

Osteomyelitis and staphylococcus aureus



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Microbiology Grand Rounds Case Scenario VI

Case Scenario #VI Summary

Objective #1: What is the pathogenesis of this infection?

- Osteomyelitis occurs when:
- You experience trauma leading to bone damage
- Organism inoculation
- Presence of a foreign material
- Most commonly, in children, it arises as a consequence of a hematogenous spread of bacteria (ex. Staphylococcus Aureus)
- Begins in areas with high vascularity due to slower blood flow

Objective #2: What is Staphylococcus Aureus? How does it relate to the normal flora? What are the portals of entry?

- Staphylococcus aureus is :
- Gram positive cocci, catalase-positive, and coagulase-positive
- Facultative aerobe
- Is a potentially lethal opportunistic pathogen
- Enzymes (ex. Coagulase, lipase, staphylokinase, beta-lactamase)
- Toxins (ex. Cytolytic toxins, leukocidin, exotoxin, toxic shock syndrome toxins)
- Structural defences (ex. Protein A, slime layer).
- Normal Flora:

- Human commensal, asymptotically colonizing about 30% of the human population
- Found in nasal passages, axillae, inguinal, perineal areas, skin (along with *S. epidermidis*)
- Those who are colonized have a higher risk for developing infections
- Portals of entry:
- Staphylococcal infections remain localized at the portal of entry by the normal host defenses
- Skin, mucous membranes, respiratory system, gastrointestinal system, genitourinary tract, conjunctiva of the eye, placenta, parenteral route

Objective #3: Is Owen at risk for this infection as well?

- *S. aureus* transmission is by:
- Direct contact with colonized individuals, contaminated objects and inhalation of infected droplets
- Children are more commonly affected than adults because:
- Prone to hematogenous osteomyelitis
- Improper handwashing/hygiene (too young)
- Rich vasculature
- Immune system not fully developed

Objective #4: What is osteomyelitis? How did this infection develop? Who is most at risk for this type of infection? Why?

- Osteomyelitis is inflammation of the bone
- Majorly caused by bacterial infection, tissue injury/trauma (Direct), bacteremia.

- Symptoms of pain, swelling and redness around the infected area, fever
- Hematogenous osteomyelitis, injury → Blood vessels → Bacteremia → Bones
- People who are most at risk are those with:
 - Recent injuries, circulation disorders, impaired immune system, IV line or catheter, and the elderly
 - Infants and young children are more susceptible because they are:
 - Prone to hematogenous osteomyelitis
 - Improper handwashing/hygiene
 - Clumsy → Injury
 - Rich vasculature
 - Immune system not fully developed

Objective #5: What was the purpose of the prescribed orders? Why did the antibiotic therapy change?

- Start with empiric therapy because of broad spectrum and to control the spreading
- After confirming we use targeted therapy
- Ampicillin – Possible lactamase resistance
- Gentamicin – Not sufficient in killing intracellular bacteria

Objective #6: What is the rationale for IV therapy? What is the rationale for 6 weeks of therapy?

- Higher bioavailability through the IV route compared to the oral route as it goes directly into the blood stream; PICC lines generally have a 100% bioavailability.
- For osteomyelitis, bacteria might be thriving even with lessened symptoms. Patients should continue taking antibiotics until they have finished the 6 week course as it makes sure the bacteria is gone and the infection is dealt with.

Objective #7: What steps could be taken to reduce the risk of acquiring this type of infection?

- Avoiding infection
- Improving your health by:
- Stopping smoking, healthy diet, managing your weight, alcohol, an regular exercise

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