



Acute monoarthritis: differentiating between crystals, sepsis and trauma

Acute monoarthritis is characterised by pain and swelling of a single joint. There are a number of causes, with crystals, trauma and infection being the most common. Bursitis and tendinitis can present in a similar manner so it is important to establish that the problem is within the joint.¹

Septic arthritis

The most important diagnosis to exclude is septic (infectious) arthritis, which if inadequately treated may cause permanent joint damage, and death in up to 11% of patients.

Septic arthritis usually affects single large joints, most frequently the knee. The patient often presents with systemic symptoms of sepsis (e.g., fever and malaise), as well as the rapid onset of swelling, warmth and local pain in the involved joint. Redness around the joint is an important clue, limiting diagnosis to either infectious or crystal-induced arthritis.

There is increased risk of septic arthritis in those who are older (especially > 80 years), have skin infections, recent joint surgery, a hip or knee prosthesis, rheumatoid arthritis, diabetes mellitus, are immunosuppressed or IV drug users.²

Staphylococcus aureus causes most septic arthritis in adults. Gonococcal infections are a rare but important cause of septic arthritis in sexually active young adults although there is often less associated morbidity due to less articular damage. Occasionally monoarthritis may be caused by other pathogens.

If the patient has septic arthritis admission is usually required for drainage of the joint, management of sepsis syndrome and IV antibiotics.

Crystal-induced arthritis

Gout is caused by precipitation of monosodium urate crystals in the synovial fluid. Gout predominantly affects the first metatarsophalangeal joints, midfoot, ankles or knees. For further information see BPJ 8.³

Pseudogout is caused by precipitation of calcium pyrophosphate dihydrate crystals and affects mainly the knees and wrists, but can occur in the first metatarsophalangeal and other joints as well. Rarely, calcium oxalate, apatite and lipid crystals may be found.

Trauma-induced arthritis

A painful swollen joint can be caused by joint trauma. It is often associated with mild-to-moderate joint swelling in the absence of erythema, and the pain is characteristically exacerbated on movement and relieved at rest. The pain of traumatic arthritis is felt within seconds to minutes of the trauma, in contrast to the pain of infectious and crystal-induced arthritis which often develops over hours.

Joint aspiration

Although most resources suggest joint aspiration (arthrocentesis) is required in most patients with monoarthritis to confirm etiology, it is not always performed. However, if septic arthritis is suspected on clinical grounds, patients are usually referred to secondary care for joint aspiration and empirical IV antibiotics whilst awaiting culture results.

Joint aspiration in primary care depends on the skill and experience of the practitioner and availability of local secondary services. When performing joint aspiration a septic technique is crucial to avoid introduction of infection.

Generally joint aspiration will not be required if a patient has classic signs and symptoms of gout, in which case the condition can be treated on clinical grounds.

Laboratory tests

Analysis of synovial fluid

Synovial fluid analysis includes cell count, WBC differential, Gram stain, culture and crystal examination. Testing synovial fluid for protein, rheumatoid factor and uric acid does not aid diagnosis.²

Blood tests

Blood tests are rarely diagnostic in the acute phase.

CBC and CRP

An elevated white blood count and increased CRP can occur in septic arthritis, but may also be present in gout and pseudogout. CBC and CRP have low specificity especially in children, the immunosuppressed and elderly people.

Serum uric acid

Serum uric acid levels are often normal in acute gout and elevated uric acid is a non-specific marker for gout. People with gout can also have septic arthritis. For further guidance on uric acid levels see BPJ 8.³

Blood cultures

Blood cultures should be taken when septic arthritis is suspected. If septic arthritis is suspected, the patient should be referred for orthopaedic opinion. Blood cultures can be collected while patient is with GP or during orthopedic assessment. A summary of tests that may be performed is provided in Table 1.

Specimen criteria

Criteria for collection tubes vary between laboratories. It is best to check the collection guide of the local laboratory.

References

1. Palmer T, Toombs J. Managing joint pain in primary care. *J Am Board Fam Pract* 2004;17:S32–42.
2. Siva C, Velazquez C, Mody A et al. Diagnosing Acute Monoarthritis in Adults: A Practical Approach for the Family Physician *Am Fam Physician* 2003;68:83-90
3. BPAC. Best practice Journal. Treatment of Gout: hit the target. *BPJ* 2007, issue 8. Available from www.bpac.org.nz keyword "gout"
4. Cibere J. *Rheumatology*;4. Acute monoarthritis. *CMAJ*;162(11):1577-83.

Table1: Summary of tests that may be indicated when investigating acute monoarthritis⁴

| Possible diagnosis | Cause | History and physical examination | Synovial fluid analysis | Common pitfalls |
|----------------------------------|--|---|---|--|
| Septic arthritis | <p>Bacteria – most often staphylococcal, occasionally gonococcal in young sexually active people</p> <p>Other bacteria</p> <p>Fungi</p> <p>Viruses</p> | <p>Severe joint pain and tenderness</p> <p>Heat, marked swelling</p> <p>Redness</p> <p>Patient unable to move joint; often refuses passive movement</p> <p>Patient often unable to tolerate any pressure on joint</p> | <p>Opaque</p> <p>Leukocyte count elevated</p> <p>Granulocytes > 85%</p> <p>Culture positive</p> | <p>Culture may be negative if patient previously treated with antibiotics</p> <p>CBC - elevated white count is suggestive of infection, but may also be present in gout and pseudogout. It is not always a reliable sign of septic arthritis, particularly in children</p> <p>CRP - is generally higher in septic arthritis than in gout, but is not diagnostic. It is a useful marker of response to treatment. Inflammatory response may be blunted in immunocompromised patient</p> <p>Blood culture – should be taken when septic arthritis is suspected</p> |
| Crystal-induced arthritis | <p>Monosodium urate crystals (gout)</p> <p>Calcium pyrophosphate crystals (pseudogout)</p> <p>Apatite crystals</p> <p>Calcium oxalate crystals</p> | <p>Severe joint pain and tenderness</p> <p>Heat, marked swelling</p> <p>Redness</p> <p>Patient unable to move joint; often refuses passive movement</p> <p>Patient often unable to tolerate any pressure on joint</p> | <p>Translucent</p> <p>Leukocyte count 1 – 75 × 10⁹/L</p> <p>Often > 50% Granulocytes</p> <p>Culture negative</p> <p>Crystals positive</p> | <p>Patient may have concomitant infectious arthritis with positive culture</p> <p>Uric acid – is non specific as hyperuricaemia is reasonably common general population. Uric acid levels may be normal during attack, therefore is a nonspecific marker.</p> |
| Trauma-induced arthritis | <p>Fracture</p> <p>Internal derangement</p> <p>Hemarthrosis</p> | <p>Joint tenderness on movement</p> <p>Warmth, mild-to-moderate swelling</p> <p>No redness</p> <p>Pain worse with activity</p> <p>History of trauma; onset of pain within minutes of trauma</p> | <p>Fluid transparent or blood stained</p> | <p>History of trauma may not be elicited with osteoporosis</p> |