

EASILY MISSED?

Septic arthritis in children

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This is one of a series of occasional articles highlighting conditions that may be more common than many doctors realise or may be missed at first presentation. The series advisers are Anthony Harnden, university lecturer in general practice, Department of Primary Health Care, University of Oxford, and Richard Lehman, general practitioner, Banbury. If you would like to suggest a topic for this series please email us (easilymissed.bmj@bmjgroup.com).

A differential diagnosis of septic arthritis in children can be difficult, but early treatment of joint infections avoids potentially disabling complications

Septic arthritis accounts for a small minority of the myriad musculoskeletal problems in childhood which primary care doctors will evaluate. Joint infections are best treated early to avoid potentially disabling complications. The earlier the presentation, the more difficult it is to distinguish an infection from benign, self limited conditions such as transient synovitis of the hip.

Why is it missed?

Joint infections overlap in presentation with transient synovitis, unexplained symptoms, and minor trauma, all of which are common. Musculoskeletal infections in very young children and in very ill children can be missed because the symptoms and signs that localise the problem are absent. Untreated pyogenic infection eventually “declares itself,” but this may be too late for optimal treatment. Antibiotic treatment before diagnosis (prescribed for other conditions or empirically) may mask clinical findings without curing the disease.

Why does this matter?

Missed septic arthritis results in severe destruction of the child’s hip, which is difficult to treat.^{3 4} A prospective cohort study of all children presenting with septic arthritis of the hip in South Africa found no sequelae among children diagnosed and treated within five days

CASE SCENARIO

A 5 year old boy is brought to the accident and emergency department with pain in his left leg. The previous day he limped markedly and now he refuses to walk. History is negative for injury and positive for fever in a previously well, immunised child who is developmentally normal. Concerned about septic arthritis, the junior doctor requests a blood count, erythrocyte sedimentation rate, and C reactive protein concentration, and requests review by the paediatric team.

of onset of symptoms, but a very high incidence of permanent problems among those treated at five days or later.⁵ Late treatment cannot reverse the damage, caused by pus under pressure and compromised blood flow, to the joint cartilage, the epiphyseal bone, or the growth plate. Unfortunately, more than two thirds of the children in the South African series were treated late, with delay in diagnosis (rather than delay in presentation) the most common reason for delay in treatment. Diagnostic delay may be less common in high income countries, but our paediatric orthopaedic unit treats many patients with ongoing sequelae of septic arthritis and sees 5-10 new late cases every year.

How is it diagnosed?

The presentation of septic arthritis is fever with limb pain, limp, or refusal to bear weight. The affected joint is held in the position of comfort, which maximises intracapsular volume. At the hip, flexion, abduction, and external rotation are typical. Muscle spasm or pain with attempts to internally rotate or “log roll” the affected hip indicates effusion, but does not distinguish septic arthritis from transient synovitis.

The younger the child, the more difficult the clinical examination. Neonates may have few localised signs and a blunted systemic response, presenting instead with “pseudoparalysis” of the affected limb.

No single test can reliably distinguish infection from inflammation, and this has led to diagnostic algorithms combining criteria. Kocher proposed the first such algorithm, identifying refusal to bear weight, fever >38.5°C, erythrocyte sedimentation rate >40 mm/h, and white blood cell count >12.0×10⁹/l as four criteria distinguishing septic arthritis from transient synovitis.⁶ If none of these criteria was positive, the probability of

KEY POINTS

Septic arthritis in children can be difficult to diagnose, and to distinguish from more common conditions such as minor trauma or transient synovitis of the hip

Early diagnosis and treatment of septic arthritis is important to avoid joint destruction and disability

Fever, weightbearing status, white cell count, erythrocyte sedimentation rate, and C reactive protein are considered together for diagnosis

Children with two or more “positive” diagnostic criteria should be referred for prompt evaluation by a specialist, whereas children with no or one positive criterion can safely be watched

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Previous articles in this series

- ▶ Human brucellosis (*BMJ* 2010;**341**:4545)
- ▶ Primary HIV infection (*BMJ* 2010;**341**:4583)
- ▶ Carcinoid syndrome (*BMJ* 2010;**341**:3941)
- ▶ Foreign body inhalation in children (*BMJ* 2010;**341**:3924)
- ▶ Acromegaly (*BMJ* 2010;**341**:4189)

septic arthritis was less than 0.2%; probability rose to 3% if one criterion was positive, 40% if two were, 96% if three were, and 99% if four were. Subsequent prospective studies showed reduced but still acceptable diagnostic performance (area under receiver operating curve 0.86)⁷; other researchers have added C reactive protein >200 mg/l or a history of a previous healthcare visit to improve diagnostic accuracy.^{8, 9}

Plain radiography shows nothing for the vast majority of children presenting with transient synovitis or septic arthritis. In general practice, plain radiographs are not a first line test, except in children 9 years and over to look for slipped upper femoral epiphysis.¹⁰

Ultrasound scans are sensitive to hip joint effusion but cannot distinguish septic arthritis from transient synovitis. They give many false negative results in early presentations or in bilateral disease.¹¹

Blood cultures can be obtained but are positive only about 30% of the time.² Usually the child is being treated before any culture results come back.

A practical approach in primary care is to consider a complete blood count, erythrocyte sedimentation rate, and C reactive protein in any child who refuses to walk or who has a high fever with bone or joint pain or tenderness. The indications for drawing blood have not been studied, but the paper by Kocher (based on data from tertiary care) showed that of 82 children with septic arthritis, 78 refused to walk and four could walk with a limp, whereas of 86 with transient synovitis only 30 refused to walk.⁶ In Kocher's series the mean recorded temperature for patients with septic arthritis was 38.7°C, compared with 37.4°C among patients with transient synovitis.

When blood is drawn, white cell count, erythrocyte sedimentation rate, C reactive protein, non-weightbearing, and fever constitute separate diagnostic criteria. If none or one diagnostic criterion (red flags) is positive, the child can be safely sent home and reviewed in 24 to 48 hours provided that parents can bring the child for re-evaluation if the condition worsens. We typically advise parents to give ibuprofen and restrict activity for such children. If two or more diagnostic criteria are present, or if the child's condition worsens, a specialist should be consulted. The diagnosis is confirmed by finding pus on aspiration of the joint.

How is it managed?

Septic arthritis is managed in consultation with an orthopaedic surgeon. Management includes arthrotomy to decompress the joint, remove infected material, and reduce the chances of sequelae from avascular necrosis or damage to the growth plate. Ideally arthrotomy is performed promptly and antibiotics are begun only after intraoperative cultures are taken (or before this on the advice of the surgeon). Although recent case series have shown acceptable results with repeated joint aspiration alone,^{12, 13} there is insufficient evidence to recommend this as routine practice. The current practice of the orthopaedic author (AH) includes arthrotomy in all cases of hip joint sepsis, and in most cases of sepsis of the knee or shoulder.

HOW COMMON IS IT?

Transient synovitis is a common idiopathic inflammatory condition of the child's hip which presents in a similar manner to the "do not miss" diagnosis of septic arthritis

Transient synovitis was diagnosed in 43 Norwegian children per 100 000 annually, compared with only five cases of septic arthritis per 100 000¹

Septic arthritis in children affects the hip in a third of cases, the knee in a third, and other joints in the remaining third²

Septic arthritis can occur at any age in childhood but is most common among infants, toddlers, and children of preschool age²

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10-MINUTE CONSULTATION

Hallux valgus

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kamal.mahtani@dphpc.ox.ac.ukCite this as: *BMJ* 2010;341:c5130
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A 52 year old woman consults you because she is worried about the shape of her feet. She mentions that over the past few months her shoes have become increasingly uncomfortable, and she was finding it hard to replace them with better fitting ones. On examination you note bilateral hallux valgus.

What you should cover

- Hallux valgus, also known as a bunion, refers to lateral deviation of the first toe at the metatarsophalangeal joint (figure). It commonly presents with medial foot pain, which is especially noticeable to the person when he or she is wearing shoes.
- The cause of hallux valgus can be extrinsic or intrinsic.
- Footwear is the principal extrinsic contributor to hallux valgus (such as narrow high heels).¹ Postulated intrinsic causes include family history (rates of a family history of the condition of about 83% have been reported²), association with pes planus (flat foot),³ and contracture of the Achilles tendon.⁴
- Differential diagnoses include hallux rigidus (arthritis of the joint), sesamoiditis, fractures, gout, rheumatological disease, neurological pain (usually diabetes), and infection.

What you should do

- Avoid examining the patient standing up as this exaggerates the deformity.
- Observe the foot arch, looking for pes planus. Ask the patient to stand up and turn around and stand on tip toe (pain permitting).
- Distinguish hallux valgus from hallux rigidus, which is managed differently. With hallux rigidus the patient has pain and stiffness mainly within the first metatarsophalangeal joint without dorsiflexion.
- Note the severity (degrees of lateral deviation of the proximal phalanx from the first metatarsal: <15° normal, <20° mild, 20-40° moderate, >40° severe).
- Other important features include involvement of the second toe (which may be at risk of dislocation),

Reasons for referral to secondary care**Urgent referral**

- Diabetic or neurological history
- Breakdown of skin

Routine referral

- Failure of conservative measures
- Refractory pain
- Worsening deformity
- Involvement of second toe



Bilateral hallux valgus. Right foot shows second toe pushed up and dislocated by big toe

- skin quality (callous indicates points of overload; skin breakdown is a possible precursor to foot ulceration), and pulses and sensation. Stiffness of the first metatarsophalangeal joint suggests arthritis; consider hallux rigidus, as the management differs.
- Conservative management most importantly includes modification of footwear—wide shoes with a soft sole and low heel are recommended. Over the counter devices such as felt bunion pads and bunion posts may improve symptoms further. If these measures fail, chiropody referral for custom made night splints can be beneficial in some patients—for example, for those with deformity who decline surgery. Some studies have shown that orthotics substantially improves foot pain associated with hallux valgus.⁵ Hallux valgus is normally slowly progressive, so the risk of trying initial conservative management is low as it has been shown not to jeopardise the final outcome.⁶
- Surgery can be considered if symptoms remain despite conservative measures or if the deformity has progressed (box). Risks of surgery for hallux valgus include hallux varus (overcorrection), recurrence, and worsened function. Not all patients will return to their previous level of activity, and up to a third will not be able to wear their shoe of choice postoperatively.⁷

FURTHER READING**For patients**

Patient UK ([www.patient.co.uk/health/Bunions-\(Hallux-Valgus\).htm](http://www.patient.co.uk/health/Bunions-(Hallux-Valgus).htm))—Evidence based information written by general practitioners

For doctors

eMedicine (<http://emedicine.medscape.com/article/1232902-overview>)—Evidence based information, updated regularly
Robinson AHN, Limbers JP. Modern concepts in the treatment of hallux valgus. *J Bone Joint Surg [Br]* 2005; 87-B:1038-45.

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Previous articles in this series

- ▶ Chalazion (*BMJ* 2010;341:4044)
- ▶ Vitamin B-12 deficiency (*BMJ* 2010;340:2305)
- ▶ Stridor in children (*BMJ* 2010;340:2193)
- ▶ “My baby keeps bringing up his feeds!” (*BMJ* 2010;340:2189)
- ▶ Hoarse voice (*BMJ* 2010;340:522)

- Surgery is generally a day case procedure. Patients can expect to walk with crutches for two weeks, and then gradually increase weight bearing up to normal at about 6 weeks.

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The “OCD bully”

People with OCD often consider their OCD to be like a bully or a demon that has to be obeyed. During cognitive behaviour therapy, they may be encouraged to “externalise” their bully and to act against it by doing the opposite to what the bully demands in terms of compulsions and avoidance behaviour. We decided to enhance the environment at our unit by making a humanoid version of an OCD bully. On the outside of the bully are various manifestations of OCD—such as chains, a clock that represents the wasted time of compulsions, a toilet seat that is full of “germs,” knives for fears of being violent, words such as “Paedophile” and numbers such as “666,” which are characteristic of the fears in OCD. The bully has several eyes to depict hypervigilance for threat. A door in its chest opens to reveal a heart of stone.

The humanoid also has a more important therapeutic role. It holds a transparent receptacle in which residents are encouraged to give up their various “safety objects” to the humanoid as a commitment to change. Safety objects are items that are instrumental to aid safety seeking or avoidance behaviours and therefore maintain a person’s obsessional doubts and fears. Initial donations have included a pair of handcuffs to prevent a fear of being violent to others; a bottle of bleach, alcohol wet wipes, and rubber gloves used to prevent contact with “contaminants”; a mobile telephone used for seeking repeated reassurance; a magnifying mirror and implements for skin-picking. The installation is interactive and will evolve over time as each resident makes a donation of a new safety object. Each donation has its own story and provides encouragement for a new resident to change by following the example of previous residents who have made the commitment to change. The receptacle is long, making it difficult to retrieve items once they have been deposited. It therefore depicts another aspect of OCD—hoarding. When the receptacle is full, another will replace it so that the unit will eventually be full of clutter.

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This installation is displayed in the entrance to the Anxiety Disorders Residential Unit at the Bethlem Royal Hospital. The unit provides a national service for the treatment of severe obsessive compulsive disorder (OCD)