ORTHOPAEDICS

FOR PRIMARY HEALTH CARE

LION

LEARNING INNOVATION VIA ORTHOPAEDIC NETWORKS

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A swollen painful limb in a child

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Learning objectives

1. Know the differential diagnosis for a swollen, painful limb in a child
2. Know which pertinent questions to ask during the history taking
3. Know the key clinical features to aid diagnosis
4. Know which special investigations to perform
5. Know the indications for urgent referral

Case example

A 2-year-old male presents with a history of limping and a progressive swelling over the left lower leg and ankle.

The caregiver is uncertain of when exactly it started, but the swelling has been getting worse over the last 2 weeks.

There is no history of trauma or prior illness. The child is developmentally normal.

Examination reveals a large mass on the medial aspect of the lower leg. There are no skin changes noted over the mass, nor are there any scars.

The mass is soft. It is tender to palpation. It appears to be adherent to the underlying bone. It is not warm compared to the other leg.

The ankle can be moved passively, although the child does not move it actively. Distal pulses and movement are intact.

His vital signs are within normal limits.

***X-rays** of the affected limb.*

There is a lesion involving the medial distal metaphysis of the tibia. The lesion has sclerotic margins and is well demarcated. There is a significant soft tissue component as is evidenced by a soft tissue mass medially. There is some calcification in the lesion. There is a periosteal

reaction on the medial diaphysis. These X-ray features are suggestive of a slow growing, or chronic lesion. The differential diagnosis includes infection or a low grade tumour.

Blood investigations reveal a raised CRP and ESR, a mild anaemia and a raised platelet count.

An MRI was performed.

This coronal image shows a large bone abscess involving the metaphysis and epiphysis of the distal tibia, extending outside the cortex.

Radiologically and clinically, TB was diagnosed, and this was confirmed on biopsy. The patient was treated medically, and the lesion healed.

Introduction

When assessing a child with a painful, swollen limb, the diagnosis will typically fall into 1 of 4 categories: Trauma, infection (acute or chronic), tumour (benign or malignant) and inflammatory.

The differential diagnosis can be narrowed down by a thorough history and clinical examination. Once the differential diagnosis has been narrowed down, appropriate special investigations are performed, and treatment instituted.

History

Duration

A condition that has been present for months and progressing slowly is less likely to require emergency treatment than a recent onset painful swollen, limb for example, TB vs acute haematogenous osteitis.

Precipitating events

Was there a traumatic event preceding the swelling of the limb? If so, how soon after the injury did it start? Was there a preceding infection (i.e. tonsilitis or otitis media)? If the pain and swelling occurred immediately after a traumatic event, a fracture or other injury is most likely. If, however, there was a delay in onset of symptoms, bone or joint infection is highly likely.

Progression

Is the pain and swelling getting worse or better? Traumatic conditions tend to improve over time as apposed to infectious or malignant conditions.

Associations

Constitutional symptoms such as malaise and weight loss are suggestive of chronic infections or malignancy. Other joint involvement is suggestive of an inflammatory condition. Fever is fairly non-specific, but typically absent in the traumatic setting.

Past medical and surgical history

This may give a clue to the underlying condition. Also ask if any treatment has been sought before, and what.

Examination

Look

- Which part of the limb is involved? Is the swelling localized or diffuse?
- Is the skin inflamed (red)? If so, a superficial infection may be the cause.

- Is there induration or blistering? Suggestive of cellulitis or necrotizing fasciitis.
- Is there a skin lesion or sinus? Chronic infection likely.
- Scarification? This would suggest a chronic or long-standing condition.
- Previous surgical scars?

Feel

- Warmth is indicative of inflammation or infection.
- Consistency: Tensely swollen limbs typically indicate trauma or a generalised infection. Fluctuant swelling indicates an abscess or haematoma. Soft, spongy swellings are unusual and may indicate a soft tissue mass or vascular malformation.
- Is there an associated joint effusion?
- Distal neurovascular status?

Move

- Are you able to move the adjacent joints? Frozen joints are very typical of infections, but patients with fractured limbs are also reluctant to move the adjacent joints.

Special investigations

Plain film X-rays

X-rays will always be the first investigation you request. If there is a fracture, you will have your diagnosis and no further investigations will be required.

Do not routinely request contralateral limb X-rays as this adds additional cost and radiation and is not always necessary. Reserve those for cases of uncertainty.

In acute infections and inflammatory conditions, X-rays are typically normal, although you may be able to appreciate the soft tissue swelling.

X-ray of a young child with chronic osteomyelitis of the tibia.

Note the irregular cortices, areas of lysis and sclerosis, as well as the developing sequestrum and involucrum. There is a pathological fracture in the proximal metaphyses. The epiphyses are spared, and the fibula appears normal.

Blood investigations

Baseline tests to request are a full blood count (FBC), c-reactive protein (CRP) and erythrocyte sedimentation rate (ESR). If you suspect an infection, take a blood culture at the same time.

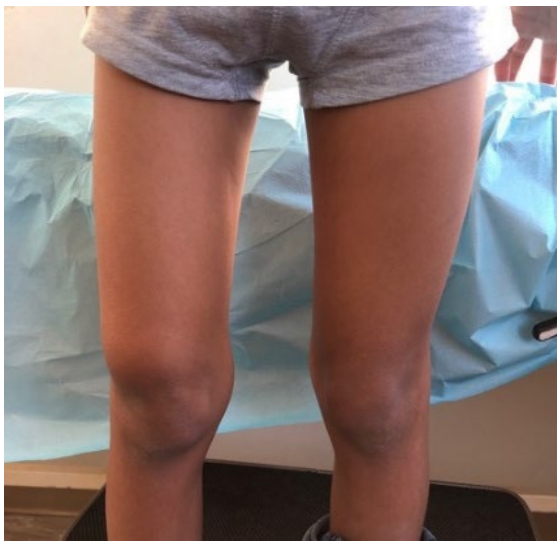
It is usually not necessary to test renal and liver function.

Normal baseline bloods exclude infection, malignancy and inflammation. Abnormal baseline bloods are non-specific but there are certain trends to look out for:

- Acute infections usually have a very high CRP and a raised white cell count.
- TB typically has a raised ESR, normal white cell count, mild anaemia and high platelets.
- Malignant conditions often present with severe anaemia, very high ESR but modestly raised CRP.

Other investigations

Magnetic resonance imaging (MRI) is the most specific investigation available. It can detect very early changes in cases of infection, and it can differentiate accurately between different pathologies that may cause a painful, swollen limb. Below is an example of a 12-year-old boy who presented with thigh swelling and pain. X-rays and blood investigations were normal. MRI demonstrated a large vascular malformation in the thigh.



Bone scan is a very useful investigation if the exact location of the pathology is unclear. This is typically the case in young, limping children with swollen painful limbs, where examination is difficult and often inconclusive. Bone scan is very sensitive, but not very specific, and is not widely available.

Ultrasound is widely available and inexpensive. It can distinguish between solid masses and collections and can diagnose the rare case of deep vein thrombosis in children. Ultrasound is quite user dependent and not very accurate in detecting small sub-periosteal collections.

Biopsy

Patients presenting with a painful, swollen limb in the absence of acute trauma will most likely require a biopsy of some sort. In cases of clear infection, this will form part of the incision and drainage of the abscess and lead to pathogen identification and antimicrobial sensitivity. In tumours, a biopsy is always required prior to the initiation of treatment.

Once you suspect a bone or joint infection or a tumour, the patient should be referred to a centre with the required expertise immediately.

Red Flags

Features suggestive of sepsis:

- Fever
- Tachycardia
- Inability to weight bear or actively move the joint
- Rapidly progressive pain

Features suggestive of malignancy

- Progressive pain and swelling in the absence of features of sepsis.
- Anaemia
- Weight loss and malaiseTypes of nerve injury

Essential takeaways

Second to trauma, infection is the most common cause of a painful, swollen limb in a child and should always be actively excluded.

Although the differential diagnosis is broad, a targeted history and examination will aid in the diagnosis.

Once infection or malignancy is confirmed or suspected, urgent referral is required.

References

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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):el0.*

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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