Limp: acute limp in a child

Most children who present with a limp will have a history of trauma and will be straightforward to assess and manage in a primary care setting. However, as GPs we need to be alert for atraumatic limps which may have serious causes such as septic arthritis, Perthes' disease or slipped upper femoral epiphysis. These more serious causes are rare but if we don’t think about them, we will miss them (BMJ 2010;341:c4250).

Aetiology

There are multiple causes of a limp – before considering how we determine which is most likely for the child we are seeing, let’s review the common conditions which can be responsible:

Transient synovitis:
- Most common in boys aged 4–8y (rare under age 3y).
- A transient synovitis of the hip causes a limp – weak evidence that it may follow a viral infection.
- Definitive diagnosis requires demonstration of hip effusion. Symptoms settle after 2 weeks.

Septic arthritis:
- An infection of synovium and joint space.
- Usually *Staphylococcus aureus*, *Haemophilus influenzae* or Group B *Streptococcus*.
- The hip, knee, ankle and elbow are particularly prone and urgent wash-out and intravenous antibiotics are needed.
- Diagnosis is based on positive blood cultures or joint aspirate.

Toddler fracture:
- Subtle undisplaced spiral fracture of the tibia usually in a preschool child.
- Caused by a sudden twist, often an unwitnessed fall.
- There may be tenderness over the tibial shaft or distress on gentle tibial strain.

Perthes' disease:
- Idiopathic avascular necrosis of the developing femoral head.
- Typically presents in boys aged 4–8y.
- Diagnosed by plain AP radiograph of the pelvis, though in early disease typical changes may be absent.
- May initially be mistaken for transient synovitis but symptoms do not settle.

Developmental dysplasia of the hip (DDH):
- This may present as a limp if not detected in the neonatal period at routine review or at screening if ultrasound ordered because of pre-existing risk factors.

Slipped upper femoral epiphysis (SUFE) - (BMJ 2009;339:b4457):
SUFE occurs during rapid pubertal growth when shear forces, particularly in obese children, increase across the femoral growth plate and displace the epiphysis. Early diagnosis is important because deformity, limb shortening and function deteriorate with time.
- Usually affects children aged >10y.
- Relatively rare disorder; 1–7 per 100 000. More common in boys than girls, and in children who are obese. Bilateral in 20% of cases.
- There is a mean delay in diagnosis of 2.5 months
- *Acute SUFE* tends to occur after some type of trauma and prevents weight bearing – most commonly these cases present to the emergency room.
- *Chronic SUFE*, where the slip progresses over weeks to months, is more common and more likely to present to GPs. These are much more likely to be missed because of indolent symptoms. Acute on chronic SUFE can occur.

How does it present?
- It can present with hip, knee or thigh pain, usually in an overweight or obese adolescent. Any child or adolescent presenting with knee pain should undergo a careful examination of the hip and knee.
- Examination of the hip will reveal loss of internal rotation and pain at the extremes of movement.
- Diagnosis is with anteroposterior and lateral radiographs of both hips on the same film.
Delay in diagnosis results in more severe slippage, more complex surgery and potentially a less successful outcome.

This BMJ article is an evidence-based review of the way to assess a child presenting with an acute limp and is a useful framework (BMJ 2010;341:c4250).

History

Is there a history of trauma?
- Remember that children may link an injury to a distant trauma which may not be relevant.
- Children are more flexible than adults and therefore more prone to subluxation or fracture with trivial force – therefore the threshold for X-ray is lower.

If there is no history of trauma, age is an important factor in considering the likely aetiology as it changes at different stages of childhood:

<table>
<thead>
<tr>
<th>Age 0–3y</th>
<th>Age 3–10y</th>
<th>Age 10–15y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Septic arthritis/osteomyelitis</td>
<td>Transient synovitis</td>
<td>Slipped upper femoral epiphysis (SUFE)</td>
</tr>
<tr>
<td>Developmental hip dysplasia</td>
<td>Septic arthritis/osteomyelitis</td>
<td>Septic arthritis/osteomyelitis</td>
</tr>
<tr>
<td>Fracture/ soft tissue injury</td>
<td>Perthes' disease</td>
<td>Perthes' disease</td>
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<tr>
<td>Toddler fracture</td>
<td>Fracture/ soft tissue injury</td>
<td>Fracture/soft tissue injury</td>
</tr>
<tr>
<td>Non-accidental injury</td>
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</tbody>
</table>

- Remember that the child may present with referred pain – most commonly pain from the hip referred to the knee.
- Take a birth and development history to identify risk factors for hip dysplasia (see section on DDH).
- Are there features of systemic illness e.g. fever, generalised myalgia or synovitis, loss of appetite etc?
- Specifically ask "Do you have any pain or stiffness in your joints, muscles or back?".

Examination

Musculoskeletal examination in children can be difficult: This review recommends using the pGALS (paediatric gait, arms, legs and spine) assessment which is validated as effective for primary care physicians in school-aged children.

Gait/general:
- Record the child's temperature.
- Observe the child walking and ask to walk on tiptoes and heels.
- Intra-abdominal pathology and testicular torsion can present as limp so check for these.

Arms:
- Not directly applicable to the limping child.

Legs:
- Check for an effusion of the knee.
- Ask the child to bend and straighten knees and feel for crepitus.
- Examine the hip: restricted internal rotation is the most sensitive marker, followed by loss of abduction but many children tilt the pelvis which can give the sense of abduction.
- Apply passive flexion of the hip to 90° with internal rotation.

Spine:
- Observe the spine from behind – look at curve and movement.
- "Can you bend and touch your toes?"
Referral for further investigation

Who should we refer? Clearly there is significant overlap between the presentation of the different conditions. The authors have suggested the following approach.

Red flags that require urgent investigation:

- Child < 3y – because transient synovitis is rare and septic arthritis/NAI more common in this age group.
- Inability to weight bear.
- Fever.
- Systemic illness.
- Child >9y with pain or restricted hip movement – to rule out SUFE – see later.

For a child aged between 3 and 9y who is well, afebrile, mobile but limping for less than 48h, a short period of observation is reasonable.

- This is because transient synovitis is most common in this group.
- Reassess after 48h – if symptoms are resolving, a diagnosis of transient synovitis can be made without further investigation.
- Safety-net carefully: if symptoms worsen or the child develops fever or systemic symptoms, urgent reassessment is required.
- If the symptoms worsen or fail to resolve after 7 days, start investigations.

Investigations: If a child is referred, they should have:

- FBC, CRP, ESR.
- Radiographs of the site of pain.
- Ultrasound may be useful to identify a hip effusion.

How can we differentiate between transient synovitis and septic arthritis? The gold standard is to aspirate the joint and determine the presence or absence of bacteria. However, this is invasive and impractical given that most cases will not be septic arthritis.

One proposed clinical prediction rule is Kocher's criteria – this was developed retrospectively based on a case series of children with a hip effusion. It has not performed as well when used prospectively but is the best tool we currently have.

Kocher’s criteria for differentiating septic arthritis from transient synovitis:

- Fever >38.5°C
- Cannot bear weight
- ESR >40mm in the first hour
- Serum WCC >12x10⁹/l

Probability of septic arthritis depending on number of factors present:

<table>
<thead>
<tr>
<th>Factors</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>&lt;0.2%</td>
</tr>
<tr>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>2</td>
<td>40%</td>
</tr>
<tr>
<td>3</td>
<td>93.1%</td>
</tr>
<tr>
<td>4</td>
<td>99.6%</td>
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</tbody>
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Note that it would probably perform less well in a primary care setting as all of these children had a confirmed hip effusion which is different from the unselected patients we see.

What does this mean in practice?

For me, this suggests we should be referring any child with a limp who is unable to weight bear or who has a fever >38.5°C.

Whether you undertake blood tests in the surgery will depend on your personal circumstances and how quickly you can get the results.
Evaluating a child with an acute limp

- Acute limp in a child should be taken seriously as it can indicate serious underlying pathology and may be a presentation of NAI.
- The age of the child is important when considering the most likely aetiology.
- Suspect SUFE in a child over 10 if there is reduced internal rotation of the hip and pain on extremes of movement. Refer for anteroposterior and lateral radiographs and orthopaedic assessment.
- If trauma has occurred, there is a lower threshold for performing X-rays in children because fractures and dislocations are more common.
- For atraumatic limps, red flags which should prompt referral are: age <3y, fever, inability to weight bear, systemic illness and a child aged >9y with pain or restricted movement in the hip.
- In children aged 3–9y who are well, have no fever, are able to weight bear and have <48h history of atraumatic limp, transient synovitis is the most likely diagnosis and a short period of observation with appropriate safety-netting may be a reasonable management strategy.
- Kocher's criteria may be useful in distinguishing transient synovitis from septic arthritis but they are validated in a secondary rather than primary care setting.