

ORTHOPAEDICS



FOR PRIMARY
HEALTH CARE



LION
LEARNING INNOVATION VIA
ORTHOPAEDIC NETWORKS

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Orthopaedic infections in children

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Learning objectives

1. Identify the key features in the clinical history suggestive of an orthopaedic infection.
2. Know which special investigations to request.
2. List the Kocher Criteria and know its relevance to the diagnosis of septic arthritis.
3. Understand the principles of antibiotic management.

Introduction

Children are particularly prone to developing bone and joint infections. This is because of **the** unique anatomy around **g**rowth plates, leading to sluggish and turbulent blood flow in these areas. Bone and joint infections in children are almost always haematogenous.

The worldwide incidence ranges from 1/800 to 1/5000. The incidence is higher in developing countries.

Boys are more commonly affected than girls, and younger children are more commonly affected than older children. Acute orthopaedic infections in children should be treated as emergencies.

Clinical findings

History

Patients will usually present with a vague history of trauma. This often leads to delayed diagnosis as infection is not considered. There will be **a** history of limping and pain, inability to weight bear and pseudoparalysis if the upper limb is involved. Ask about a history of an upper respiratory **tract** infection or recent skin infection, as it is often associated. There may also be a history of fever.

Examination

Start with a general examination including vital signs. Raised temperature and pulse rate is suggestive of infection. Examine the whole body for infectious cutaneous lesions or other obvious sources. Local examination follows the 'look, feel, move' principle:

Look: Swelling, erythema, sinus or pustule

Feel: Warmth, fluctuance, effusion (joint), tenderness

Move: Patients with septic arthritis are very reluctant to move their joints. If the joint moves easily, consider adjacent osteitis or cellulitis.

Special investigations

Radiographs of the affected limb should be requested. In acute infections, X-rays are typically normal but may show soft tissue swelling or an effusion. In the case of septic arthritis of the hip, subluxation may be evident. It takes on average 2 weeks for X-ray changes to appear following an acute infection.

Blood cultures should be taken in all patients with suspected bone or joint infection.

Full blood count, ESR and CRP should be requested. White cell count and platelets are typically raised, as is the ESR and CRP.

Bone scan is useful to detect occult infections of the spine and pelvis and in the young child where it is difficult to localise the site of the infection. Use is limited by availability.

MRI has a very high sensitivity and specificity for detecting infection, but use is limited by availability and cost.



Right hip subluxation as a result of septic arthritis

Kocher Criteria

Originally described to differentiate septic arthritis of the hip from a transient synovitis. Nonetheless useful in determining whether limb pain is caused by infection or something else.

Kocher Criteria

non-weight bearing	or pseudoparalysis
ESR	> 40mm/hr
WCC	> 12 x 10 ⁹ /L
Pyrexia	Temp >38.5°C

The number of criteria present predicts the likelihood of infection:

1 = 3%, 2 = 40%, 3 = 93%, 4 = 99%

Bacteriology and antibiotics

The most common infecting organism is staphylococcus aureus in all age groups, which accounts for 80–90% of positive cultures. The table at the end of this chapter shows common organisms of different age groups and patient populations with antibiotic choice, but this should be guided by local trends.

Management

Non-surgical management is seldom indicated. In very early onset osteitis without collection of pus, antibiotic management alone is acceptable. If no infecting organism is identified, empiric antibiotics as listed in the table above should be prescribed for 6 weeks.

Surgical management is nearly always indicated to release the pus.

In septic arthritis, a small arthrotomy is performed and the joint irrigated copiously. Pus swabs are taken as well as synovial samples. These are sent for culture and sensitivities as well as TB testing.

In osteitis, the affected bone is surgically approached and any extra-osseous pus is released. If not pus is found in cases with a high suspicion of osteitis, holes may be drilled in the bone to assess for and release intramedullary pus. Following surgery, patients are started on antibiotics as described above: 6 weeks for osteitis and 4 weeks for septic arthritis. Empiric antibiotic treatment can be changed depending on culture results or poor clinical response.

Complications

Untreated septic arthritis will lead to destruction of the joint cartilage and severe arthritis. In the hip and elbow, it may lead to avascular necrosis of the femoral and radial head, respectively.

Acute osteitis, even if treated adequately, may lead to pathological fracture, growth disturbance and the development of chronic osteomyelitis.

Essential takeaways

- Orthopaedic infections are common in children and should be actively excluded in any child that presents with limb pain or limping.
- Special investigations are helpful in establishing the diagnosis, but the presentation is mostly clinically obvious.
- Urgent surgical management is indicated in patients diagnosed with septic arthritis or acute osteitis with a pus collection.
- Staph aureus is the most common infecting organism and antibiotic treatment should always include cover for this organism.

References

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2. J Dartnell, M Ramachandran, M Katchburian. Haematogenous acute and subacute paediatric osteomyelitis. A systematic review of the literature. *J Bone Joint Surg (Br)*. 2012; 94-B: 584–595.

Patient cohort and bacteriology		Antibiotics
Neonates	S. aureus (MRSA), Group B strep Gram negatives	Cloxacillin (Fusidic Acid) 3rd gen cephalosporin
6 months – 4 years	S. aureus, K. kingae, H. influenzae (rare)	Cloxacillin + Ampicillin/3rd gen cephalosporin
>4 years	S. aureus	Cloxacillin
Adults (acute)	S. aureus	
Penicillin allergy		Clindamycin
immunocompromised	S. aureus, S. pneumoniae, pseudomonas, fungal	Cloxacillin + 3rd gen cephalosporin Cloxacillin + 3rd gen cephalosporin Cefazolin is an alternative to Cloxacillin (if not available)
Sickle cell disease	S. aureus, Salmonella	
contiguous chronic osteomyelitis	The most common causative organism in s are: Enterobacteriaceae sp. Staphylococcus sp. Pseudomonas aeruginosa Enterococcus sp. In 45% of infections multiple organisms cultured	
heamatogenous chronic osteomyelitis	Staphylococcus aureus is the most common organism involved in adults (60-90%)	

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ABOUT THE BOOK

Informed by experts: Most patients with orthopaedic pathology in low to middle-income countries are treated by non-specialists. This book was based on a modified Delphi consensus study* with experts from Africa, Europe, and North America to provide guidance to these health care workers. Knowledge topics, skills, and cases concerning orthopaedic trauma and infection were prioritised. Acute primary care for fractures and dislocations ranked high.

Furthermore, the diagnosis and the treatment of conditions not requiring specialist referral were prioritised.

* Held et al. Topics, Skills, and Cases for an Undergraduate Musculoskeletal Curriculum in Southern Africa: A Consensus from Local and International Experts. JBJS. 2020 Feb 5;102(3):e10.

THE LION

The Learning Innovation via Orthopaedic Network (LION) aims to improve learning and teaching in orthopaedics in Southern Africa and around the world. These authors have contributed the individual chapters and are mostly orthopaedic surgeons and trainees in Southern Africa who have experience with local orthopaedic pathology and treatment modalities but also in medical education of undergraduate students and primary care physicians. To centre this book around our students, iterative rounds of revising and updating the individual chapters are ongoing, to eliminate expert blind spots and create transformation of knowledge.

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