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Diagnosing Osteomyelitis in Sickle Cell Disease




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Diagnosing Osteomyelitis in Sickle Cell Disease


- Infection and SCD-Pathophysiology
- Role of Imaging Studies in Δ
- GSTT protocol
- Case Presentation
- Local Data
- Discussion
- Recommendation

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REVIEW
Infection in sickle cell disease: A review
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Inflammation and Infection in SCD

RBC Sickling

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Inflammation and Infection in SCD

CHEMICAL
PHYSICAL
BIOLOGICAL → RBC Sickling

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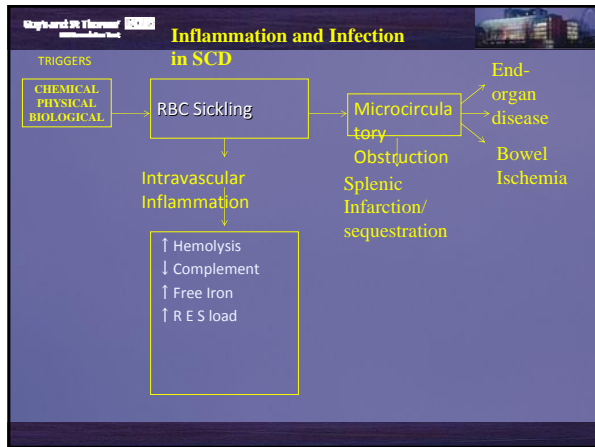
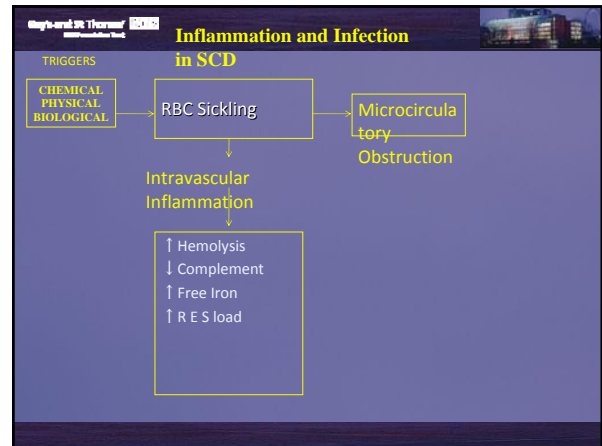
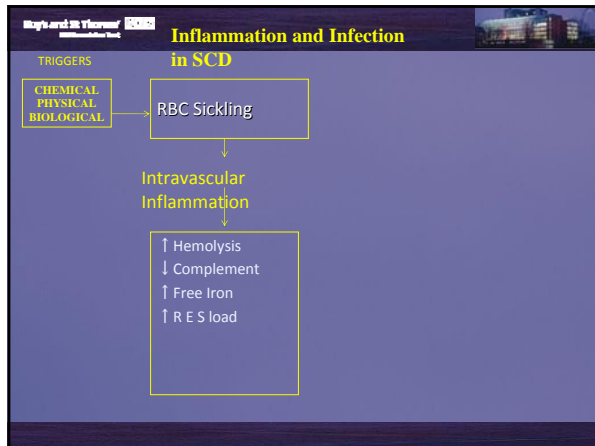
Inflammation and Infection in SCD

TRIGGERS

CHEMICAL
PHYSICAL
BIOLOGICAL → RBC Sickling

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Intravascular Inflammation



- ### Hyposplenism
- #### Encapsulated organisms
- Sluggish circulation
 - Acidosis
 - Sickling
 - Intrasplenic shunts
 - 30-600x more prone to IPD
 - Rapid onset; rapid progression
 - V young most susceptible:
 - 5.8/100 in under 3s
 - 1.1 in 5-9
 - 0.6 >10yrs (Overturf 2003)



- ### Micronutrients
- Zinc (Prasar 1999; Faker 2000)
 - Known association with lymphopenia
 - ? Due to chronic glucocorticoid production from HPA axis
 - XS glucocorticoids stimulate B & T lymphocyte apoptosis in BM & thymus
 - ↓ IL2 production
 - ↓ NK cell killing activity
 - ↓ CD4:CD8
 - ↓ Th1 helper activity
 - Zn deficiency
 - Haemolysis
 - Renal
 - ??Empirical supplementation

- ### Mechanical
- #### Bone infections
- Expanded space from increased haemopoiesis
 - Sluggish circulation
 - Causative organism
 - Salmonella
 - St aureus
 - Gram neg – Bordetella
- #### Acute chest syndrome



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Bone & joint infections

- Non-typhi Salmonella
- Culture negative
- Occult / under-diagnosed
- Long-term disability if treated late



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Osteomyelitis in SCD

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Osteomyelitis (OM) vs Vasoocclusive crises (VOC)

- Osteomyelitis is one of the most common infections in children with sickle cell disease (arti-Carvajal et al M 2009)
- Gold standard for diagnosis – Positive cultures, however this is not possible in the majority of cases.
- The challenge is the ability to differentiate acute Osteomyelitis from acute bone infarction even though it is much rarer- 1:50.
- Both clinical and radiological information may be indistinguishable (Berger E et al, 2009)

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

Sickle Cell Disease Osteomyelitis v Acute Infarction

- In the clinical scenario of a child with sickle cell disease presenting with bony pain and swelling affecting a single site, with prolonged fever and pain, the physician should consider closer monitoring and investigations to exclude a diagnosis of osteomyelitis- *Elizabeth Berger et Arch Pediatr Adolesc Med. 2009;163(3):251-255*
- Osteomyelitis most commonly affects the diaphyses of the femur, tibia or humerus. Laboratory-Leucocytosis and raised inflammatory markers-CRP-both infarction / osteomyelitis Periosteal and paraosteal soft tissue enhancement cannot differentiate between these conditions
- Gold standard - **Positive culture**

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Sickle cell disease Osteomyelitis v Bone infarction: Role of radiological investigations

- The principal ultrasonographic finding of subperiosteal fluid was present in 14 (74%) patients with osteomyelitis and seven (37%) patients without infection. A finding of a subperiosteal fluid depth of 4mm or more was significantly associated with osteomyelitis ($P<0.01$). William et al, Clinical Rad 2000; 55: 307-310
- The value of Gadolinium enhanced MRI -Thick irregular periphery, unaffected centre, Geographic enhancement with periosteal reaction. Umans et al- Umans, Mag Reson Imag 2000; 18: 255-262

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Developing a local protocol

Suspected Osteomyelitis in Sickle Cell Disease:
Guideline for the evaluation & treatment

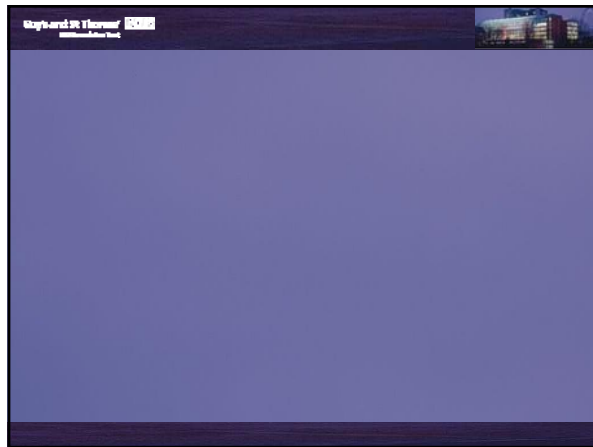
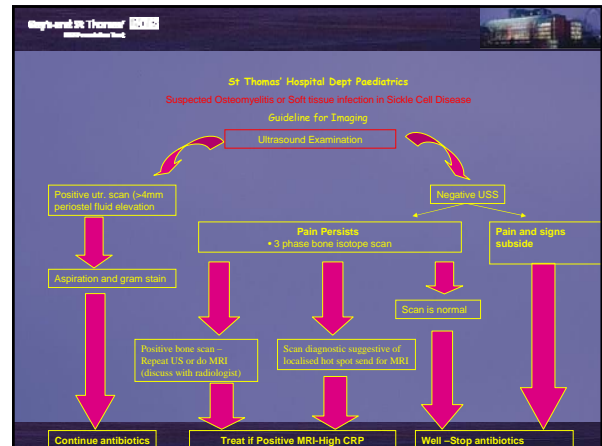
History & Examination

- Acute bone/soft tissue swelling +/- localised erythema or Joint pain / effusion
- Fever 38.0 C

Always give adequate analgesia¹

•FBC, Blood culture, CRP, Bone profile
•Consider Plain Film X-ray if history >1week
•Urine and Stool culture
•Commence IV Ceftriaxone /suitable cover 4 Salmonella 50mg/kg

Imaging protocol



Case 25/11/2004- 6 admissions

14/03- Pain / Swollen Right leg

- USS- Extensive inflammatory reaction, periosteal collection 2mm
- Ceftriaxone- 1week- D

20/06

- Right Leg- Swollen, X-Ray- Mixed sclerotic / lucent areas
- MRI-?Proximal Tibia Osteomyelitis
- IV Ceftriaxone(14d), Oral Clindamycin(4weeks)
- 18/08/

Case

18/08-26/08

- Left leg pain-tibia
- US-No effusion, No periosteal reaction
- Unresolved features- MRI-?Osteomyelitis left Femur/Periosteal collection

16/10-22/10

- Pain left Leg-Tibia- X-ray- Normal
- US-Collection 17-repeat 19,
- 20/10- Surgical I&D-IV Ceftriaxone-6weeks

2 further presentations with avascular necrosis of foot bones

Summary

- Ultrasound correctly identified 26/35 cases of Osteomyelitis-benefits
 - Fast and Simple but Operator dependent
- C-Reactive Protein correlates with ultrasound finding
- MRI may be essential to clarify the diagnosis in a proportion of cases
- What to check
- C-RP- admission, repeat at least every three days / 7day
- US then MRI
- Orthopaedics role