

## Acute monoarthritis

*Synonym: hot swollen joint*

### Acute monoarthritis assessment

Patients presenting with a single painful and/or inflamed joint (without history of trauma) require thorough and rapid assessment. The principal diagnosis to consider is [septic arthritis](#), as a failure rapidly to diagnose this condition can lead to irreversible severe joint damage in a very short time. Where there is any question of this diagnosis, immediate inpatient assessment and management are the safest course.<sup>[1] [2]</sup>

A combination of clinical assessment, synovial fluid aspiration/analysis and other investigations may be needed to reach a diagnosis. Where the cause is uncertain and infection remains a possibility, management should be directed to treating this as the default diagnosis. It is possible for conditions that normally present with [acute polyarthritis](#) to begin by affecting only one joint and evolve into the classical pattern over time; however, be wary of assuming this to be the case.

Oligoarthritis (fewer than five joints involved) is less likely to be due to sepsis but it is not unheard of for this to be the case. Where small numbers of joints are involved in an active inflammatory process, the differential diagnosis is very similar to a monoarthritis, but evolving causes of an acute polyarthritis must be considered.

For a detailed discussion of the assessment of the swollen knee, see separate [Knees That Swell](#) article.

### History<sup>[3]</sup>

See also separate [Rheumatological History, Examination and Investigations](#) article.

- Characterise the speed of onset of the symptoms.

- Establish whether this is a first episode or has occurred previously.
- Enquire about symptoms of infection such as recent fever, rigors, and focal symptoms of infection.
- Enquire about any extra-articular manifestations of rheumatological disease - eg, ocular symptoms, urethritis, diarrhoea, nodules, dyspnoea.
- Establish whether symptoms are intra- or peri-articular.
- Ask whether there is any history of psoriasis, other arthropathy, inflammatory bowel disease, and sexually transmitted infections.
- Ask whether there has been any recent trauma to the affected area.
- Establish whether symptoms are getting better or worse.
- Note any other symptoms of systemic illness - eg, rash, myalgia, headache and visual disturbance.
- Establish whether there has been any previous joint/prosthesis surgery.

The history will give an indication of the likely cause:

- **Pain coming on very suddenly over seconds or minutes** suggests a mechanical cause, whereas that coming on over the course of several hours to a day or so suggests sepsis, crystal arthropathies or an inflammatory condition.
- **Onset over days to weeks** suggests atypical infection, [osteoarthritis](#) or synovial infiltration. Septic arthritis is likely in the immunosuppressed (remember steroids) or in injecting drug users. Steroid use is also associated with avascular necrosis.
- **Haemarthrosis is more likely** in those with a bleeding disorder or taking anticoagulants.
- **Previous attacks of arthritis** suggest a diagnosis of [gout](#) or other crystal arthropathy, as does the use of diuretics or a history of renal colic/stones.
- **Associated symptoms** like eye irritation, diarrhoea or rash suggest an inflammatory, [reactive](#) or vasculitic cause.

- **A rash on the shins** suggests [erythema nodosum](#) and [sarcoidosis](#). Psoriatic pattern rash suggests a [psoriatic arthropathy](#).
- It is worth enquiring about **alcohol and recreational drug use** where either could be a possible factor.
- Consider taking a **sexual history**, particularly if there is a history of rash and migratory arthralgia, suggesting gonococcal arthritis.
- A history of a **recent sore throat** may suggest a diagnosis of [rheumatic fever](#).

## Examination<sup>[3]</sup>

- **General:** check temperature, pulse and blood pressure. Establish whether the patient appears to have sepsis. Check to see if there is pharyngitis. Look at the nail folds and listen to the heart if there is possible rheumatic fever.
- **Eyes:** check for any inflammation there.
- **Skin:** check to see if there is any rash. Examine the extensor aspects of the forearms for nodules and the shins for evidence of erythema nodosum. Check whether there are gouty tophi.

- **Joint examination:**
  - When examining the affected joint, first inspect it for evidence of any deformity, swelling, erythema, peri-articular muscle wasting or evidence of overlying bursitis.
  - Palpate to discern if swelling is due to bony enlargement, synovial thickening (firmness without fluctuance at joint margin) or effusion. If effusion is suspected, confirm it by testing for fluctuance or patellar tap in the knee joint.
  - Test the active and passive movements of the joint. Note if there is pain or crepitus for each.
  - If the affected joint is prosthetic, examine the skin carefully for evidence of abscess or sinus formation.
  - Don't forget to examine other joints that may be the cause of symptoms - eg, a hip causing knee symptoms. If the painful and surrounding joints are normal on examination, consider referral from another pain source - eg, shoulder pain caused by cardiac/gallbladder pathology.

# Differential diagnosis<sup>[4]</sup> <sup>[5]</sup>

<p><b>Septic arthropathy</b>          Bacterial – eg, streptococcal, staphylococcal          Viral arthritis – eg, mumps, parvovirus, Epstein–Barr virus (EBV), hepatitis B virus (HBV), enteroviruses. May cause synovial infection or reactive arthritis          Fungal infection          Mycobacteria  <a href="#">Lyme disease</a>  <a href="#">Brucellosis</a>  <a href="#">Leptospirosis</a></p>	<p><b>Crystal arthropathy</b>  <a href="#">Gout</a> (uric acid)  <a href="#">Pseudogout</a> (calcium pyrophosphate)          Apatite arthropathy (this may be associated with secondary septic arthritis)          Calcium oxalate arthritis</p>
<p><b>Bony or cartilaginous disease</b>          Avascular necrosis  <a href="#">Osteochondritis dissecans</a>          Ligamentous injury/instability or soft tissue injury  <a href="#">Osteoarthritis</a>  <a href="#">Osteomyelitis</a>          Overuse injury          Loose body in joint          Bone tumour or metastasis</p>	<p><b>Inflammatory arthritis</b>  <a href="#">Rheumatoid arthritis</a> with monoarthritic presentation  <a href="#">Juvenile idiopathic arthritis</a>/adult-onset Still's disease  <a href="#">Vasculitis</a>          Associated with inflammatory bowel disease  <a href="#">Relapsing polychondritis</a>  <a href="#">Psoriatic arthropathy</a>          Pigmented villonodular synovitis</p>
<p><b>Manifestation of systemic illness</b>  <a href="#">Sarcoidosis/systemic lupus erythematosus (SLE)</a>  <a href="#">Rheumatic fever</a>  <a href="#">Behçet's disease</a>  <a href="#">Reactive arthritis</a>          Hypertrophic pulmonary osteoarthropathy  <a href="#">Ankylosing spondylitis</a>  <a href="#">Familial Mediterranean fever</a>  <a href="#">Amyloid arthropathy</a></p>	<p><b>Trauma or haemorrhage</b>          Peri-articular/intra-articular fracture          Traumatic effusion          Haemarthrosis          Associated with haemoglobinopathy  <a href="#">Neuropathic joint</a> (painless)</p>

Drugs may cause arthritis due to their metabolic effects or as part of an idiosyncratic reaction. Intermittent hydrarthrosis is an unusual and rare benign condition which does not fit into the above classification. It causes regular and recurrent joint effusions, usually of the knee. It often affects peri-pubertal girls.

Diagnosis is by exclusion and no definitive treatment except symptomatic relief is indicated. In children consider [Osgood-Schlatter disease](#) if there is tenderness over the tibial tuberosity, or [slipped capital femoral epiphysis](#) if there is pain in one hip or knee (referred symptoms).

## Investigations

- Aspiration – if a single joint is acutely hot, red and painful then the most important investigation is to aspirate and analyse synovial fluid.<sup>[6]</sup> This should be performed only by those with appropriate training and clinical experience of aspiration of the relevant joint. See the separate [Joint Injection and Aspiration](#) article.
- Overlying cellulitis is a contra-indication to the procedure. Intra-articular steroids should not be given unless it is certain that the diagnosis of septic arthritis is excluded.
- Do not aspirate a **prosthetic joint** without first seeking an orthopaedic opinion, as this procedure should only be performed in a sterile environment, such as an operating theatre.
- Anticoagulated patients with INR in the therapeutic range can have the procedure in expert hands and using the smallest possible needle size.

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The table below shows the synovial fluid findings in the more common causes of monoarthritis:<sup>[7]</sup>

### Synovial fluid changes in common causes of monoarthritis

<b>Normal</b>	<p>Appearance: clear, viscous fluid</p> <p>WBC count (cells per <math>10^{-6}/L</math>): 0-200</p> <p>Crystals: nil</p> <p>Culture: sterile</p>
<b>Septic arthritis</b>	<p>Appearance: turbid, low viscosity</p> <p>WBC count (cells per <math>10^{-6}/L</math>): 50,000-200,000</p> <p>neutrophils</p> <p>Crystals: nil</p> <p>Culture: positive (in some cases)</p>
<b>Gout (uric acid)</b>	<p>Appearance: clear, low viscosity</p> <p>WBC count (cells per <math>10^{-6}/L</math>): 500-200,000</p> <p>neutrophils</p> <p>Crystals: needle-shaped and negatively birefringent</p> <p>Culture: sterile</p>
<b>Pseudogout (pyrophosphate)</b>	<p>Appearance: clear, low viscosity</p> <p>WBC count (cells per <math>10^{-6}/L</math>): 500-10,000</p> <p>neutrophils</p> <p>Crystals: block-shaped and positively birefringent</p> <p>Culture: sterile</p>
<b>Inflammatory - eg, rheumatoid arthritis</b>	<p>Appearance: turbid, yellowish-green (chicken soup), low viscosity</p> <p>WBC count (cells per <math>10^{-6}/L</math>): 2,000-100,000</p> <p>neutrophils</p> <p>Crystals: nil</p> <p>Culture: sterile</p>
<b>Osteoarthritis/injury</b>	<p>Appearance: large volume, normal viscosity, may be blood-stained if trauma/haemarthrosis</p> <p>WBC count (cells per <math>10^{-6}/L</math>): 0-2,000</p> <p>mononuclear</p> <p>Crystals: usually none (5% have pyrophosphate crystals)</p>

There is little evidence that analysis of other parameters of synovial fluid is useful in diagnosis. It must be remembered that there is variable sensitivity and specificity for each of the tests so diagnosis must be made in the context of all available information, including the clinical context.<sup>[8]</sup>

There is evidence that synovial fluid polymerase chain reaction may be useful for rapidly diagnosing infection, particularly where culture is negative in bacterial infection.<sup>[9]</sup>

- Urinalysis – dipstick for microscopic haematuria/protein indicating an inflammatory condition. Consider microscopy/culture.
- Blood tests:
  - Blood culture if there is suspected sepsis.
  - FBC, ESR, CRP, urate, and U&E may aid in diagnosis. Low serum urate does not exclude gout (is often low during acute attack).
  - Consider rheumatoid factor and other autoantibodies if inflammatory arthritis is suspected.
  - Antistreptolysin O (ASO) titre and throat swab should be considered if rheumatic fever is possible.
- Imaging:<sup>[7]</sup>
  - Plain X-rays – these may show soft tissue swelling or a joint effusion. Later stages of septic arthritis may show joint changes or calcium deposits.
  - Ultrasound is useful for guiding optimal site of joint aspiration, (used for diagnosis).
  - CT and MRI scanning are more sensitive and specific than plain radiographs but have little utility in acute diagnosis.



# Management of acute monoarthritis

The management will depend on the underlying cause of acute monoarthritis. Pain control is likely to be a feature of most management plans.

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## Medico-legal pitfalls<sup>[4]</sup>

- Do not give intra-articular steroids before sepsis is definitively excluded.
  - Rule out sepsis due to the presence of crystals; the two may co-exist.
  - Do not attribute fever purely to sepsis when it may occur in crystal arthropathy and other conditions.
  - Do not discount gout when serum urate is normal; it is often low in an acute attack.
  - Do not exclude sepsis on the basis of initial Gram staining and culture; repeated culture of synovial fluid, blood and other sources of sepsis may be needed.
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## Further reading

- [Knee pain - assessment](#); NICE CKS, Aug 2022 (UK access only)
- [Oliveira AS, Abbasi F, Radha SS](#); A hot, swollen joint without trauma: septic arthritis until proven otherwise. *BMJ Case Rep.* 2015 Apr 9;2015:bcr2014209190. doi: 10.1136/bcr-2014-209190.

## References

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