

Hip pain in children

The clinical challenge in paediatric hip pain is to distinguish urgent conditions such as infection of the hip joint from the more common irritable hip. Transient synovitis is one of the most common causes in children over 3 years of age but it has similar early symptoms to septic arthritis. This article offers a guide to assessment, an overview of common causes, and clarity around which children need urgent secondary care assessment. ^[1]

Assessment of a child with a limp ^[2]

The most common cause of a limp in childhood is a hip problem. Children with hip pathology may present with pain, refusal to bear weight, a limp, or decreased movement of the lower extremity.

History

History should include pain characteristics (location, character, onset, duration, change with activity or rest, aggravating and alleviating factors, night pain), together with any mechanical symptoms (catching, clicking, snapping, worse during or after activity).

- If pain is present it is important to determine the origin:
 - Pain in the hip area may originate from any part of the hip joint or from the femur. Intra-articular hip pathology is usually localised to the groin.
 - Pain in the hip area may be referred from the knee joint or from structures in the inguinal canal, testis (including torsion) and lower abdomen, or from the lower back.
 - Hip pathology often causes referred thigh or knee pain.

- History should include previous injury (acute macrotrauma, repetitive microtrauma), surgery, neurological disorder, inflammatory joint disease or bleeding diathesis, as well as conditions associated with arthropathies, including psoriasis, acute uveitis and inflammatory bowel disease.
- Any other underlying developmental conditions (eg, Down's syndrome).
- Establish whether there is any possibility of tick exposure.
- Ask about developmental history, particularly noting late onset of walking, unusual gait or clumsiness in very young children. These might suggest developmental or degenerative conditions.
- Ask about family history of hip problems.
- Ask about systemic symptoms (fever, irritability); inflammatory symptoms (morning stiffness); neurological symptoms (weakness, altered sensation); and the current level of function of the child.
- Ask about previous treatments and response (including antibiotics, analgesics, anti-inflammatories, physiotherapy, steroid treatment).

Examination of hip pain in children

- Examine gait (limp, altered weight-bearing). Evaluation of gait and manoeuvres such as squatting, single leg hopping, and sit-ups may be helpful.
- Careful examination of the hips is essential.
- Inspect for swelling, redness, deformity, asymmetry, leg length discrepancy:
 - Swelling of the hip is rarely visible, as the joint is so deep to the soft tissues.

- Check range of active and passive movement, by comparison to the other side. The hip should be moved through active range of motion and then placed through full passive range of motion:
 - Active movements are typically as follows: hip flexion – most children can bring their knee to touch their chest; 120–135°. Hip extension (30°); abduction (45–50°); adduction (20–30°).
 - Passive movements: rotation with hip and knee flexed to 90°. Total angle from full internal to full external rotation should equal 90°:
 - Restricted internal rotation is the most sensitive marker of hip pathology in children, followed by a lack of abduction.
 - Loss of hip abduction can be difficult to assess because children often tilt their pelvis to give a false impression of hip abduction.
- Try to reproduce the patient's pain through gentle palpation and manipulation.
- Assess for predisposing factors such as excessive stiffness, joint laxity and/or increased or decreased muscle tone.
- Most causes of hip pain are unilateral, allowing comparison to the unaffected side.
- The lumbar spine, sacroiliac joint, knee and abdomen should also be examined.
- A complete musculoskeletal examination to look for joint swelling should be done if there is a history of inflammatory symptoms.
- Examine the corresponding knee, inguinal canal, abdomen and testes.
- Systemic examination should include temperature and vital signs.
- Because of the serious nature of many of the underlying causes and the importance of early intervention, urgent referral for specialist assessment is often required.

Investigations^[2] ^[3]

If infection is suspected, urgent assessment in secondary care is required and FBC, ESR, CRP, blood and joint cultures will form part of the evaluation. Cultures of joint and synovial fluid may be needed.

Arthritis is a clinical diagnosis; anti-nuclear antibody (ANA), rheumatoid factor and HLA-B27 are helpful in classification and treatment.

Diagnostic imaging^[4]

Radiographs, ultrasound and magnetic resonance imaging (MRI) are the most common imaging tools used to assess the paediatric hip. As with all tests, false positive and false negative results may occur.

Children and adolescents with hip pain, referred pain to the thigh or knee or a limp require visualisation of the proximal femur in two planes. Anterior posterior (AP) plain films of both hips, preferably taken with the patient standing and 'frog leg' view are standard.

- **Ultrasonography** can be used to identify an effusion, although it lacks specificity regarding the underlying disease. Ultrasound also can be used to guide aspiration of the hip joint.
- **Computerised tomography (CT)** can detail bony anatomy but exposes the patient to a moderate amount of radiation. Both CT and MRI provide good ability for multi-planar imaging. CT has the advantage of being able to be manipulated to make 3D reconstructions.
- **MRI** provides increased soft tissue contrast and more detailed evaluation of articular and epiphyseal cartilage, subchondral bone, periosteum, synovium and bone marrow elements.
- **Technetium bone scan** identifies areas of increased osteoblastic activity and can help localise infection and subtle areas of bone injury such as early stress fracture.

Common causes of hip pain in children^[1]

Transient synovitis and septic arthritis are the most common causes of hip pain in children. Hip pain in children may be caused by conditions unique to the growing skeleton, including Perthes' disease, slipped capital femoral epiphysis (SCFE) and apophyseal avulsion fractures of the pelvis. The relative likelihood of the different causes of hip pain varies with age.^[5]

The most common and significant causes of hip pain in children are:

- Transient synovitis (irritable hip) peaking at 3-8 years.
- [Septic arthritis](#) - any age (peaking at 0-6 years).
- [Perthes' disease](#) (3-12 years peaking at 5-7 years).
- [SCFE](#) (early adolescence - usually in obese children).

Transient synovitis versus septic arthritis

Transient synovitis and septic arthritis have similar early symptoms with spontaneous onset of:

- Progressive hip, groin, or thigh pain.
- Limp or inability to bear weight.
- Fever.
- Irritability.

This significant clinical overlap means that there are no absolute criteria for definitive diagnosis of either condition.

- Transient synovitis typically has an acute onset, followed by spontaneous recovery with no systemic upset. It is a benign condition with a small amount of fluid in the joint. It is the most common cause of hip pain in children between the ages of 3-10 years (peaking between 5 years and 6 years) and is more common in boys, often preceded by viral infection. It is a self-limited condition with no long-term sequelae. It can be managed with oral analgesics and observation. Transient synovitis recurs in up to 15% of children. It may affect the same or the opposite hip:
 - Pain is usually not severe but may prevent weight-bearing.
 - Usually there is no pain at rest and passive movements are only painful at the extreme range of movement.
 - The child is usually systemically well and the ESR is either normal or slightly raised.
 - Management includes rest and analgesia, with mobilisation once the pain has settled.

- Children with **septic arthritis** appear ill. Most are under 4 years of age and present with fever, pain, irritability, inability to bear weight, and a hip which is often held flexed and abducted. The most common causative agent is *Staphylococcus aureus*. Early management with surgical drainage and intravenous antibiotics is needed to prevent bony destruction and preserve hip function. A septic hip is a surgical emergency. A clinical prediction algorithm uses:
 - History of fever.
 - Non-weight-bearing.
 - ESR of at least 40 mm per hour and serum white blood-cell count of more than 12,000 cells per mm³.
 - The predicted probability of septic arthritis is less than 0.2% for zero predictors, 3.0% for one predictor, 40.0% for two predictors, 93.1% for three predictors, 99.6% for four predictors.^[6]

Other inflammatory and infectious disorders

- **Lyme disease** usually presents with rash but both myalgias and polyarthralgias are early symptoms in over half of cases; monoarthritis of large joints including the hip is a later symptom in over half of untreated cases.
- **Proximal femur or pelvic osteomyelitis** presents similarly to septic arthritis with fever and pain but children have some passive range of motion unless there is extension of the infection into the joint. Osteomyelitis of the femur is not uncommon and usually occurs in the rapidly growing metaphyseal region. The most common pathogen in normal hosts is *S. aureus*. Treatment includes intravenous antibiotics and, sometimes, surgical drainage.
- **Juvenile idiopathic arthritis** affects the hips in 30–50% of cases and is usually bilateral. It is very uncommon for hip monoarthritis to be the initial manifestation. Children typically present with groin pain but may have referred thigh or knee pain. There is often morning stiffness, with gradual resolution of pain with activity. There is painful or decreased range of motion, especially in internal rotation. Treatment includes physiotherapy and anti-inflammatory therapies. All children suspected of having chronic inflammatory arthritis should be referred to a paediatric rheumatologist.

- **Reactive arthritis** secondary to gastrointestinal and genitourinary pathogens is not common in children. There is an association with the HLA-B27 antigen.
- **Kawasaki disease** presents as a febrile illness with rash and joint pain which is frequently bilateral.
- Idiopathic chondrolysis of the hip causes pain and limp in adolescence, with progressive loss of articular cartilage space by a presumed inflammatory process. Girls are affected more than boys. Symptoms of pain and stiffness are commonly unilateral. Management includes protective weight-bearing, non-steroidal anti-inflammatory drug (NSAID) therapy, physiotherapy and orthopaedic intervention.
- **Appendicitis** and psoas abscess may present as hip pain in children.
- Pyomyositis is a disease of tropical countries. Large muscle groups of the pelvic girdle and lower extremities are the most common sites of infection and deep muscle infections can mimic septic arthritis. Children present with fever and guarded hip motion and pain with passive stretch of the involved muscle.

Developmental conditions

- **Perthes' disease** is an idiopathic avascular necrosis/osteonecrosis of the femoral epiphysis (usually affecting those aged 4-10 years and peaking between 5 and 7 years). It affects more boys for each girl affected and is bilateral in 10%. Children usually present with a limp or pain in the hip, thigh or knee. There is limited and painful rotation and abduction of the ipsilateral hip. Internal rotation is usually affected more than external rotation. Treatment consists of rest from aggravating activities and range of exercises. Orthoses or surgery may be required.
- Secondary avascular necrosis of the femoral head may occur following trauma or may be associated with systemic diseases such as leukaemia, lymphoma, systemic lupus erythematosus, haemoglobinopathies, coagulopathies and as a complication of corticosteroid treatment.

- **SCFE** is displacement of the proximal femoral epiphysis off the femoral neck, usually in those aged 11–14 years. It is more common in obese children and boys and is bilateral in 20–40%. Adolescents usually present with a limp and may have hip, groin or knee pain. The hip is often held in abduction and external rotation with decreased internal rotation, flexion and abduction. Treatment includes non-weight-bearing, and surgery.^[7]
- Children with **Down's syndrome** may develop abnormalities of the hip. The most common condition is subluxation, which is sometimes associated with malformation of the acetabulum. The dislocation appears to be due to a combination of laxity of the connective tissue that normally keeps the hip together along with the low muscle tone found in Down's syndrome. Hip subluxation in children with Down's syndrome is hardly ever found at birth but is most common between the ages of 3–13 years. The most common sign is a limp; pain may or may not be present. Treatment will often start with immobilisation but many will require surgical correction.

Overuse injuries and pain

Pain is usually localised to the hip but may be referred to the thigh or knee. It may have acute or insidious onset. Pain increases with activity and decreases with rest. Systemic symptoms are absent. ESR and CRP are usually normal.

- Muscle strains and tendinopathies are common causes of hip pain in children. Hamstring and quadriceps injuries are common in active young people, especially during the adolescent growth spurt when skeletal growth is greater than muscle tendon growth. Muscle injuries include contusions, strains, tendinopathy and rupture. Presentation is with localised pain aggravated by activity. There may be tenderness, swelling or bruising along the muscle. There may be pain with passive and resisted strength testing. Management includes rest, ice, compression, activity modification and physiotherapy.
- Apophyseal avulsion fractures are common in young athletes, affect boys more often than girls and usually occur secondary to forceful or repetitive traction. There is localised pain, swelling and limited range of motion. Management includes rest, ice, modified activity and physiotherapy.

- [Stress fractures of the femur](#) are uncommon in children but can occur in athletes engaged in repetitive loading of the lower extremities, such as endurance running. Children present with activity-related hip, groin or thigh pain that can be reproduced by asking them to hop. Fractures can be diagnosed by technetium bone scan or MRI. Femoral neck stress fractures sometimes require surgical stabilisation.
- Snapping hip syndrome refers to sounds or sensations of snapping or clicking with hip flexion and extension. There can be some pain. An internal snapping hip is due to movement of the iliopsoas tendon over the iliopectineal eminence, lesser trochanter or anterior superior iliac spine. An external snapping hip is due to movement of the iliotibial band over the greater trochanter. It can be associated with a tight iliotibial band. Treatment involves rest, avoidance of aggravating activities, and physiotherapy.

Tumours

- Benign and malignant tumours can cause hip and groin pain. The proximal femur is a common site for benign osteoid osteomas. Neoplastic bone pain is generally persistent and becomes worse over time. It can be sharp or dull. It tends to persist into the night and can be worse at night, preventing the child from sleeping. Persistent limping is a feature. Fever, pain and weight loss are usually later signs. Malignant tumours include local Ewing's sarcoma, soft tissue sarcomas, leukaemia or metastases from neuroblastoma.

See also the separate article on [Bone Tumours](#).

Non-musculoskeletal causes of pain

- It is important to recognise referred pain from low back, intra-abdominal or pelvic pathology. In adolescent athletes groin pain can be difficult to diagnose and manage. 'Athletic pubalgia' includes a spectrum of related pathological conditions resulting from musculotendinous injuries. Adolescents typically present with poorly localised pain, aggravated by activity. Referral to a sports medicine physician may be helpful.

Association of diagnosis with age

At any age

- Transient synovitis.
- Septic arthritis of the hip.
- Trauma
- Acute osteomyelitis of the proximal femur.
- Tuberculous arthritis.
- Lyme disease.
- Juvenile idiopathic arthritis.
- Bone malignancy.
- Non-accidental injury.
- Secondary avascular necrosis

Age 0–3 years (red flag age)

- Transient synovitis is rare in this age group and the diagnosis should be made with extreme caution after excluding serious causes of limp. Urgent referral is advised because examination may be difficult and clinical signs subtle.
- Children under 3 years of age are particularly vulnerable to septic arthritis and child maltreatment:
 - Other possible causes are:
 - Septic arthritis.
 - Osteomyelitis.
 - Developmental hip dysplasia.
 - Fracture or soft tissue injury (including non-accidental injury).
 - Kawasaki disease.

Age 3–10 years

- Transient synovitis.
- Septic arthritis.

- Osteomyelitis.
- [Perthes' disease](#).
- Fracture or soft tissue injury (stress fracture).
- [Kawasaki disease](#).
- Subluxation in [Down's syndrome](#).

Age 10–16 years

- [SCFE](#).
- Septic arthritis.
- Osteomyelitis.
- Idiopathic chondrolysis.
- Fracture (including stress fracture) or soft tissue injury.
- Subluxation in Down's syndrome.

Hip pain in children treatment and management^[1]

Management of hip pain in children depends on the underlying cause. In primary care, however, the most pressing question is which children need urgent assessment in secondary care.

Referral

Arrange urgent specialist assessment if the child:

- Has a fever and/or red flags, such as:
 - Pain waking the child at night (possible malignancy).
 - Redness, swelling, or stiffness of the joint or limb (possible infection or inflammatory joint disease).
 - Weight loss, anorexia, fever, night sweats, or fatigue (possible malignancy, infection, or inflammation).
 - Unexplained rash or bruising (possible haematological or inflammatory joint disease, or child maltreatment).
 - Limp and stiffness worse in the morning (possible inflammatory joint disease).
 - Inability to bear weight, or painful limitation of range of motion (possible trauma or infection).
 - Severe pain, anxiety, and agitation after a traumatic injury (possible neurovascular compromise or impending compartment syndrome).
 - Palpable mass (possible malignancy or infection).
 - [Suspicion of child abuse.](#)
 - Is younger than 3 years of age (transient synovitis is rare in this age group, and septic arthritis is more common).
 - Is older than 9 years of age with painful or restricted hip movements (particularly internal rotation): to exclude slipped upper femoral epiphysis.

Arrange specialist assessment (urgency depends on clinical judgement):

- Where there is uncertainty about the cause of the limp.
- If the cause of the limp cannot be managed in primary care.
- Where a child presents with a limp on multiple different occasions.

Dr Mary Lowth is an author or the original author of this leaflet.

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