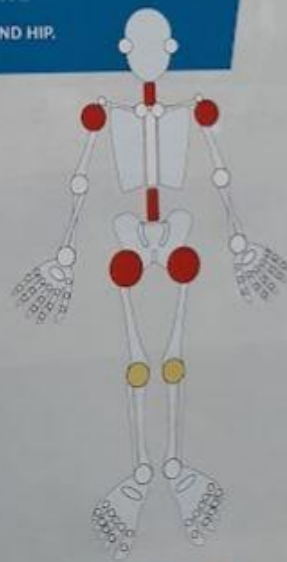
- ACUTE ONSET SEVERE PAIN AND STIFFNESS AFFECTING THE SHOULDERS AND PROXIMAL ASPECTS OF THE ARMS BILATERALLY. INVOLVEMENT OF NECK AND HIP GIRDLE IS ALSO COMMON.
- INCREASE IN ESR AND CRP.
- RESOLVES RAPIDLY AFTER THE ONSET OF GLUCOCORTICOID THERAPY.

### Key imaging findings

- SYMMETRICAL BURSITIS.
- CONCURRENT ARTERITIS.

### GOLDEN BULLET POINT IN IMAGING

SYMMETRICAL BURSITIS OF THE SHOULDER AND HIP.



## 6.1.1 PERIPHERAL JOINTS



Mostly involved:  
1<sup>st</sup> MTP joint  
Midfoot

Any peripheral joints

Usually asymmetric

### Radiography



Soft tissue swelling

Tophi:  
Soft tissue dense nodules, calcification

Erosions:  
Extramarginal/ articular/ intrasosseous  
Well-circumscribed with overhanging sclerotic margins  
Look like 'O'

Preserved bone density and joint space in the early stage

### (Dual-energy) CT



#### CONVENTIONAL CT

Erosions:  
Juxta-/ intra-articular/ intrasosseous  
Well-circumscribed with overhangs  
Sclerotic margins

Soft tissue swelling

Tophi:  
Soft tissue dense nodules adjacent to  
calcification (+/-)  
Preserved bone density



#### ADDITIONAL FINDINGS ON DUAL-EN

Postprocessing algorithm for MSU crystal deposition  
MSU crystal deposition around joints, tendons and bursae

Gout

## 6.3.1 PERIPHERAL JOINTS



Monoarticular

Most common: shoulder (rotator cuff)

Other joints:  
Knee, hip, elbow, wrist, and hand

### Radiography & CT



PERIARTICULAR HA deposition (common)  
Mostly in tendons

Dynamic changes

Amorphous (homogeneous  
→ denser) well-defined  
→ may resolve

Can extend (migrate) into bursa, muscle, joint and bones (cortical erosions)



INTRAARTICULAR HA deposition:  
Rapidly destructive arthropathy (uncommon)

Milwaukee shoulder

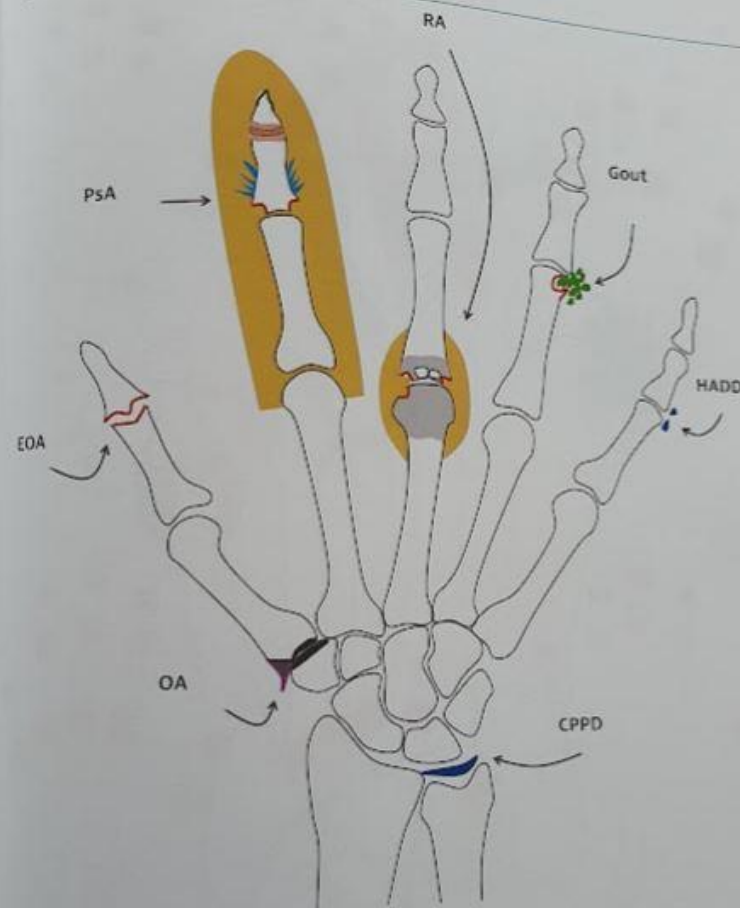
Glenohumeral joint space narrowing  
Bone erosions, sclerosis, bone cysts  
Rapid joint destruction and bone fragments  
Subluxation of the humeral head  
Subtle or absent osteophytes



HADD

## GRAPHIC DIFFERENTIAL DIAGNOSIS

### Hand



- RA: Rheumatoid arthritis. Soft tissue edema, erosions, subchondral cysts and periarticular osteoporosis in the MCP joints.
- PSA: Psoriatic arthritis. Sausage finger (dactylitis), erosions, periostitis, ankylosis and acro-osteolysis in the IP joints.
- Gout: Tophus and erosions with overhanging edges.
- CPPD: Calcium pyrophosphate deposition disease. Calcium pyrophosphate deposition in the triangular fibrocartilage.
- HADD: Hydroxyapatite deposition disease. Homogeneous calcification in the tendon.
- OA: Osteoarthritis. Joint sclerosis, osteophytes and joint space narrowing.
- EOA: Erosive osteoarthritis. Gull-wing deformity in the IP joints.

Graphical DDX