Inflammatory Joint Conditions

Inflammatory joint conditions, such as septic arthritis, gout, pseudogout, and other related disorders, cause acute or chronic joint inflammation, leading to pain, swelling, and potential joint damage. This pamphlet provides an overview of septic arthritis, gout, pseudogout, and other inflammatory conditions, focusing on their clinical presentation, pathophysiology, diagnosis, hospital management, and complications, with clinical scenarios for practical understanding.

Clinical Presentation

Septic Arthritis:

- Symptoms:
  - Acute onset (hours to days) of severe joint pain, swelling, warmth, erythema; fever, chills; often monoarticular (knee most common).
- Exam:
  - Joint effusion, limited range of motion (ROM), tenderness, fever (T >38°C in 60-80% of cases).

Gout:

- Symptoms:
  - Acute onset (hours) of severe joint pain, often 1st MTP joint (podagra), swelling, erythema; history of prior attacks, hyperuricemia risk factors (e.g., alcohol, purine-rich foods).
- Exam:
  - Monoarticular, erythematous, warm, tender joint; tophi in chronic cases.

Pseudogout (Calcium Pyrophosphate Deposition Disease, CPPD):

- Symptoms:
  - Acute or subacute onset of joint pain, swelling, warmth; often knee or wrist; may mimic gout or osteoarthritis.
- Exam:
  - Monoarticular or oligoarticular, joint effusion, tenderness; less erythema than gout.

Other Inflammatory Conditions:

- Rheumatoid Arthritis (RA):
  - Symptoms: Chronic symmetric polyarthritis, morning stiffness (>1 hour), fatigue, weight loss.
  - Exam: Symmetric small joint involvement (MCP, PIP), rheumatoid nodules, joint deformities (late).
- Reactive Arthritis:
  - Symptoms: Asymmetric oligoarthritis (often lower extremities), post-infectious (e.g., Chlamydia, Salmonella), conjunctivitis, urethritis.
- Exam: Enthesitis (e.g., Achilles), dactylitis, sacroiliitis.

Pathophysiology

Septic Arthritis:

- Cause: Bacterial infection (e.g., S. aureus, Streptococcus, N. gonorrhoeae), often hematogenous spread, direct inoculation, or contiguous spread.
- Mechanism: Bacteria invade the synovial space, triggering an inflammatory response with cytokine release (e.g., IL-1, TNF-α), leading to synovial proliferation, cartilage destruction, and pus formation.

Gout:

- Cause: Hyperuricemia leading to monosodium urate (MSU) crystal deposition in joints.
- Mechanism: MSU crystals precipitate in joints, triggering an acute inflammatory response via NLRP3 inflammasome activation, neutrophil recruitment, and cytokine release (e.g., IL-1β).

Pseudogout (CPPD):

- Cause: Calcium pyrophosphate crystal deposition in joints, often associated with aging, osteoarthritis, or metabolic disorders (e.g., hemochromatosis, hyperparathyroidism).
- Mechanism: CPP crystals induce inflammation via similar pathways as gout, but less intense; often linked to cartilage degeneration.

Other Conditions:

- RA:
  - Autoimmune; autoantibodies (RF, anti-CCP) target synovial tissue, causing chronic inflammation, pannus formation, and joint destruction.
- Reactive Arthritis:
  - Post-infectious immune response (molecular mimicry) leads to synovial inflammation, often HLA-B27 associated.

Diagnosis

Septic Arthritis:

- Joint Aspiration (Arthrocentesis):
  - **Gold standard; synovial fluid analysis:**
    - WBC >50,000/µL (often >100,000), >90% neutrophils.
    - Gram stain, culture (positive in 50-70%), PCR for fastidious organisms (e.g., N. gonorrhoeae).
- Labs:
  - Elevated WBC, ESR, CRP; blood cultures (positive in 50% of hematogenous cases).
- Imaging:
  - X-ray (soft tissue swelling, late erosions), MRI (effusion, osteomyelitis).

Gout:

- Joint Aspiration:
  - **Synovial fluid:** Negatively birefringent needle-shaped MSU crystals under polarized light.
- Labs:
  - Serum uric acid (often >6.8 mg/dL, may be normal during attack), elevated ESR/CRP.
- Imaging:
  - X-ray (tophi, erosions with overhanging edges in chronic gout), US (double contour sign).

Pseudogout:

- Joint Aspiration:
  - **Synovial fluid:** Positively birefringent rhomboid CPP crystals.

- Labs:
  - Normal uric acid, elevated ESR/CRP; screen for metabolic causes (e.g., TSH, iron studies).
- Imaging:
  - X-ray (chondrocalcinosis in cartilage, e.g., knee menisci), US (crystal deposition).

Other Conditions:

- RA:
  - RF, anti-CCP positive; elevated ESR/CRP; X-ray (erosions, joint space narrowing).
- Reactive Arthritis:
  - HLA-B27 positive (70%), recent infection history, elevated ESR/CRP; X-ray (asymmetric sacroiliitis).

Differential Diagnosis

- Infectious:
  - Septic arthritis (bacterial, fungal, viral).
  - Osteomyelitis (contiguous spread).
- Crystal-Induced:
  - Gout (MSU crystals).
  - Pseudogout (CPP crystals).
- Autoimmune:
  - RA (symmetric polyarthritis).
  - Reactive arthritis (post-infectious).
  - Lupus arthritis (SLE, symmetric, non-erosive).
- Other:
  - Osteoarthritis (chronic, degenerative, non-inflammatory).
  - Trauma (hemarthrosis, fracture).

Hospital Management of Inflammatory Joint Conditions

Septic Arthritis:

- Urgent Arthrocentesis:
  - Drain joint, send fluid for analysis (WBC, Gram stain, culture).

- Antibiotics:
  - Empiric: Vancomycin 15 mg/kg IV q12h (MRSA coverage) + ceftriaxone 2 g IV daily (gram-negatives).
  - Adjust based on culture:
  - MSSA (nafcillin 2 g IV q4h), N. gonorrhoeae (ceftriaxone), gram-negatives (piperacillin-tazobactam 4.5 g IV q6h).
  - Duration: 2-4 weeks IV, then 2-4 weeks PO.
- Surgical Intervention:
  - Arthroscopic washout or open drainage if large joint, poor response to antibiotics, or loculated fluid.
  - Orthopedic consult for prosthetic joint infection (PJI).
- Supportive Care:
  - Pain control: Opioids (e.g., morphine 2-4 mg IV q4h), avoid NSAIDs (risk of masking inflammation).
  - Monitor: Daily WBC, ESR/CRP (should decrease), repeat aspiration if no improvement after 48-72 hours.
- Complications: Joint destruction (20-30% if delayed treatment), osteomyelitis, sepsis (mortality 10-15%).

Gout:

- Acute Attack:
  - NSAIDs:
    - Indomethacin 50 mg PO TID or ibuprofen 800 mg PO TID x 5-7 days.
    - Colchicine: 1.2 mg PO load, then 0.6 mg 1 hour later, 0.6 mg BID thereafter.
    - Steroids: Prednisone 30-40 mg PO daily x 5 days, taper over 10-14 days (if NSAIDs contraindicated).
- Chronic Management:
  - Urate-lowering therapy (ULT):
    - Allopurinol 300 mg PO daily (start after acute attack resolves, titrate to uric acid <6 mg/dL).
  - Prophylaxis:
    - Colchicine 0.6 mg PO daily during ULT initiation.
- Supportive Care: Hydration, avoid alcohol/purines, pain control.

Pseudogout:

- Acute Attack:
  - NSAIDs: Ibuprofen 800 mg PO TID x 5-7 days.
  - Colchicine: Same as gout.

- Steroids: Prednisone 20-30 mg PO daily x 5-7 days (if NSAIDs contraindicated).
- Chronic Management:
  - Treat underlying cause (e.g., hemochromatosis), colchicine for prophylaxis if recurrent.
- Supportive Care: Joint aspiration for symptomatic relief, pain control.

Other Conditions:

- RA: (Involve rheumatology)
  - Acute Flare:
    - Prednisone 10-20 mg PO daily x 5-7 days, intra-articular steroids if monoarticular.
- Chronic:
  - DMARDs (methotrexate 15-20 mg PO weekly), biologics (e.g., adalimumab 40 mg SC q2w).
- Reactive Arthritis:
  - Acute:
    - NSAIDs (ibuprofen 800 mg PO TID), steroids if severe (prednisone 20 mg PO daily).
- Chronic:
  - Treat underlying infection (e.g., doxycycline for Chlamydia), sulfasalazine 2 g PO daily if persistent.

Complications

- **Septic Arthritis:**
  - Joint destruction**:** Cartilage loss, deformity (20-30% if untreated).
  - Osteomyelitis**:** Bone involvement, chronic infection.
  - Sepsis**:** Systemic spread, mortality 10-15%.
- **Gout**:
  - Tophi**:** Chronic urate deposits, joint deformity.
  - Uric acid nephropathy: Renal stones, CKD.
- **Pseudogout**:
  - Joint destruction: Mimics osteoarthritis, chronic pain.
  - Secondary osteoarthritis**:** Cartilage damage.
- **RA**:
  - Joint deformities: Ulnar deviation, swan-neck.
  - Systemic**:** Vasculitis, lung fibrosis, cardiovascular disease.
- **Reactive Arthritis**:
  - Chronic arthritis**:** Persistent joint damage.

    - Uveitis**:** Vision loss if untreated.

Key Pearls

- Presentation:
    - Septic (acute, fever, monoarticular),
    - gout (podagra, hyperuricemia),
    - pseudogout (knee/wrist, chondrocalcinosis),
    - RA (symmetric, morning stiffness),
    - reactive (post-infectious, asymmetric).
- Diagnosis: Arthrocentesis (WBC, crystals, culture), labs (uric acid, RF, anti-CCP), imaging (X-ray, US).
- Hospital Management (Septic Arthritis): Urgent arthrocentesis, antibiotics (vancomycin + ceftriaxone), surgical drainage if needed, monitor for sepsis.
- Treatment: Septic (antibiotics, drainage), gout (NSAIDs, colchicine, ULT), pseudogout (NSAIDs, steroids), RA (DMARDs), reactive (NSAIDs, treat infection).
- Complications: Septic (joint destruction, sepsis), gout (tophi, nephropathy), pseudogout (osteoarthritis), RA (deformities, systemic).

References

- **UpToDate:** “Septic Arthritis: Diagnosis and Management” (2025). UpToDate Septic Arthritis
- **ACR:** “Guidelines for the Management of Gout” (2024). ACR Gout Guidelines
- **EULAR:** “Management of Calcium Pyrophosphate Deposition Disease” (2023). EULAR CPPD Guidelines
- **NEJM:** “Advances in the Treatment of Rheumatoid Arthritis” (2024). NEJM RA

Case Scenarios

Case 1: A 60-Year-Old Male with Acute Knee Pain

- Presentation: A 60-year-old male with a history of IV drug use presents with 2 days of severe right knee pain, swelling, and fever. Exam shows T 38.5°C, BP 110/70 mmHg, erythematous, warm, tender right knee, limited ROM.
- Labs/Studies: WBC 15,000/µL, ESR 80 mm/h, CRP 100 mg/L. Arthrocentesis: WBC 80,000/µL, 95% neutrophils, Gram stain positive for gram-positive cocci, culture grows S. aureus.
- Diagnosis: Septic Arthritis → Acute monoarticular pain, fever, positive culture.

- Management: Admit for treatment. Urgent arthrocentesis with drainage. Start vancomycin 15 mg/kg IV q12h. Orthopedic consult: Arthroscopic washout performed. Monitor WBC, ESR/CRP (decreasing). Continue IV antibiotics x 4 weeks, then PO x 2 weeks. Discharge with infectious disease follow-up.

Case 2: A 50-Year-Old Male with Foot Pain

- Presentation: A 50-year-old male with a history of alcohol use presents with 1 day of severe right foot pain and swelling. Exam shows T 37°C, BP 130/80 mmHg, erythematous, tender 1st MTP joint, no tophi.
- Labs/Studies: Uric acid 8.5 mg/dL, ESR 40 mm/h, CRP 30 mg/L. Arthrocentesis: Negatively birefringent needle-shaped crystals.
- Diagnosis: Gout → Acute podagra, hyperuricemia, MSU crystals.
- Management: Start indomethacin 50 mg PO TID x 5 days. Colchicine 1.2 mg PO load, then 0.6 mg 1 hour later. Hydration, avoid alcohol/purines. Plan allopurinol initiation after resolution (uric acid <6 mg/dL). Discharge with rheumatology follow-up.

Case 3: A 65-Year-Old Female with Knee Pain

- Presentation: A 65-year-old female presents with 3 days of right knee pain and swelling. Exam shows T 37°C, BP 140/85 mmHg, tender, warm right knee, joint effusion.
- Labs/Studies: Normal uric acid, ESR 50 mm/h, CRP 40 mg/L. Arthrocentesis: Positively birefringent rhomboid crystals. X-ray: Chondrocalcinosis.
- Diagnosis: Pseudogout → Subacute knee pain, CPP crystals, chondrocalcinosis.
- Management: Arthrocentesis for relief. Start ibuprofen 800 mg PO TID x 7 days. Colchicine 0.6 mg PO BID for prophylaxis. Screen for hemochromatosis (normal iron studies). Pain improves, discharge with primary care follow-up.