

# Radiographic Evaluation of Arthritis

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**HOSPITAL SUNGAI BULOH**  
*The Skill To Heal, The Spirit To Care*



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# Clinical

# Radiography

- ✦ Age and Gender
- ✦ History and Symptoms
  - ✦ pain, inflammation, fever
  - ✦ diabetes, immune status
- ✦ Physical Examination
  - ✦ distribution, swelling, redness, tenderness, joint motion, rash, iritis, discharges
- ✦ Laboratory
  - ✦ serum markers, WBC, ESR
  - ✦ joint fluid analysis, culture

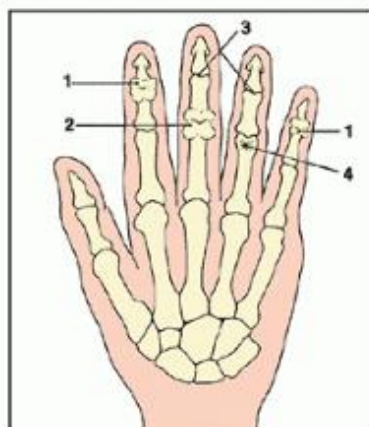
- ✦ Skeletal distribution
- ✦ Local distribution
- ✦ Cartilage spaces
- ✦ Erosions
- ✦ Soft tissue swelling
- ✦ Effusions
- ✦ Soft tissue lumps
- ✦ Calcifications

# Typical Features

- ✦ Juxta-articular erosions and Tophi (lumpy-bumpy): **Gout**
- ✦ Pencil cup deformity: **Psoriatic**
- ✦ Sausage finger: **Psoriatic**
- ✦ Seagull deformity: **Erosive OA**
- ✦ TFCC calcification and soft tissue calcification: **CPPD**
- ✦ **Sarcoid** hand / foot: lacy trabecular pattern and granulomas; always look at CXR
- ✦ **Haemochromatosis** (iHC typically involves 2nd and 3rd MT)

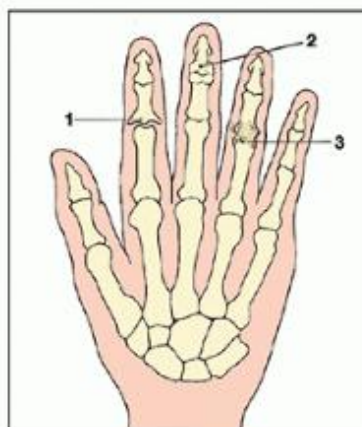
# RADIOGRAPHIC MORPHOLOGY OF ARTHRITIDES IN THE HAND

## Osteoarthritis



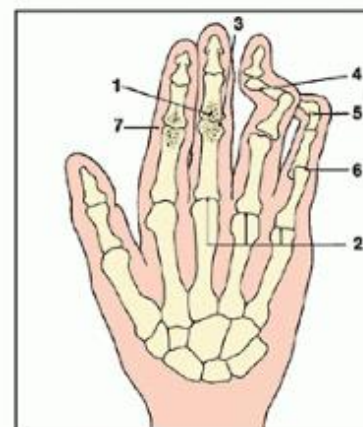
- 1 Heberden nodes
- 2 Bouchard nodes
- 3 joint space narrowing
- 4 subchondral sclerosis

## Erosive Osteoarthritis



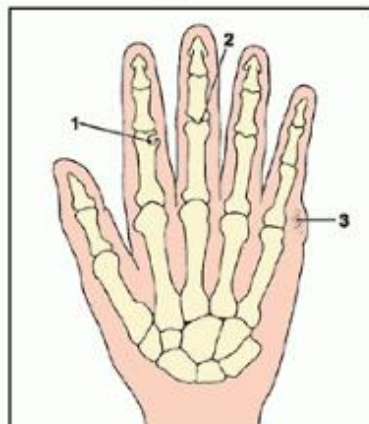
- 1 gull-wing erosion
- 2 Heberden nodes (occasionally)
- 3 interphalangeal ankylosis

## Rheumatoid Arthritis



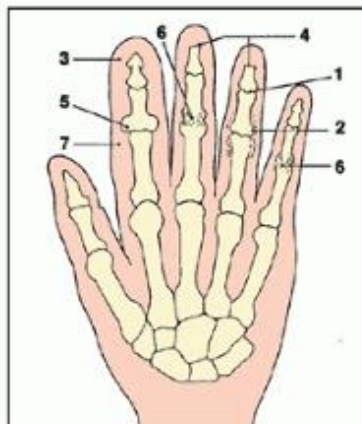
- 1 periarticular osteoporosis
- 2 joint space narrowing
- 3 marginal erosions
- 4 boutonnière deformity
- 5 swan-neck deformity
- 6 subluxations and dislocations
- 7 soft tissue swelling (symmetric, fusiform)

## Gouty Arthritis



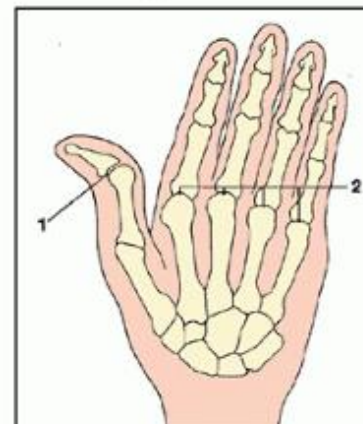
- 1 asymmetric erosion with overhanging edge
- 2 partial preservation of joint space
- 3 asymmetric soft tissue swelling with or without calcifications (tophus) (usually at dorsal aspect)

## Psoriatic Arthritis



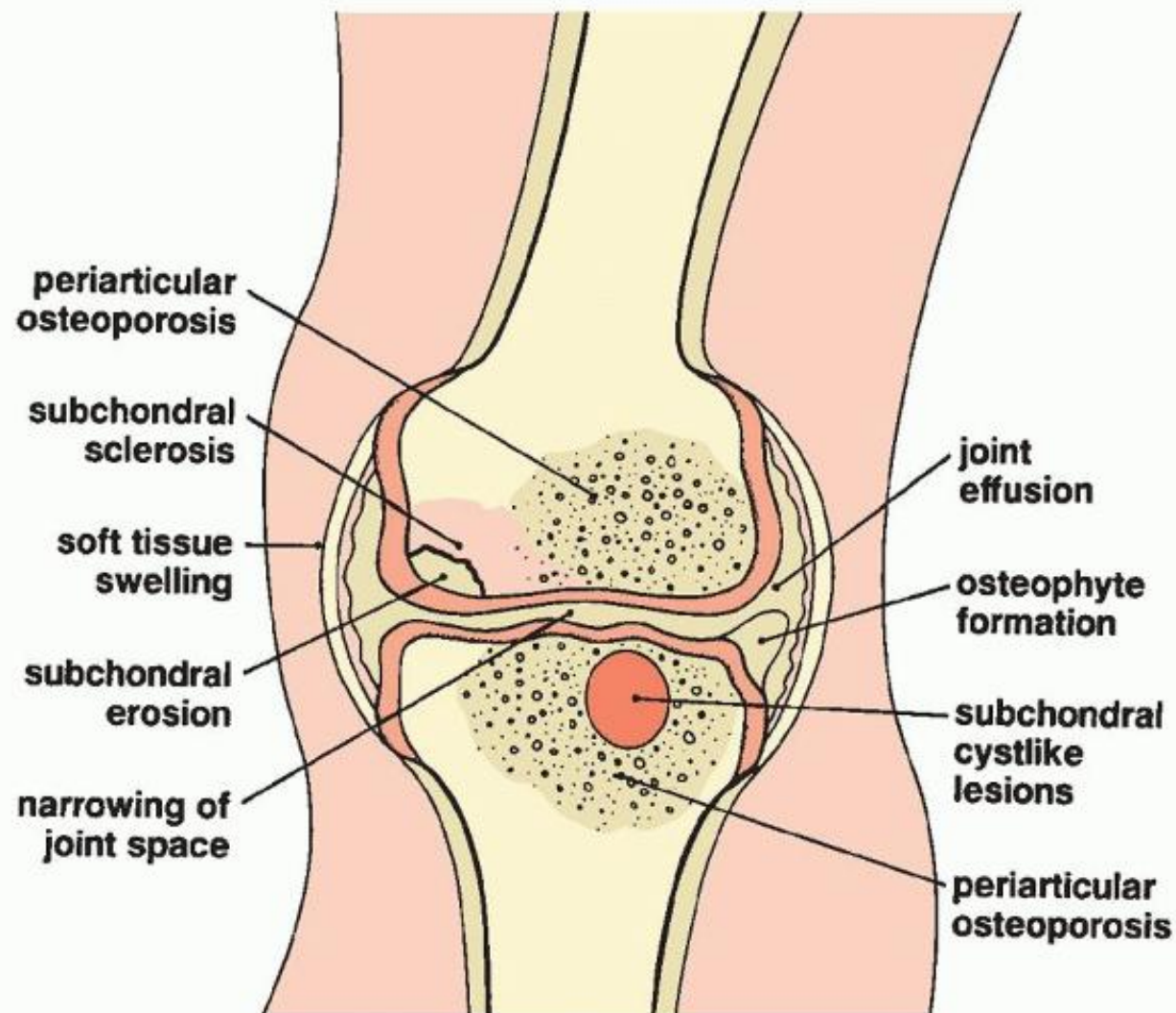
- 1 joint space narrowing
- 2 fluffy periostitis
- 3 "sausage digit" (soft tissue swelling of single digit)
- 4 erosion of terminal tufts
- 5 "mouse-ear" type of articular erosion
- 6 interphalangeal ankylosis
- 7 soft tissue swelling

## Lupus Arthritis



- 1 hitchhiker's thumb deformity
- 2 flexible deformities (subluxations)

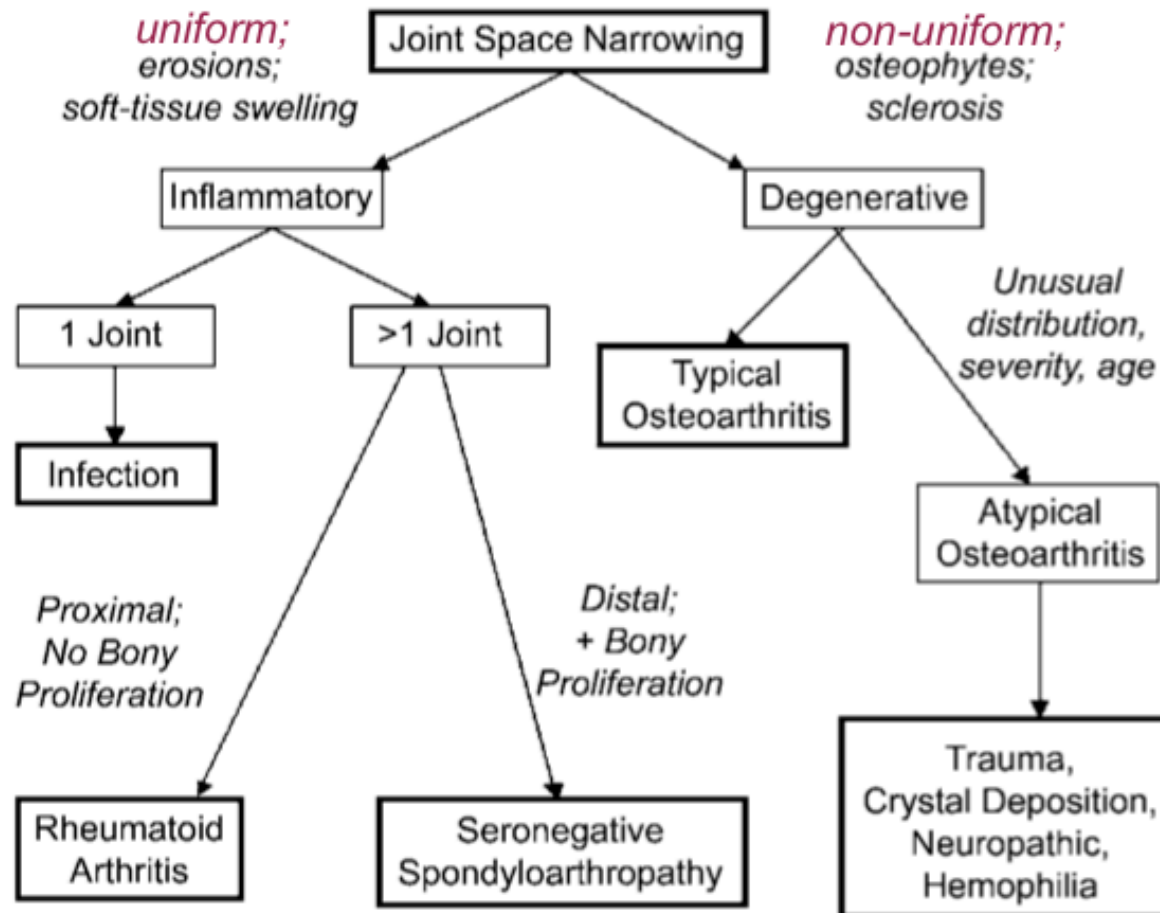




Summary representation of radiographic features seen in the arthritides.  
\*\* Not all of these features are seen in every type of arthritis.

Greenspan, Adam. Orthopedic Imaging: a Practical Approach. Wolters Kluwer/Lippincott, Williams & Wilkins, 2011.

**Figure 1**



**Figure 1:** Flow chart shows approach to radiographic evaluation of arthritis. Algorithm begins with joint space narrowing and initially uses differentiation between inflammatory and degenerative findings to reach the final diagnosis.

Modified from Jacobson JA, Girish G, Jiang Y, Resnick D. Radiographic evaluation of arthritis: inflammatory conditions. Radiology. 2008;248(2):378-89

# Inflammatory Arthritis

- ✦ Uniform joint space loss
- ✦ Bone erosions
- ✦ Osteopenia
- ✦ Soft-tissue swelling
- ✦ Proximal distribution & NO bone formation – RA
- ✦ Distal distribution & bone proliferation – seronegative spondyloarthropathy
  - ✦ psoriatic arthritis
  - ✦ reactive arthritis (Reiter's)
  - ✦ ankylosing spondylitis

# Degenerative Arthritis



- ✦ Joint space narrowing – non-uniform
- ✦ Osteophytes
- ✦ Bone sclerosis
- ✦ Subchondral cysts
- ✦ Absence of inflammatory features – eg erosions
- ✦ Typical osteoarthritis
- ✦ Atypical OA
  - ✦ crystal deposition
  - ✦ neuropathic joint
  - ✦ hemophilia
  - ✦ trauma



# Comparison



\*\* Start with joint space narrowing of extremities

Degenerative	Inflammatory
<ul style="list-style-type: none"><li>• Joint space narrowing – asymmetric</li><li>• Osteophytes</li><li>• Sclerosis</li><li>• Subchondral cysts / geodes</li></ul>	<ul style="list-style-type: none"><li>• Joint space narrowing – uniform</li><li>• <b>Bone erosions</b><ul style="list-style-type: none"><li>• Early discontinuities of the thin, white, subchondral bone plate,</li><li>• joint margins</li></ul></li><li>• Osteopenia</li><li>• Soft tissue swelling</li></ul>

## HIGHLIGHTS OF INFLAMMATORY ARTHRITIS

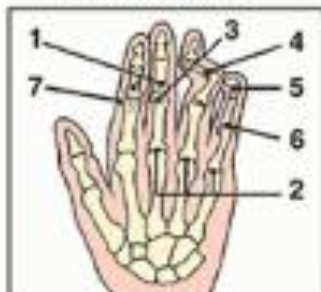
### Large Joints



### Morphology

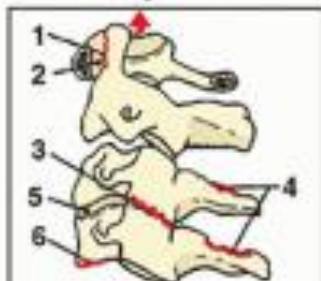
- 1 diffuse joint-space narrowing
- 2 marginal or central erosions
- 3 absent or minimal subchondral sclerosis
- 4 lack of osteophytes
- 5 cystic lesions
- 6 osteoporosis
- 7 periarticular soft tissue swelling (symmetric, usually fusiform)

### Small Joints



- 1 periarticular osteoporosis
- 2 joint-space narrowing
- 3 marginal erosions
- 4 boutonniere deformity
- 5 swan-neck deformity
- 6 subluxations and dislocations
- 7 soft tissue swelling (symmetric, fusiform)

### Spine



- 1 erosion of anterior aspect of odontoid
- 2 atlantoaxial subluxation with cephalad migration of C-2
- 3 erosion and fusion of apophyseal joints
- 4 erosion and whittling of spinous processes
- 5 destruction of intervertebral disks
- 6 erosion of vertebral bodies

### Distribution

#### Rheumatoid Arthritis



#### Psoriatic Arthritis and Reiter Syndrome\*

#### Ankylosing Spondylitis\*\*

\*Reiter syndrome more often affects the hip and lower extremity

\*\*Most frequently affected large joints are hips and glenohumeral articulations

#### Erosive Osteoarthritis

adult

juvenile



#### Rheumatoid Arthritis



#### Psoriatic Arthritis

#### Reiter Syndrome

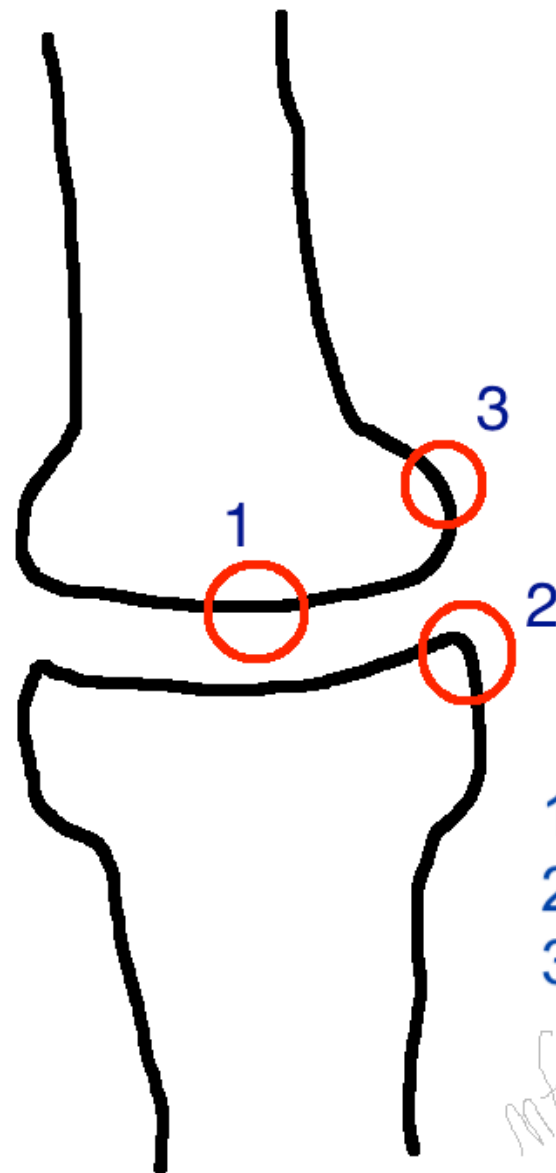
# Rheumatoid Arthritis

- ✦ Osteopenia
- ✦ Uniform joint space loss
- ✦ Bone erosions
- ✦ Soft-tissue swelling
- ✦ Proximal distribution
- ✦ Lack of bone proliferation
- ✦ Chronic inflammation
  - ✦ joint subluxation
  - ✦ subchondral cysts
- ✦ metacarpophalangeal, proximal interphalangeal
- ✦ midcarpal, radiocarpal
- ✦ distal radioulnar joints,
  - ✦ **ulnar styloid process**
- ✦ Feet → metatarsophalangeal, proximal interphalangeal and intertarsal joints, and such involvement
  - ✦ lateral aspect of the **fifth metatarsal head** - **early**
  - ✦ retrocalcaneal bursa



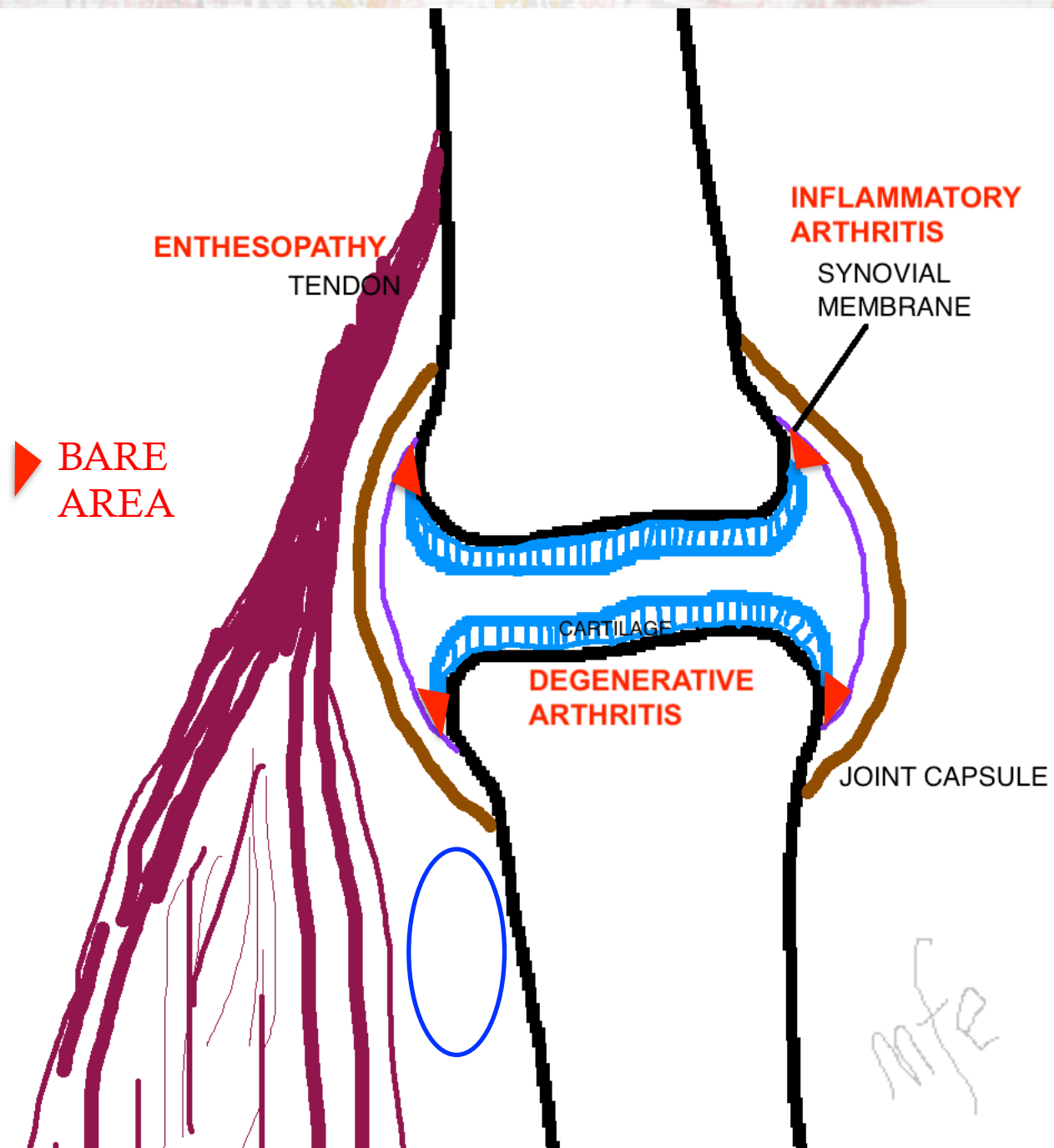
1. periarticular osteoporosis
2. joint space narrowing
3. marginal erosions
4. boutonniere deformity
5. swan-neck deformity
6. subluxation and dislocation
7. soft tissue swelling (symmetric, fusiform)





1 = central  
2 = marginal  
3 = juxta-articular

mfe





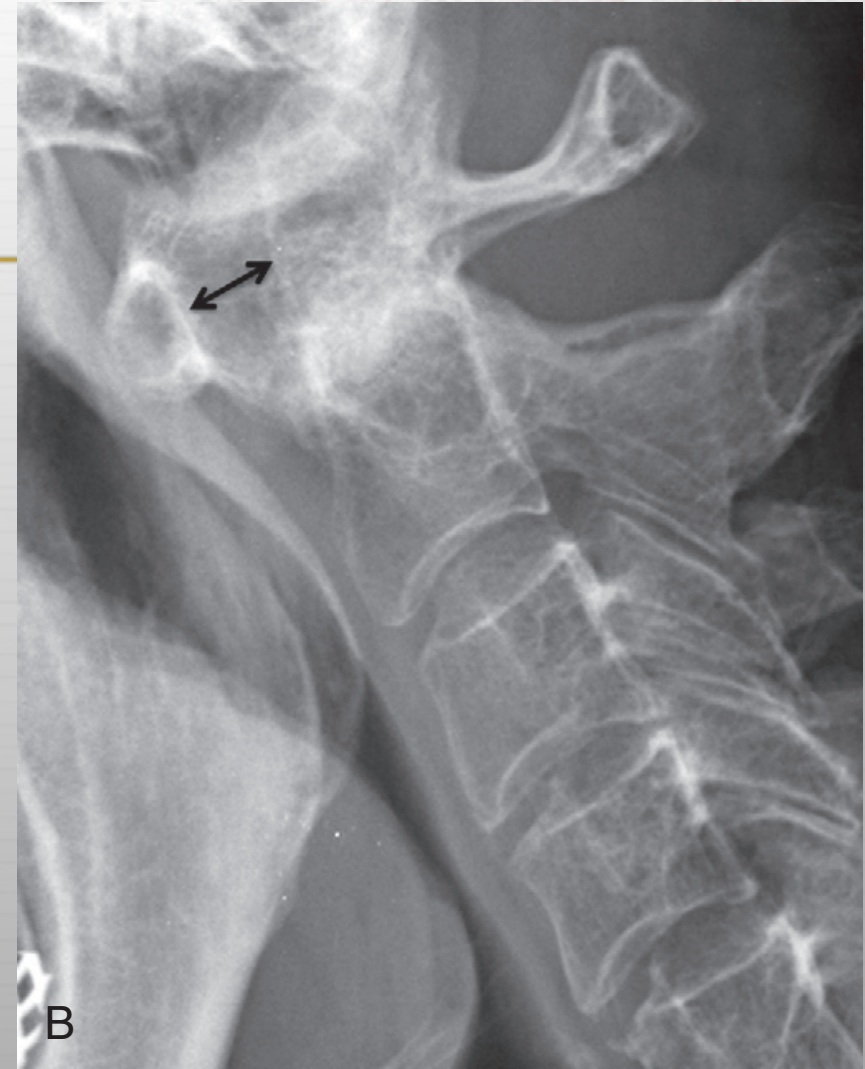
Inflammatory arthritis, synovitis, and pannus (P) → cartilage destruction.  
Marginal erosions (arrows) - subchondral bone plate at **bare area** is exposed to intraarticular synovitis.

# Rheumatoid Arthritis

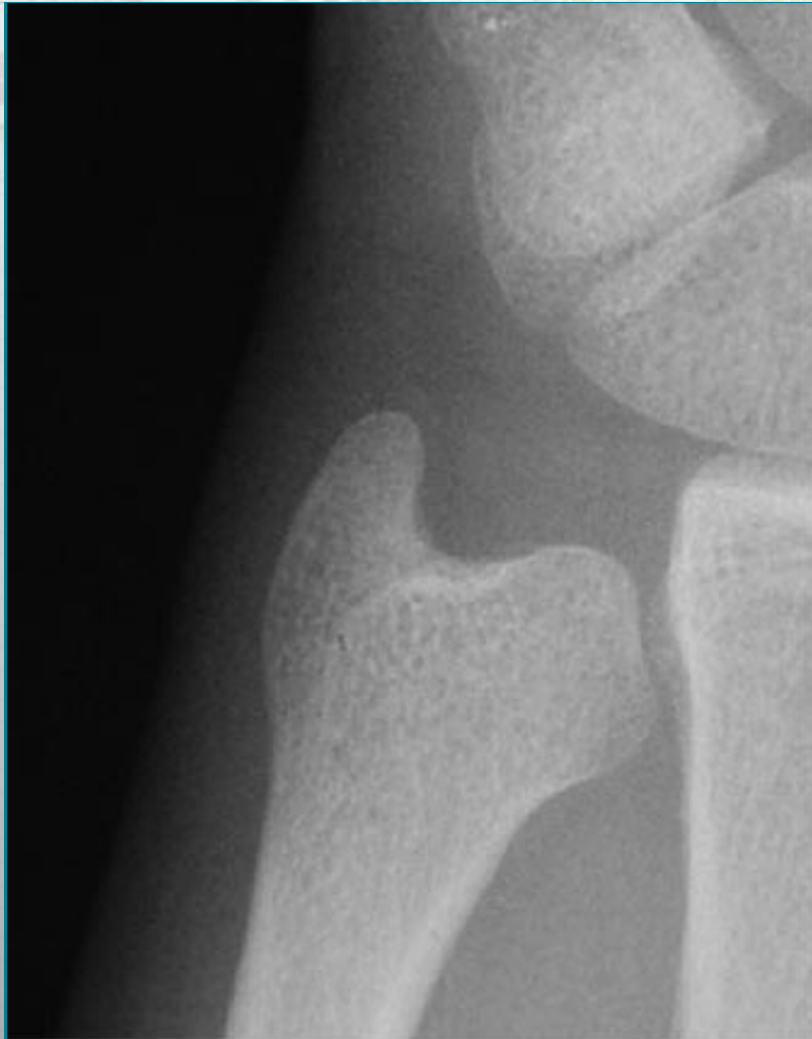


- ✧ knees
- ✧ hips
- ✧ sacroiliac
- ✧ shoulder – RCT tear → high-riding humeral head
- ✧ spine - C1-C2;
  - ✧ erosion of odontoid process
  - ✧ widening of anterior atlantodens interval ( 3 mm in adults)





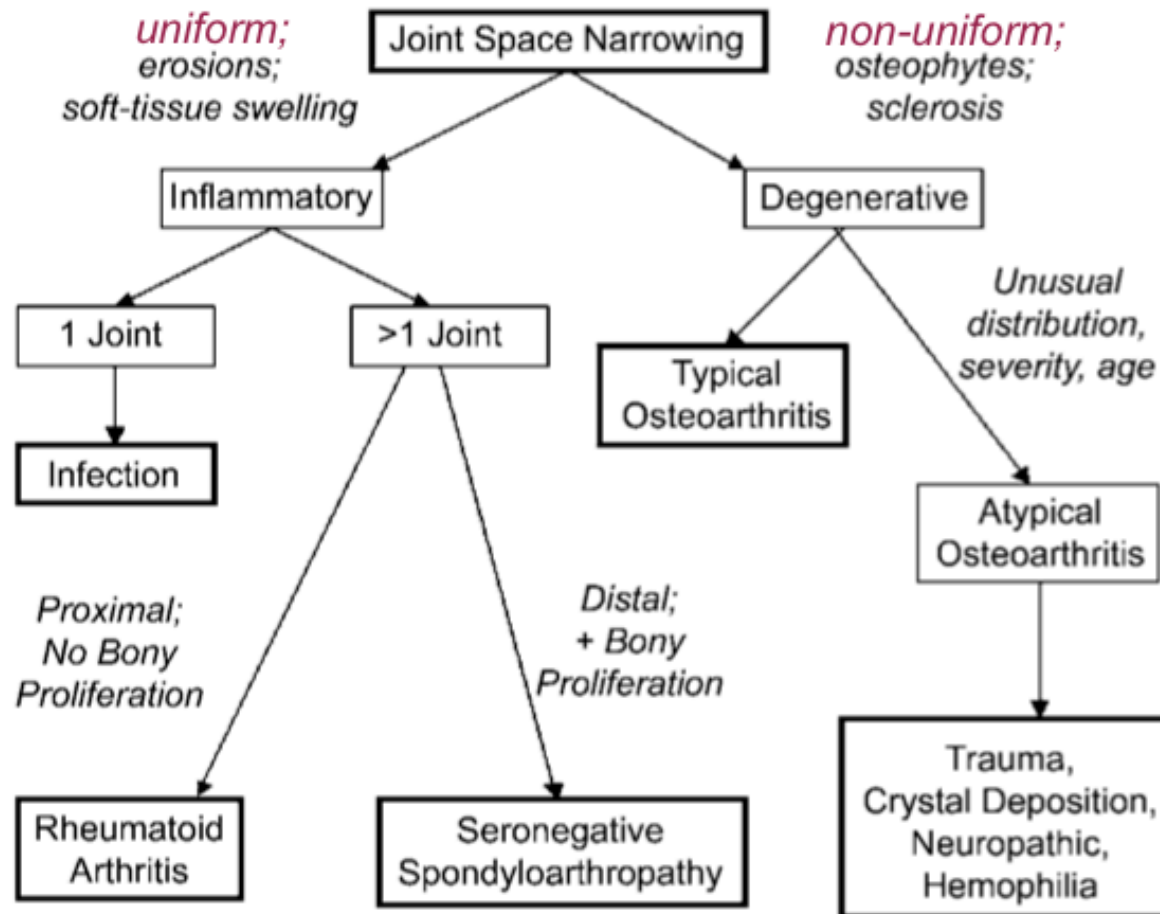
A, neutral position. B, flexed position shows widening of anterior atlantodens interval due to laxity of the transverse ligament.



### Early inflammatory arthritis

- Discontinuities of the thin, white, subchondral bone plate
- Arrow – bone erosion; **marginal** (margins of inflamed synovium)
- Osteopenia

**Figure 1**



**Figure 1:** Flow chart shows approach to radiographic evaluation of arthritis. Algorithm begins with joint space narrowing and initially uses differentiation between inflammatory and degenerative findings to reach the final diagnosis.

Modified from Jacobson JA, Girish G, Jiang Y, Resnick D. Radiographic evaluation of arthritis: inflammatory conditions. Radiology. 2008;248(2):378-89

# Septic Arthritis



- ✦ joint space narrowing
- ✦ osteopenia
- ✦ soft-tissue swelling
- ✦ bone erosion
- Joint space widening
  - initially; effusion
  - indolent and atypical infections;
    - TB & fungus
- 20% multiple joints