Septic Arthritis due to *Neisseria meningitidis* in the Absence of Meningitis

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Outline

• Background Information
• Case Presentation
• Discussion
  – Literature Review
  – Pubmed Search
  – Proposed Treatment (experience based)
• Take home message
Introduction
Introduction

• Septic arthritis is inflammation of a joint space secondary to a microorganism.

• Route of infection
  – Hematogenous (usually)
  – Direct inoculation from an adjacent site of infected tissue or during trauma.

• Pathogenic organisms
  – *Staphylococcus aureus* (most common, 44 % of patients)
  – Streptococcal and other staphylococcal species
  – *E. coli* and *Pseudomonas* (neonates & patients with immunodeficiency)
  – *N. gonorrhea* (young adults)
N. meningitidis

- 2.5 to 6 per 100,000 in developing countries
- Presentation from meningitis to septicemia
- Arthritis associated with or after symptoms of acute meningitis has been reported since the 19th century
- Meningococcal arthritis is rare in the absence of meningitis or septicemia
- 1% isolated from synovial fluid
- Most cases involve the knee
Case Presentation
History

- 46 year old female presented to the ED
- 24 hours onset of spontaneous painful swelling of the right elbow
- Returned from a trip to Mexico
- No recent illness or history of sick contacts
- No trauma to the elbow

- ROS: fever over the last few hours prior to admission, no chills, sweats or headache
Exam & Lab

• Physical examination
  – 100.6 °F otherwise normal vital signs
  – Right upper extremity
    • Minimal effusion
    • Swelling and warmth around the elbow
    • Motion limited secondary to pain
    • Lateral epicondyle tender to palpation
    • No ecchymosis or abrasion noted
  – Neurological exam
• Leukocytosis 17,900 with 74 % neutrophils
• ESR = 56; CRP = 7.1
Small anterior fat pad sign indicative of effusion but no fracture or dislocation.
Management

- Arthrocentesis
  - 96,000 nucleated cells; 60% neutrophils & 20% bands
  - 50,000 red blood cells
  - No crystals
  - Gram stain
    - Innumerable WBC’s
    - Few gram negative diplococci
- Started on empiric vancomycin and piperacillin/tazobactam
- Arthrotomy with irrigation & debridement
- Intraoperative cultures grew *N. meningitidis*
- Blood and urine cultures negative
- Ceftriaxone one gram daily for four weeks
- Patient finished the course with no complications
Discussion
Clinical Presentation

- *N. meningitidis* is an airborne pathogen usually transmitted from close contacts or living situations such as in college campuses and barracks.

- **Clinical scenarios**
  - Meningitis (50%)
  - Meningococccemia
  - Pneumonia
  - Epiglotittis
  - Otitis media
  - Conjunctivitis
  - Urethritis
  - Pericarditis
  - Arthritis
Risk Factors

• Young age
  – most occur in infants
  – 2\textsuperscript{nd} peak young adults mainly in military recruits/college dormitories
• Close contact with an individual with meningococcal disease
• Overcrowding
• Complement and properdin deficiencies
• Asplenia
• AIDS
• Multiple Myeloma
Three clinical scenarios for arthritis

Primary meningococcal arthritis

Associated with chronic meningococcemia

Complication of acute meningitis
Primary Meningococcal Arthritis

- Bacterial isolation from synovial fluid without concomitant meningococcemia or meningitis

**Proposed Mechanism of Pathogenesis**

Blood stream infection with bacterial invasion of the synovium
(Based on 40% of patients having positive blood cultures)

- Preceding Symptoms:
  - Upper respiratory symptoms (50% of cases)
  - Maculopapular rash (30%)
Primary Meningococcal Arthritis

• More prevalent amongst males
• Joints affected
  – Knee (most common)
  – Ankle (second most common)
• Bacteria isolated
  – Synovial fluid (highest positive in 70 to 90 %)
  – Blood (28 to 40%)
  – Pharynx (13 to 30%)
• Importance of arthrocentesis in diagnosis
Discussion

46 cases
Isolated joint infection w/o meningeal signs

19 cases
Isolated joint infection

9 cases
Children less than 4 years old

7 cases
Healthy men ages 50 to 60

3 cases
Immune suppressive state (SLE, MM, leukemia)

<table>
<thead>
<tr>
<th>Author/Year publication</th>
<th>Age/Sex</th>
<th>Joint</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>Giamarellos-Bourboulis et al.; 2002</td>
<td>16/Female</td>
<td>Knee</td>
<td>IV Penicillin G</td>
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<tr>
<td>Shawn; 2002</td>
<td>18/Female</td>
<td>Knee</td>
<td>IV Ceftriaxone</td>
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<tr>
<td>Cartolano et al; 2001</td>
<td>19/Female</td>
<td>Knee</td>
<td>IV Ceftriaxone, IV Amoxicillin, PO Ofloxacin</td>
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<td>Christiansen JC; 1995</td>
<td>19/Female</td>
<td>Hip</td>
<td>IV Penicillin G</td>
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<td>Harwood et al.; 2008</td>
<td>29/Female</td>
<td>Knee</td>
<td>IV Ceftriaxone</td>
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<tr>
<td>Garner et al.; 2011</td>
<td>75/Female</td>
<td>Shoulder</td>
<td>IV Ceftriaxone</td>
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<td>Joyce et al.2003</td>
<td>19/Female</td>
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<td>IV Benzylpenicillin</td>
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<td><strong>Current Case; 2012</strong></td>
<td><strong>46/Female</strong></td>
<td><strong>Elbow</strong></td>
<td><strong>IV Ceftriaxone</strong></td>
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• *N. gonorrhea* is the most common cause of septic arthritis in sexually active young adults with a 4 times more preponderance in females
• Morphologically indistinguishable
• Different outcomes
  – *N. gonorrhea*
    • Minimal damage to joint surfaces
    • Few systemic manifestations
  – *N. meningitidis*
    • Serious complications of CNS, heart, lungs
    • Bone and joint destruction
Treatment

• Challenging as few cases reported
• Antibiotic therapy
  – IV penicillin or cephalosporins
  – Duration varied from 7 to 42 days
• Surgical debridement
  – To avoid high rate of complications
Take Home Message

• This case highlights the systemic nature of *N. meningitidis* infection causing disease in a native joint of an immunocompetent patient.
• The elbow being the infected joint is rare.
• Obtaining fluid or tissue culture prior to administration of antibiotics is critical for diagnosis.
• Microbiology support is essential to differentiate from *N. gonorrhea* as approach and duration of treatment is different.
• Surgical debridement adjunct to antibiotic therapy.
• Do not suggest STD based on gram stain.
References

1. Bonsell S. Isolated Knee Joint Infection With *Neisseria meningitidis*. Orthopedics; May 2002; 25, 5: 537-539
15. Joyce et al. Isolated septic arthritis: meningococcal infection
16. Harcup et al. Primary meningococcal arthritis and pseudogout in an elderly woman
Thank You