PATHOLOGY TEAM

“ 430 ”

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OSTEOMYELITIS

Definition :

Osteomyelitis formally donates inflammation of the bone and marrow cavity, it almost always implies infection and can be a complication of systemic infection but more frequently occurs as a solitary(isolated) focus of disease.

Causative Agents :

All types of organisms, including viruses, parasites, fungi and bacteria can produce osteomyelitis, but infections caused by certain pyogenic bacteria and mycobacteria are the most common.

Pyogenic Osteomyelitis: *(is almost always caused by* bacteria)

The offending organisms reach the bone by one of three routes:

1. ***Hematogenous spread****(most common)*
2. Extension from a contiguous site
3. Direct implantation

Causes of Pyogenic Osteomyelitis :

- ***Staphylococcus Aureus*** is responsible for 80% to 90% the cases of pyogenic osteomyelitis in which an organism is recovered.
- Staph Aureus expresses receptors to bone matrix components, may be related to the fact that facilitating its adherence to bone tissue.
- E.coli, Klebsiella and Pseudomonas are more frequently isolated from patients with genitourinary tract infections or with intravenous drug abusers.
- Mixed bacterial infections usually seen in the setting of direct spread during surgery or open fractures.
- Salmonella infections for unknown reasons common in sickle cell patients.
- *E. coli and group B streptococci are common in neonates.*
- In 50% of the cases no organisms can be isolated.

Sites of Involvement :

- Influenced by the vascular circulation; which varies with age.
  - **Neonates**:The Metaphyseal vessels penetrate the growth plate, resulting in frequent infection of the metaphysis, epiphysis or both.
  - In **Children:**Metaphyseal
  - **Adults:**Epiphyses &Subchondral regions.

Stages of Osteomyelitis :

- **Acute**
- **Sub acute**
- **Chronic**

Sequence of Infection :

- Once localized in bone, the bacteria proliferate (inside the bone) and induce an acute inflammatory reaction and cause cell death.
- Necrosis of the bone within first 48hrs; the dead bone pieces in infected sites is called a **sequestrum**.
- Spread of bacteria and inflammation within the shaft of the bone may percolate through the Haversian systems to reach the periosteum.
- In children, the periosteum is loosely attached to the cortex; therefore sizable subperiosteal abscess formation occurs *(because the out layer in the children is very weak).*
- Further ischemia and bone necrosis occurs.
- Rupture of the periosteum can lead to an abscess in the surrounding soft tissue and formation of a **draining sinus**.
- In infants, epiphyseal infection may spread to the adjacent joint and causes **septicarthritis** or **suppurative arthritis**; this may lead to permanent disability.
- After the first week chronic inflammatory cells become more numerous with the release of cytokines and deposition of new bone formation at the periphery.
- New bone may be deposited as a sleeve of living tissue known as the **Involucrum**.

- **Brodie'sAbscess :**

  Is a small intraosseus abscess that frequently involves the cortex and is walled off reactive bone.

- **Clinical Features :**

  Fever, chills, malaise, marked to intense throbbing pain over the affected region.

- **Diagnosis :**

- Sign/symptoms.
- X-ray
- Blood cultures
- biopsy

- **Rx** *(Prescription)* **:**

  Combination of antibiotics & *surgical drainage(aggressive).*

- **Complications :**

- Pathologic fracture.
- Secondary amyloidosis
- Endocarditis
- Sepsis
- Squamous cell carcinoma.
- Rarely sarcoma in the affected bone.

TUBERCULOUS OSTEOMYELITIS

Routes of Entry :

- Usually blood borne and originate from a focus of active visceral disease.
- Direct extension (e.g. from a pulmonary focus into a rib or from tracheobronchial nodes into adjacent vertebrae) or spread via draining lymphatics.
- With hematogenous spread, long bones and vertebrae are favored sites.
- The lesions are often solitary but can be multicentric, particularly in patients with an underlying immunodeficiency.
- In patients with AIDS frequently multifocal.

Site of Tuberculous Osteomyelitis :

Thoracic and Lumbar vertebrae followed by the knees and hips are the most common sites of skeletal involvement.

Pott Disease :

- Pott disease is the involvement of spine by Tuberculosis.
- Thoracic and lumber spines are the most common sites of involvement.
- The infection breaks through the intervertebral discs and extends into the soft tissues forming abscesses.

Clinical Features & Complications :

- Pain.
- Fever weight loss.
- May form an inguinal mass “psoas abscess”.
- Bone destruction.
- Tuberculousarthritis.
- Sinus tract formation.
- Amyloidosis.

INFECTIOUS ARTHRITIS

- Infectious arthritis is serious because it can cause rapid joint destruction and permanent deformities.
- Bacteria can seed joints during episodes of bacteremia.
- Articular structures can also become infected by direct inoculation or by contiguous spread from osteomyelitis or a soft tissue abscess.

Causal Agents :

- Virtually any bacteria can be, common agents :
  - **Haemophilus Influenzae** predominates in children under age 2 years.
  - ***S. aureus*** is the *main causative agent* in older children and adults
  - **Gonococcus** is prevalent during late adolescence and young adulthood.
  - Individuals with sickle cell disease are prone to infection with **Salmonella** at any age.

Risk Factors :

- Immune deficiencies
- Severe illness
- Joint trauma
- Chronic arthritis
- Intravenous drug abuse

Symptoms :

- Sudden development of acutely painful and swollen joint with restricted range of motion
- Systemic findings.

Sites :

Usually single joint *(knee, hip, shoulder)*

Micro *(under the microscope)* :

Neutrophils infiltration

TUBERCULOUS ARTHRITIS

- Insidious onset of chronic progressive arthritis, usually monoarticular in knee and hip; usually after osteomyelitis.
- Leads to fibrous ankylosis of joint with obliteration of joint space.
- Can detect from culture and examination of synovial fluid.
- PCR is sensitive.