Learning Outcomes

1. Describe the structure and function of joints.
2. Describe the clinical-radiographic correlation of common arthropathies.
3. Describe the most common joints involved in common arthropathies.

Joint Anatomy

Synovial Joints

- Affected in degenerative and inflammatory joint disease

Differential Diagnosis of Arthritis
Differential Diagnosis of Arthritis

- Correlation of clinical, pathologic, and radiographic findings
- Categorization based on these findings has delineated three basic types: inflammatory, degenerative, and metabolic

DDx Arthritis:
- Inflammatory
- Degenerative
- Metabolic

Polyarthritis
Monoarthritis
Traumatic
Infectious
Crystal induced (gout, CPPD)
Rheumatoid
Degenerative
Inflammatory joint disease
Degenerative joint disease
Metabolic joint disease

Primary DJD
Secondary DJD

Degenerative Joint Disease
Peripheral Joints, Degenerative Disc Disease, Erosive Arthritis

Gout
Degenerative Joint Disease: General Features
- Aka osteoarthritis
- MC form of arthritis
- 1° form
  - Absence of underlying condition
  - Genetic component
  - Middle-aged women
- 2° form (MC)
  - Abnormal mechanical forces
  - Previous joint trauma

Degenerative Joint Disease: Clinical Features
- Joint Px, ↓ROM
- Stiffens with rest and improves with activity
- PIPs, DIPs, 1st CMJ, 1st MTP hip, knee
- Bony outgrowths result in soft tissue nodules over involved joints
- PIPs: Bouchard nodes
- DIPs: Heberden nodes

Degenerative Joint Disease: Pathological-Imaging Correlation
- Altered biomechanical forces
- Thinning and degradation of articular cartilage
- Asymmetrical, nonuniform joint space narrowing
- Osteophytes
- Subchondral sclerosis
- Subchondral cysts

Case 1.
- 75 yof, bilateral hand pain.

Case 2.
- 80 yof, bilateral hip pain, right > left.

Dx: Severe degenerative joint disease of the hands
• Asymmetrical, non-uniform joint space narrowing of the superolateral joint space with osteophytes, subchondral sclerosis, and subchondral cysts, right worse than left.
• Chronic remodeling changes of the right hip joint.

• Total hip arthroplasty with marked degenerative change of the left hip.

**Case 3.**

75 yof, gradually progressive pain in both knees with increased activity and a varus deformity.

**Erosive Osteoarthritis: Clinical Features**
- DJD variant
  - Inflammatory component
  - DIP, PIP joints
  - Relatively symmetric distribution
- Clinical:
  - Middle-aged, post-menopausal women
  - Episodic acute inflammatory attacks
  - Swelling, Px, erythema, ↓ROM
  - Nodules

**Erosive Osteoarthritis: Imaging Features**
- Non-uniform joint space narrowing
  - DIP, PIP joints
  - Relatively symmetric distribution
  - “Gull wing” deformities: central subchondral erosions + marginal osteophyte proliferation
**Osteitis condensans ilii**

- **Pathology:**
  - Non-inflammatory mechanical stress across SI joint
- **Clinical:**
  - SIJ Px, stiffness,
  - Multiparous female - ↑ relaxin
  - Self-limiting; may resolve spontaneously

**Osteitis condensans ilii: Imaging Features**

- Benign sclerosis of the ilium adjacent to the sacroiliac (SI) joint
- B/L, symmetrical, triangular in shape
- Preservation of SI joint space
- Tx: self-limiting; may resolve spontaneously

**Osteitis condensans ilii: CT Features**

Hx: 35 yof, LBP and stiffness.

Note preservation of articular cortex of SI joint (compare w/ sacroiliitis).

**Neuropathic Joint: Pathologic and Clinical Features**

- Progressive degenerative/destructive arthropathy
- Patients with abnormal pain sensation and proprioception
- Sensorimotor and autonomic neuropathies:
  - Diabetics (MC): foot, ankle
  - Syringomyelia: shoulder
  - Neurosyphilis/tabes dorsalis: knee
  - Traumatic spinal cord injury: spine

**Neuropathic Joint: Imaging Features**

- Atrophic form
  - Sensory +/- motor nerves affected
  - Acute, rapid progression
  - Joint destruction with resorption of bone
  - Non-weight bearing joints of UE

- Hypertrophic form
  - Sensory nerves affected
  - Slow progression
  - Joint destruction
  - Osteosclerosis
  - Osteophytes
  - Weight bearing joints of LE

**Neuropathic Joint of the Foot: Hypertrophic Changes**

- 6 D's:
  - Destruction
  - Debris
  - Density (osteosclerosis)
  - Distention
  - Dislocation
  - Disorganization
Neuropathic Joint of Shoulder: Atrophic Changes

- “Licked candy stick” appearance
- Resorption of bone end
- Destruction of glenohumeral joint
- Dislocation of humerus anteriorly

Degenerative Joint Disease: Hallmark Findings

- Asymmetrical joint space narrowing, osteophyte formation, subchondral sclerosis, and subchondral cysts.

Degenerative Disc Disease: Pathologic Features

- Dessication of the nucleus pulposis
  - ↓ proteoglycans
- Degeneration of annulus fibrosis
  - Fissures in collagen
    - Annular tears
- N₂ gas released
- Vacuum cleft phenomenon

Degenerative Disc Disease: Radiographic Features

- Osteophytes
  - Anterior > posterior
- Disc space narrowing
- Vertebral endplate sclerosis

Normal Appearance of Discs on MRI

- T1W
- T2W
- STIR W

Disc Dessication on MRI: L4/5

- T1W
- T2W

- Disc height loss
- T2W: loss of normal HSI
Degenerative Disc Disease: Types

- Disc Lesion
  - Disc Bulge > 25%
  - Disc Herniation < 25%
  - Disc Protrusion
  - Disc Extrusion
  - Disc Sequestration

Normal Disc Morphology

- Annulus fibrosis
  - Outer AF is vascular
  - Inner AF is avascular
  - Weakest posterolaterally
    - Thinner and has more disorganized collagen bundles
- Nucleus pulposis
  - Collagen, glycosaminoglycans
  - Dessication: ↓T2

Disc Bulge

- Involves >25% of disc circumference
- Circumferential
- Asymmetric

Disc Protrusion: L5/S1

- T1W
- T2W

Disc Extrusion

- <25% of disc circumference, base narrower than herniation
Disc Extrusion: L4/5

Disc Sequestration: L4/5

Degenerative Disc Disease: Modic Endplate Changes
- Classification for vertebral endplate MRI-signal changes
- Degenerative process
- Three types (stages):
  1. Edema
  2. Fat
  3. Sclerosis

Degenerative Disc Disease: Modic Type 1
- Edema
  - T1: ↓ signal
  - T2: ↑ signal

Degenerative Disc Disease: Modic Type 2
- Fat
  - T1: ↑ signal
  - T2: ↑ signal
Degenerative Disc Disease: Modic Type 3

- Sclerosis
  - T1: ↓ signal
  - T2: ↓ signal

Degenerative Disc Disease: Subchondral Sclerosis

- Sclerosis
  - T1: ↓ signal
  - T2: ↓ signal

Degenerative Disc Disease: Hallmark Findings

- Disc height narrowing and desiccation, osteophyte formation, and endplate changes.

Degenerative Disc Disease: Hallmark Findings

- Pathology:
  - Adjacent lumbar spinous processes degenerate and rub against each other
    - Hypertrophy, sclerosis, bursal formation

- Clinical:
  - Focal midline Px, tenderness
  - Px relieved by flexion, aggravated by extension
  - Older age, hyperlordosis, central canal stenosis

Baastrup Disease: Pathological and Clinical Features

- Pathology:
  - Adjacent lumbar spinous processes degenerate and rub against each other

- Clinical:
  - Focal midline Px, tenderness
  - Px relieved by flexion, aggravated by extension
  - Older age, hyperlordosis, central canal stenosis

Baastrup Disease: Radiographic Features

- Radiographs:
  - Approximation and contact of adjacent spinous processes (kissing spines)
  - Hypertrophy, flattening and reactive sclerosis of apposing interspinous surfaces

Baastrup Disease: MRI Features

- MRI:
  - T2 HSI: reactive edema, interspinous bursal fluid
DISH: Pathological and Clinical Features

- ? etiology; chronic inflammatory cellular infiltration
- Periosteal new bone formation
  - Calcification/ossification of the anterior longitudinal ligament (ALL)
  - Thoracic > cervical > lumbar
  - Enthesopathy of spine and pelvis
- Associations: OPLL (50%), hyperglycemia (i.e. diabetics; 50%)
- Clinical:
  - Elderly individuals
  - ↓ ROM, dysphagia (rare)
  - Lab: HLA-B8+ +/- HLA-B27+ (~1/3rd)

DISH: Imaging Features

- Thick ossification noted anterior to ≧4 contiguous vertebrae (*flowing hyperostosis)
- Disc spaces well preserved
- No sacroiliitis or facet joint ankylosis

DISH: Lumbar Spine and Pelvis

- Cervical > thoracic > lumbar
- Japanese/Asian populations
- M:F = 2:1
- Neurological S/Sx

Ossification of the Posterior Longitudinal Ligament

- Cervical > thoracic > lumbar
- Japanese/Asian populations
- M:F = 2:1
- Neurological S/Sx

DISH and OPLL

Inflammatory Joint Disease

Rheumatoid Arthritis
Rheumatoid Arthritis: Clinical Features

- Middle-aged females
- Fatigue, malaise, generalized aches
- Joint Px
  - Develops in symmetric, proximal distribution
- Haygarth nodes @ MCP joints
- Deformities, arthritis mutilans
- Labs: RF+

Swan neck deformity
Extension of PIP + flexion of DIP

Boutonniere deformity
Flexion of PIP + extension of DIP

Rheumatoid Arthritis: Pathologic Features

- Chronic multisystemic inflammatory disease
- Autoimmune response targeted against synovial structures, other organs
  - Inflammatory response → pannus
    - Edematous, hyperplastic synovium infiltrated by B- and T-lymphocytes
  - Erosion of "bare area" of bone

Rheumatoid Arthritis: Pathological-Imaging Correlation

- Autoimmune response targets synovial structures
- Inflammatory cascade (CD4 cells) leads to pannus formation infiltrated by immune cells
- Erosion of bare areas initially, followed by articular cartilage

Symmetrical, uniform joint space narrowing
Periarticular osteopenia
No osteophytes or subchondral sclerosis
Periarticular soft tissue swelling

Rheumatoid Arthritis: Marginal Erosions at Bare Areas

- MCP and PIP joints
- Sparing of DIPS
- Ulnar styloid
- Bilateral symmetric distribution
- Uniform loss of joint space
- Periarticular osteopenia
- Ulnar subluxations of phalanges
- Deformities

Rheumatoid Arthritis of the Hands

- MCP and PIP joints
  - Sparing of DIPS
  - Ulnar styloid
- Bilateral symmetric distribution
- Uniform loss of joint space
- Periarticular osteopenia
- Ulnar subluxations of phalanges
- Deformities

Rheumatoid Arthritis of the Cervical Spine

- Pannus formation erodes C1-C2 synovial joint
  - Destruction of dens → transverse ligament laxity → ↑ADI
  - Cervical subluxations, eventual dislocations
  - 80% cases eventually involve cervical spine → assess ADI
Rheumatoid Arthritis of the Hip

- Concentric (superior + axial + medial) hip joint space narrowing
- Axial migration of femoral head
  - Protrusio acetabuli (15%)
- MC cause of bilateral protrusio acetabuli (corticosteroid Tx implicated)

Severe inflammatory degeneration of left hip with marked erosive change. THA of right hip.

Case 4.

55 yof, difficulty walking and bilateral hip px 5 years duration.

Rheumatoid Arthritis of the Knee

- Axial migration of femoral heads with concentric joint space narrowing in bilateral, symmetric distribution
- Severe osteoporosis and inflammatory degenerative change
- Erosion of pubic symphysis

Dx: Rheumatoid arthritis of the hips and pubic symphysis

55 yof, bilateral knee px and swelling.

Rheumatoid Arthritis of the Knee on MRI

- Prominent suprapatellar synovial joint effusion
- Thickening and hyperplasia of the synovium
- Large calcified Baker’s cyst

55 yof, knee px and palpable mass in popliteal fossa.

Rheumatoid Arthritis of the Foot

- MTP, PIP joints
- 5th MTP → progresses medially (4th through 1st)
- Multiple erosions, subluxation, dislocations
- Lanois deformity
  - Fibular subluxation of phalanges + dorsal subluxation of MTP joints
- Prominent hallux valgus

55 yof, knee px and palpable mass in popliteal fossa.
Rheumatoid Arthritis of the Foot

- “Licked candy stick” appearance
- Tapering of the tips of the MC and MT bones, phalanges, or clavicles

Rheumatoid Arthritis of the Lung

- Decreased lung volume and interstitial thickening in lower lung predominance consistent with ILD in RA.

Rheumatoid Arthritis: Management

- Assess for c-spine involvement
- Lab testing:
  - Rheumatoid factor (+ in 70% cases)
  - ↑ ESR
- Joint aspiration (biopsy of synovium)
- Consultation with rheumatologist
- Corticosteroid Tx (Note: level of RF proportional to severity of Sx)
- Monitor clinically for development of instability and AVN

Inflammatory Joint Disease: Imaging Features

- Symmetrical, polyarticular involvement with periarticular osteopenia, erosive changes, and periostitis.

Inflammatory Joint Disease

Seronegative spondyloarthropathies

Review: Spinal Osteophytes

- Horizontal bone extension of vertebral endplates
- Degeneration of Sharpey fibers from IVD movement and shearing forces on ligaments
- Seen in DDD
**Review: Spinal Osteophytes**

- **Traction osteophytes**: extend horizontally from vertebral endplate
- **Claw osteophytes**: extend superiorly from vertebral endplate
  - May bridge adjacent vertebra

**Review: Syndesmophytes**

- Paravertebral ossifications that run parallel with spine
  - Vertically oriented
- Heterotopic ossifications of a spinal ligament +/- annulus fibrosis
- Seronegative spondyloarthropathies

**Syndesmophytes: Marginal vs. Non-Marginal**

- **Marginal (symmetric):**
  - Originate at edge (margin) of one vertebral body and extend to margin of adjacent vertebral body
  - Thin
  - AS, EnA
- **Non-marginal (asymmetric):**
  - Originate from mid-vertebral body
  - Thick, bulky
  - PsA, ReA

**Marginal Syndesmophytes in Ankylosing Spondylitis**

**Non-Marginal Syndesmophytes in Psoriatic Arthritis**

**Non-Marginal Syndesmophytes in Reactive Arthritis**
Normal Sacroiliac Joint: Grade 0
- Upper 1/3 is syndesmosis
- Lower 2/3 lined by articular cartilage
  - Lower 1/3 lined by synovium
  - Cartilage thicker anteriorly and thinner on iliac side

Sacroilitis: Grade 1
- Some blurring of joint margins – suspicious

Sacroilitis: Grade 2
- Minimal sclerosis
- Minimal erosion
  - Iliac > sacral side
- Dx of AS usually made in this stage

Sacroilitis: Grade 3
- Definite sclerosis on both sides of SI joint
- Severe erosions with widening of SI joint space

Sacroilitis: Grade 4
- Complete ankylosis of SI joint

Ankylosing Spondylitis: Clinical Features
- Chronic inflammatory autoimmune disease
- Predilection for axial skeleton
- Caucasian males, 15-35 years
- Chronic LBP, progressively worsening
- Stiff, aching SI joint, T/L and L/S spine
**Ankylosing Spondylitis: Pathological-Imaging Correlation**

- **Synovial Joints**
  - Pannus formation

- **Cartilaginous Joints**
  - Inflammatory cell infiltrate
  - Subchondral osteitis, fibrosis, ankylosis
  - Erosive change at ligament attachment site to bone

- **Entheses**
  - Joint destruction

**Ankylosing Spondylitis: Imaging Features**

- **Early SI joint involvement**
- **Bilateral, symmetrical osteopenia, erosions, and reactive sclerosis**
- **Eventual bony ankylosis**
- **Spinal changes ascending from T/L junction**
- **With equivocal early films, re-take in 3-6 months**
- **Women show peripheral and SI joint changes with little/no spinal involvement**

**Ankylosing Spondylitis of the Spine**

- **Trolley track sign**
- **Bamboo spine**
- **Romanus lesions**
- **Shiny corner sign**

**Ankylosing Spondylitis of the Hips**

- **Bilateral, symmetric hip joint arthropathy**
- **Uniform destruction of joint space**
- **Enthesopathy**
- **Image:**
  - Grade 3-4 sacroiliitis
  - Sacrotuberous ligament calcification
  - Bilateral hip arthropathy
Ankylosing Spondylitis of the Foot

- Calcaneus:
  - Erosions and periostitis
  - Insertions of Achilles tendon and plantar aponeurosis

Ankylosing Spondylitis of the Lung

- Decreased lung volume and interstitial thickening with upper and mid-lung predominance and extensive bullous changes, consistent with ILD in AS.

Ankylosing Spondylitis: Management

- Assess cervical spine for instability
- Lab testing:
  - HLA-B27+ (90%)
  - ↑ ESR in active, inflammatory phase
  - RF-
- Consultation with rheumatologist

Enteropathic Arthritis: Clinical Features

- Etiology: Inflammatory bowel disease
- Hx: Ulcerative colitis or Crohn’s Dz
  - 15% patients with GI involvement develop associated arthritis
  - MSK manifestations parallel GI episodes
- Systemic Sx
  - Malaise, weight loss, abdominal Px, altered stool characteristics
- Joint Px

Enteropathic Arthritis: Imaging Features

- Gastrointestinal pathology
- Skeletal findings of AS:
  - Bilateral symmetric sacroiliitis
  - Erosive change at T/L junction with reactive sclerosis
  - Marginal syndesmophytes
  - Fusion of spine and facet joints
  - Ossification of spinal ligaments
  - Enthesopathy

Enteropathic Arthritis with Ulcerative Colitis

- Lead pipe appearance of colon
- Ankylosis of left SI joint, partial ankylosis of right SI joint
Enteropathic Arthritis with Crohn Disease

- CECT Abdominal Window

Enteropathic Arthritis: Management

- Clinically correlate for co-existing inflammatory bowel disease
- Assess cervical spine for instability
- Lab testing:
  - HLA-B27+
  - ↑ ESR in active, inflammatory phase
  - RF-
- Consultation with rheumatologist

Psoriatic Arthritis: General Features

- ~15% patients with psoriasis (skin lesions) develop associated arthritis
- Hands, feet
- Occasionally affects spine, SIJ, hips, knees
- Seronegative spondyloarthropathy (asymmetrical involvement)

Psoriatic Arthritis: Clinical Features

- Psoriatic lesions
  - Extensor forearm, knee, back, scalp
- Nail lesions
  - Pitting, ridging, discoloration, nail loss, subungual hyperkeratosis
  - 80% psoriatic patients with nail lesions get arthritis
- DIP redness, Px, swelling
- Sausage digit: tenosynovitis swells entire digit
- Deformities, arthritis mutilans
- Chronic, low-grade LBP

Psoriatic Arthritis: Pathological-Imaging Correlation

- Pannus formation
- Inflammatory cell infiltrate
- Synovial Joints
- Cartilaginous Joints
- Entheses
- Joint destruction
- Subchondral osteitis, fibrosis, ankylosis
- Erosive change at ligament attachment site to bone

Psoriatic Arthritis: Hallmark Radiographic Features

- Destructive changes
  - "Mouse-ear" erosions
- Proliferative changes
  - Fluffy periostitis
- Distal, asymmetric distribution
  - MCP, MTP, PIP and DIP joints
- Periarticular soft tissue swelling
  - Sausage digit/ spindle digit
- Lack of periarticular osteopenia
- Joint deformities
Psoriatic Arthritis of the Hands
- DIP joint destruction
- Asymmetrical distribution
- “Pencil-in-cup” deformities of MCP joints
- Right digits 2-4

Psoriatic Arthritis of the Foot
- Similar to findings in hands
- Soft tissue swelling, erosions, fluffy periostitis
- Lysis at MT heads and distal tufts
- “Licked candy stick” appearance
- Ivory phalanx
- Deformities
- Calcaneus
- Erosions, periostitis at insertion of Achilles and plantar ligaments

Psoriatic Arthritis of the Foot
- Similar to findings in hands
- Soft tissue swelling, erosions, fluffy periostitis
- Lysis at MT heads and distal tufts
- “Licked candy stick” appearance
- Ivory phalanx
- Deformities
- Calcaneus
- Erosions, periostitis at insertion of Achilles and plantar ligaments

Psoriatic Arthritis of the Pelvis and Sacroiliac Joints
- 30-50% patients have SIJ involvement
- Bilateral asymmetric sacroiliitis
  - Erosions, sclerosis, hazy joint margins
  - Bony ankylosis
  - Enthesopathy, erosive changes, periostitis
  - Iliac crests, ischial tuberosities, trochanters

Psoriatic Arthritis of the Spine
- Coarse, nonmarginal syndesmophytes

DDx Atrophic Bone Destruction
- Neuropathic arthropathy
- Rheumatoid arthritis
- Psoriatic arthritis
- Leprosy (infection)
Psoriatic Arthritis of the Cervical Spine

- 75% patients have cervical spine involvement
- 45% patients have C1/2 instability

Psoriatic Arthritis of the Cervical Spine

50 yom, 22 yr Hx PsA

60 yof, 27 yr Hx PsA

Psoriatic Arthritis: Management

- Clinically correlate for presence of coexisting skin and nail lesions
- Assess for C1/2 instability
- Lab testing:
  - HLA-B27+
  - ↑ ESR in active, inflammatory phase
  - RF-
- Consultation with rheumatologist

Psoriatic Arthritis: Management

Reactive Arthritis: Clinical Features

- Etiology: STI
- Male predilection (50:1)
- Triad: urethritis, conjunctivitis, polyarthritis
  - Dysuria, discharge, prostatitis
  - Eye (iritis), skin, mucosal lesions (late)
  - Joint Px

Reactive Arthritis: Clinical Features

Reactive Arthritis of the Foot

- Soft tissue swelling
- Erosions MTP and IP joints
  - Especially 1st IP joint
  - Fluffy periostitis
  - Lanois deformity
- Calcaneus
  - Lover’s heel
  - Erosions at Achilles tendon and plantar fascia insertions

Reactive Arthritis of the Foot

Reactive Arthritis: Spine and SI Joints

- SI:
  - Involved in ~70% patients with ReA
  - Bilateral, asymmetric sacroiliitis
    - Erosions, hazy joint margin, variable sclerosis
    - Can progress to bony ankylosis
- Spine:
  - Coarse, non-marginal syndesmophytes
  - C1/2 instability may result

Reactive Arthritis: Spine and SI Joints

Why was an IVP performed?

Why was an IVP performed?
Reactive Arthritis: Management
- Clinically correlate for co-existing STI
- Assess for C1/2 instability
- Laboratory testing:
  - HLA-B27+ (75%)
  - Leukocytosis
  - ↑ ESR in active, inflammatory phase
  - RF-
- Consultation with rheumatologist

DDx Sacroilitis
- B/L involvement:
  - Seronegative spondyloarthropathies
- U/L involvement with normal contralateral joint:
  - Infection
    - Pyogenic septic arthritis
    - Tuberculous arthritis
  - Neoplasm

Metabolic Joint Disease
Gout: Pathological Features
- Intra- and periarticular deposition of monosodium uric acid (UA) crystals
  - Deficiency in uric acid oxidase enzyme
  - Crystalline arthropathy
- Podagra
  - Gout of big toe → enlarged, swollen
- Tophi
  - Chalky white intra- and periarticular UA deposits
  - Purine metabolism exacerbate Sx

Gout: Clinical Features
- M:F=20:1
- Avg. onset > 40 years
- Family Hx common
- Attacks usually early morning
- Erythematous, hot (but dry) swollen joints
- Patients may be ASx for years
- 1st MTP joint MC (60%)
- Hyperuricemia

Gout: Imaging Features
- Lag behind clinical features by 5-10 years
- Joint effusion (earliest sign)
- Periarticular tophi
  - Eccentric bone erosions
    - “Overhanging margin” sign
- Preservation of joint space until late in disease
- Absence of periarticular osteopenia
**Gout of the 1st Metatarsal Phalangeal Joint**
- Soft tissue tophi with mild marginal erosive change.
- Soft tissue tophi with severe marginal erosions (“overhanging margins”).

**Gout of the Bursae**
- Tophus masses in prepatellar and infrapatellar bursae.
- Tophus mass in olecranon bursa.

**Gout: Management**
- Conservative Tx in non-acute stage of Dz
- Joint aspiration
  - UA crystals in synovial fluid
- MRI may be indicated to further evaluate joint(s) involved
- Consultation with rheumatologist

**Calcium Pyrophosphate Dihydrate Deposition Disease**
- Chondrocalcinosis
  - Ca\(^{2+}\) deposition in cartilage, menisci
- Knee, pubic symphysis
- Medial → patellofemoral → lateral joint involvement
- Subchondral sclerosis, cysts, fragmentation

**CPPD of the Knee**

**CPPD of the Pubic Symphysis**
CPPD: Management

- Joint aspiration
  - CPPD crystals within joints
- Advanced imaging (i.e. PD-MRI)
  - Further evaluate extent of articular involvement
- Consultation with rheumatologist

Hydroxyapatite Deposition Disease: Clinical Features

- Periarticular and intra-articular deposition of hydroxyapatite (HA) crystals
- Calcifications within periarticular tendons, bursae, joint capsule
  - Calcific tendonitis of rotator cuff
- Supraspinatus, gluteus medius tendons MC
- Painful ROM of affected area
- Middle-aged to elderly individuals
- ? Hx of repeated trauma

Hydroxyapatite Deposition Disease of the Supraspinatus Tendon

- Curvilinear calcification paralleling humeral head in expected location of supraspinatus tendon

Hydroxyapatite Deposition Disease of the Subacromial Bursa

- Homogenously dense, amorphous calcification within subacromial space
- Assess acromiohumeral space
  - Humeral head displaced inferolaterally
  - ↑ GH joint space and AH distance, likely due to effusion

Hydroxyapatite Deposition Disease of the Gluteus Medius Tendon

- Calcification superior to both greater trochanters in expected location of gluteal tendons

HADD: Management

- Conservative Tx
  - NSAIDS, corticosteroids
- Joint aspiration
  - HA crystals within joints
- MRI to further evaluate extent of articular involvement
- Consultation with rheumatologist
Pop Quiz

POP QUIZ! Type of Modic endplate change?

- **Type 1 Edema**

- **Type 2 Fat**

- **Type 3 Sclerosis**

Differential Diagnosis of Arthritis: Summary

- Arthritis
  - Monoarthritis
    - Traumatic
    - Infectious
    - Crystal induced (gout, CPPD)
    - Rheumatoid
  - Polyarthritis
    - Degenerative joint disease
    - Inflammatory joint disease
    - Metabolic joint disease
Arthritis
Polyarthritis
Inflammatory joint disease
Degenerative joint disease
Metabolic joint disease
Monoarthritis (Bony enlargement of joints)
Primary DJD
Secondary DJD
Rheumatoid arthritis
Seronegative spondyloarthropathies
DIP: DJD, EOA, PsA, Reactive
PIP: DJD, EOA, RA, PsA
MCP: RA, CPPD
1st CMC: DJD
Wrist: RA, CPPD, JRA
Bilateral symmetric sacroiliitis: AS, EnA
Unilateral/asymmetrical sacroilitis: PsA, ReA
Learning Outcomes: Revisited

1. Describe the structure and function of joints.

2. Describe the clinical-radiographic correlation of common arthropathies.

3. Describe the most common joints involved in common arthropathies.

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