Septic Arthritis vs. Transient Synovitis – A Practical Approach
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Objectives

- Definition/Epidemiology
- Workup
  - History and Physical
  - Labs and Imaging
  - Aspiration
- Treatment
- Case Presentation

Transient Synovitis

- Inflammation of the synovium of the hip
- Can be associated with:
  - Trauma
  - Viral or Bacterial infection
  - Allergic Reaction
- Benign course with marked improvement within 24-48 hours
Transient Synovitis

- Epidemiology
  - Most common cause of hip pain in the pediatric population
  - Most common age group 4-8 yo
  - Boys affected 2X more often

Septic Arthritis

- Culture positive joint fluid
- Negative cultures and five of the following:
  - Temp >38.3
  - Pain with motion
  - Swelling
  - Systemic symptoms
  - Absence of other pathologic processes
  - Response to antibiotics

Septic arthritis

- Epidemiology
  - 5.5-12/100,000 children
  - Peak incidence is in kids < 3
  - Boys affected 2X more often
  - Lower extremity most commonly affected, with the hip and knee most often involved
Septic Arthritis

- Caused by hematogenous seeding of synovium from transient bacteremia
- Acute osteomyelitis and septic arthritis co-exists 20-30%
- Metaphysis is intra-articular in four locations:
  - Proximal femur
  - Proximal humerus
  - Distal lateral tibia
  - Proximal radius
- Direct inoculation from penetrating injury

History

- Onset/Duration
- Location of pain
- Limping vs refusal to bear weight
- Constitutional symptoms - fever
- History of recent trauma or illness

Evaluation

- Physical Exam
  - Inability to bear weight, limp vs crawl
  - Erythema, swelling, warmth of affected area
  - Pain with range of motion
  - Hip flexed, abducted, externally rotated
- Laboratory
  - CBC with diff, ESR, CRP
  - Blood cultures
Transient synovitis

- Child eating well
- Often history of URI or gastroenteritis
- May have low grade fever
- Permits some hip movement

Septic arthritis

- Fever >101°F
- Won’t walk
- Poor appetite
- Limited hip movement

Differential Diagnosis

- Differential Dx
  - Transient synovitis
  - Septic arthritis
  - Reactive arthritis
  - Inflammatory arthropathies: JRA
  - Trauma
  - Neoplasm
  - Other infection

Septic arthritis vs transient synovitis

- Kocher criteria:
  - History of fever
  - Non-weight bearing
  - ESR >40
  - WBC >12,000
  - 93% predictive of septic arthritis with 3 criteria
  - 99.6% with 4 criteria

Kocher, JBJS, 1999
Probability of Septic Arthritis vs. Number of Predictors

Kocher, et al.
81A:1662, 1999

Recommendations

- 0 positive risk factors – Observe
- 2 positive risk factors – Aspirate (IR)
- 3-4 positive risk factors – To OR for aspiration and I&D

Kocher, et al.
81A:1662, 1999

Septic arthritis vs transient synovitis

- Five variables:
  - Temp >38.5
  - WBC >12,000
  - ESR >40 mm/hm
  - CRP >2.0 mg/dL
  - Refusal to bear weight
- Predicted probability of septic arthritis:
  - 95.3% 4 criteria; 97.5% 5 criteria
- CRP only risk factor associated with outcome

Caird et al. JBJS, 2006
Septic arthritis vs transient synovitis

- 39/133 pts who underwent hip aspiration were diagnosed with septic arthritis
- CRP:
  - Sensitivity: 41-90%
  - Specificity: 29-85%
  - PPV: 34-53%
  - NPV: 78-87%
- CRP <1.0, 87 % probability patient does not have septic arthritis

Levine et al, JPO, 2003

Validation

- Validation of Kocher's criteria
  - 4 criteria, area under the receiver operating characteristic curve was 0.86
    Kocher JBJS 2004
  - 4 criteria, 59% predicted probability of septic arthritis Luhmann JBJS 2004
  - 5 criteria, 59.9% predictive, fever best predictor Sultan JBJS Br 2010

Radiographs

- Rule out fracture/dislocation
- Assess for joint effusion
- Assess for boney involvement
Ultrasound

- Assess for joint effusion
- Low cost
- Non-invasive
- No sedation
- Lack of specificity (5% false-neg rate)
- Operator dependent
- Useful to guide hip aspiration

Laine, JPO B, 2015

MRI

- Evaluate for effusion
- Assess for bone involvement
- Abscess or pyomyositis
- Multifocal involvement

At Our Institution

- MRI hip Osteo Protocol
  - Coronal T1
  - Coronal STIR
  - Axial T2 fat-sat
  - Axial DWI
  - Approximately 15 mins to perform
MRI vs. Emergent Aspiration

- Aspiration
  - 68% diagnosed with septic hip
  - 30% had MRI after non-response to treatment
  - 32% incorrect/incomplete diagnosis
  - 30% reoperation

- MRI
  - 17% did not require surgery
  - 30% with septic arthritis has associated osteomyelitis
  - 16.8% reoperation rate

Gornohalsi, JPO 2014

MRI vs. Emergent Aspiration

- Considerations:
  - Systems Based Practice
  - Need for sedation
  - Delay in operative treatment of septic arthritis

Aspiration Synovial Fluid Analysis

<table>
<thead>
<tr>
<th>WBC(000's)</th>
<th>Poly</th>
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<tbody>
<tr>
<td>Transient Synovitis</td>
<td>5-15</td>
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<tr>
<td>JRA</td>
<td>15-50</td>
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<tr>
<td>Septic Arthritis</td>
<td>50-100</td>
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</table>
Aspiration

- Management of Aspiration WBC 25,000-75,000
- Septic arthritis final diagnosis 48% >50,000 and 17% <50,000
- Other diagnoses: Lyme arthritis, transient synovitis
- In patients >50,000, each Kocher's criteria increased odds of septic arthritis near fourfold
- In patients <50,000, no association between increasing number of Kocher criteria and diagnosis of septic arthritis

Heyworth, JBJS, 2015

Transient Synovitis Treatment

- Rest and NSAIDs
- Follow fever curve
- Close observation for:
  - Persistent/worsening limping
  - Fever
  - Signs of systemic illness

Septic Arthritis Treatment

- Drainage in all cases—"when in doubt, wash out"
- Multiple aspirations and irrigations
  - Unstable patient; Gonococcal infection
- Arthroscopic drainage
- Open surgical drainage
- IV Antibiotics
Complications: Septic Arthritis

- Arthrofibrosis
- Joint destruction
- AVN
- Physeal closure

Risk factors:
- Symptoms >4 days
- Associated AHO

Future Direction: Clinical Practice Guidelines

Clinical Practice Guidelines

Koehler, JBJS, 2003

- Lower rate of presumptive drainage
- Greater compliance with recommended antibiotic therapy
- Faster change to oral antibiotics
- Shorter hospital stay
3 yo M presented as a transfer for fever and refusal to bear weight on the right lower extremity. He reports the pain to be in his knee.

ED workup:
- Temp 103.8
- XR of entire right lower extremity and knee U/S
- Labs: WBC 11.4, ESR 35, CRP 52.7

Orthopedic evaluation
- PE: RLE: Skin is intact. No erythema is present. No swelling throughout. No knee effusion. He is nontender to palpation over the proximal tibia or distal femur. He has tenderness to palpation in the right thigh as well as tenderness in the right hip anteriorly in the groin and guards against range of motion to both hip and knee. He holds extremity in hip and knee flexion with hip ER
- Based on exam Hip U/S and MRI right femur ordered

Hip U/S: Small right hip effusion

If I would not have been able to get MRI urgently, plan would be for OR for right hip aspiration given criteria of fever, refusal to bear weight, and CRP
Case Presentation

MRI right femur:
- 1. Nonspecific myositis of the right obturator internus/externus, pectineus and adductor longus muscles possibly indicating a muscle strain. Underlying infection cannot be entirely excluded.
- 2. Small right hip joint effusion which may be reactive to trauma or adjacent inflammation however cannot totally exclude an early septic arthritis.

Case Presentation

Patient taken directly to the OR from the MRI suite for open I&D of the right hip
- Empiric IV antibiotics given after cultures obtained in the OR
- Blood culture and right hip culture: MSSA
References: Kocher


References


Thank you!