Bone and Joints Infection

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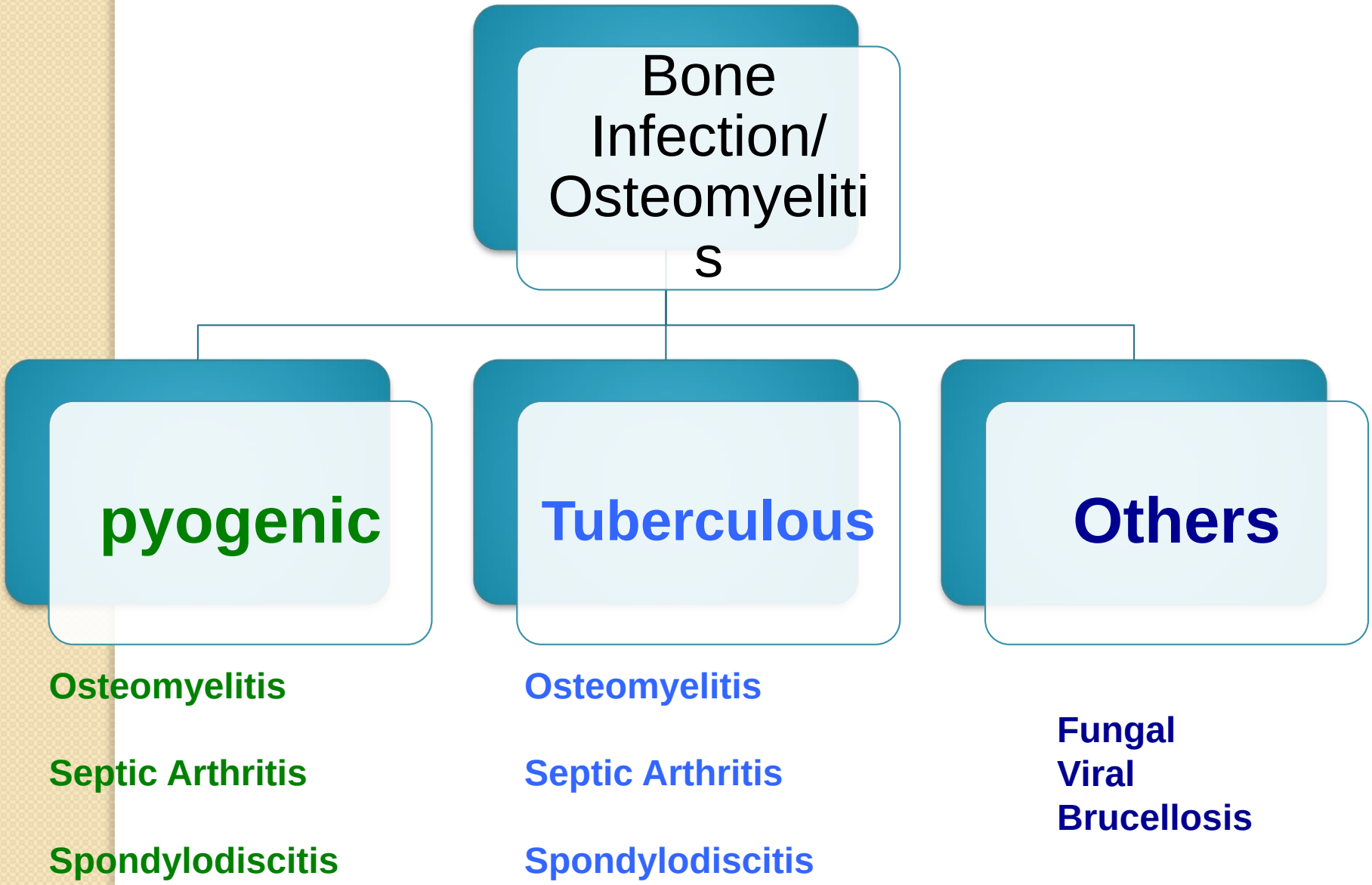
Bone & Joints Infections

- Sufficient number of virulent organisms overcome hosts natural defence.

Osteomyelitis

- The term osteomyelitis implies an **infection of bone and marrow**. (osteo-myelo-itis)
- Osteomyelitis most commonly results from bacterial infections, although fungi, parasites, and viruses can infect the bone and the marrow


Bone Infection/ Osteomyelitis
pyogenic
Tuberculous
Others
Osteomyelitis
Septic Arthritis
Spondylodiscitis
Osteomyelitis
Septic Arthritis
Spondylodiscitis
Fungal
Viral
Brucellosis

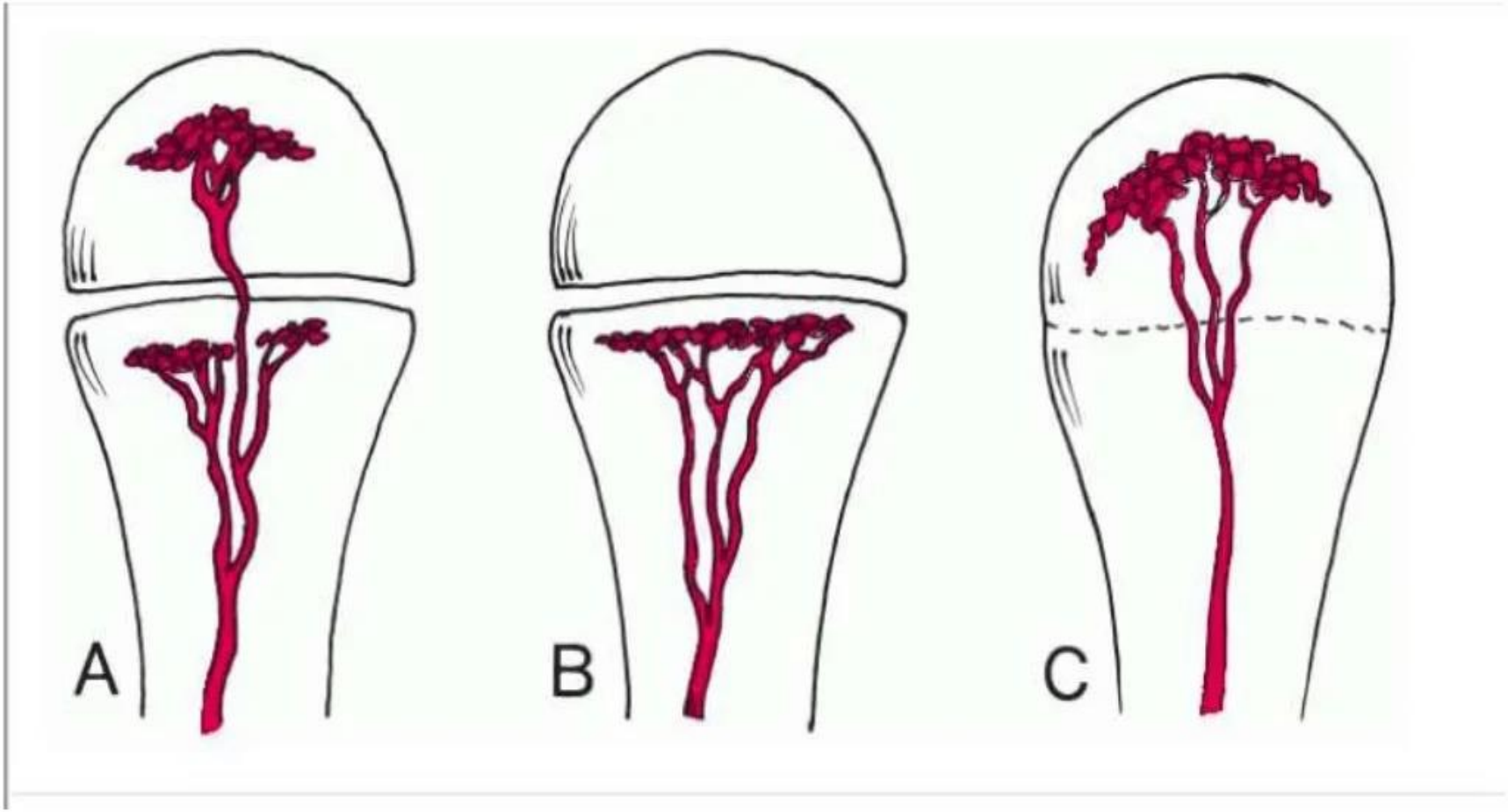
Osteomyelitis

Classification

- **Acute-** diagnosed within 2 weeks of onset of symptoms
- **Subacute-**Symptoms exceed 2 weeks duration
- **Chronic-** diagnosed months after the onset of symptoms

- All cases of osteomyelitis don't progress through each of these phases as well.

VASCULAR ANATOMY



- Younger than 2 years infection can spread to joints
- Older than 2 years the physis act as barrier to septic artheritis
- In adults spread is more common to vertebral bodies

Aetiology

Age group	common	uncommon	rare
Neonates	Grp.B streptococus Staph.aureus Enteric bacilli	Hemophilus influenza	candida
1mo-3yrs	Staph.aureus streptococci	H.Influenza pseudomonas	candida
>3yrs	Staph.aureus (80-90 %) Streptococci	• Salmonella (in sickle cell anemia) • Pseudomonas, E coli, Klebsiella (urinary tract infection)	candida

Prediction of Organism

- IV drug abusers Pseudomonas
- Chronically Ill patient Fungal infection
- Sickle Cell/SLE/Neonates Salmonella
- Sexually active adults N. Gonorroea

Diagnosis

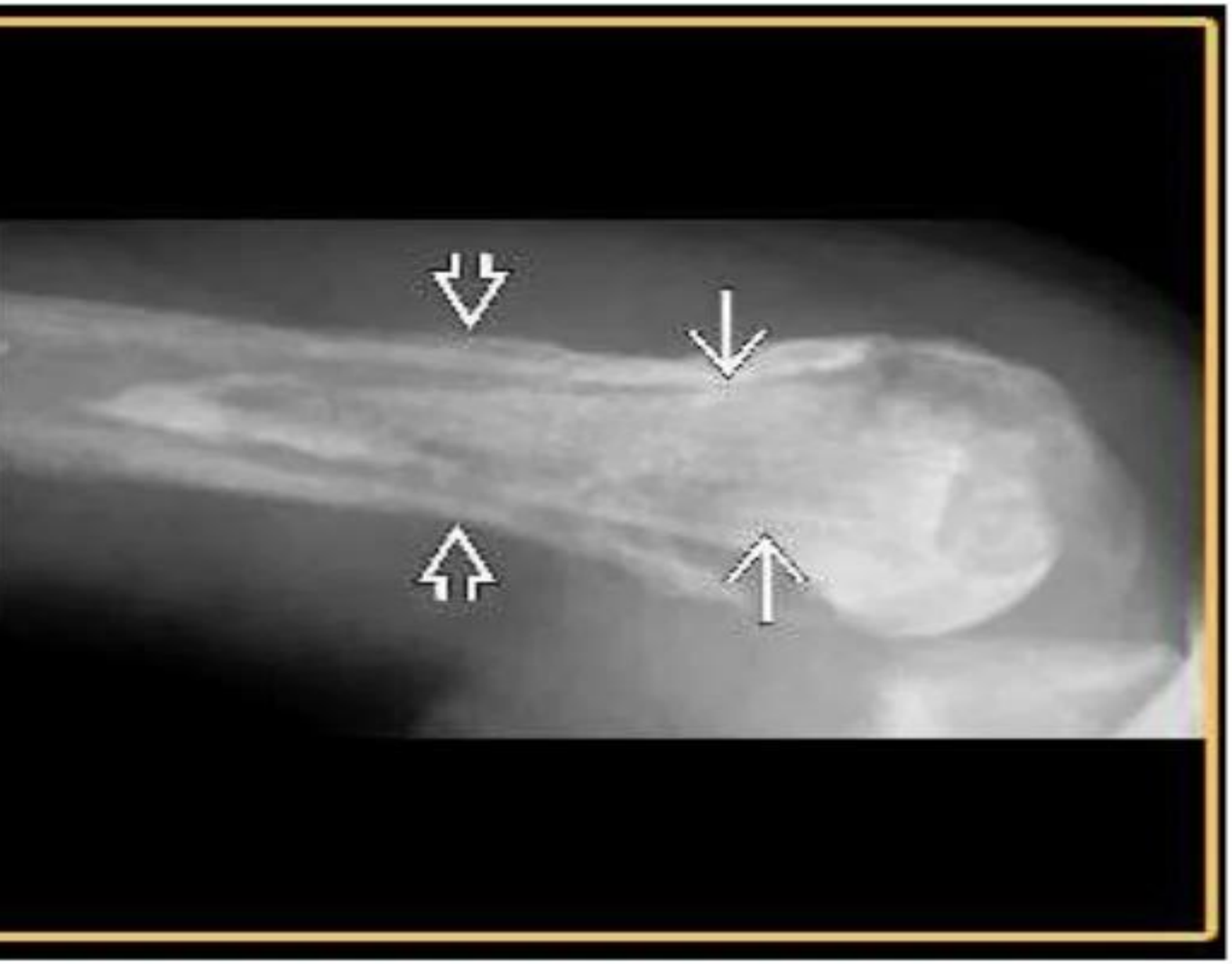
- Laboratory
  - Full blood count
  - ESR
  - CRP
  - Joint aspiration
  - Culture sensitivity
- Imaging
  - X ray
  - US Scan
  - MRI
  - CT Scan
  - Bone scan

Imaging modalities in osteomyelitis

- Plain radiography
- CT scan
- MRI
- Bone scan
- Ultrasonography
- Sinography
- Guided Biopsy

Plain radiography

- In the early stage of osteomyelitis, the findings on conventional radiography may be normal 5 to 7 days in children and 10 to 14 days in adults after the onset of infection
- A 30% to 50% loss of bone density must occur before a radiograph becomes abnormal.
- Soft-tissue changes are the earliest manifestations



Radionuclide scanning:

- Should precede plain film examination in suspected bone infection.
- Diagnosis can be confirmed as early as 48 hours after the onset of the disease, even if clinical signs are equivocal.
- This may help to initiate early aggressive treatment to prevent gross bone destruction.

CT scanning:

- Less value in the diagnosis in the acute infection
- Useful in subacute and chronic Osteomyelitis.
- Better evaluation of cortical bone, periosteum.
- CT – guided biopsy can be used to obtain material for culture.
- Demonstrate abnormalities earlier than conventional radiographs.
- It is superior to MRI for visualizing bony destruction, and a bony sequestration.

MRI

- Modality of choice in the diagnosis of musculoskeletal infection:
  - Marrow abnormality is more sensitive indicator of disease than lytic changes seen in radiography, and appears much earlier in the course of the disease.
  - Demonstrates osteomyelitis as early as isotope scanning
  - Ischemia and destruction of cortex and marrow edema may be identified
  - Subsequent soft tissue extension of pus through cloacae and para-osseous abscesses may be seen.

Ultrasonography

- In acute osteomyelitis, US changes are demonstrable 1 or 2 days after the onset of symptoms.
- Ultrasound excels as a fast and cheap examination of the soft tissues.
- USG guided aspiration of subperiosteal collection for bacterial culture.
- It has little direct role in the assessment of osteomyelitis, as it is unable to visualise within bone
- It does, however, have a role to play in the assessment of soft tissues and joints adjacent to infected bone, able to visualise soft tissue abscesses, cellulitis, subperiosteal collections and joint effusion

Bone Biopsy

- Aim:
  - To confirm the presence of infection and exclude tumor or other causes of radioloical lesion
  - To distinguish organism
  - To allow correct antibiotic treatment after appropriate sensitivities have been established
- Blood cultures are positive in approximately 50 per cent of patients with acute hematogenous osteomyelitis.
- Spine is the area more frequently biopsied.

ACUTE Osteomyelitis

- Define
- Clinical features:
  - High grade fever, pain, swelling , malaise, unwell, lethargic, TOXIC .
  - Localised signs of inflammation.
  - Joint immobilized. Painful to move
  - Unable to bear weight.

DIAGNOSIS

- LAB investigations:
  - TLC, ESR, CRP.

Radiological Investigations:

Xrays?

MRI?

Cultures?

Acute Pyogenic Osteomyelitis

Treatment

Surgical Drainage:

- Indications?
- Procedure?
- Drilling?

Antibiotics:

- Type?
- Route?
- When to start?
- When to stop
- Monitoring?

Acute Pyogenic Osteomyelitis

Complications

- Septicemia and metastatic abscesses
- Septic arthritis
- Growth disturbance (children)
- Pathological fracture
- Chronic osteomyelitis

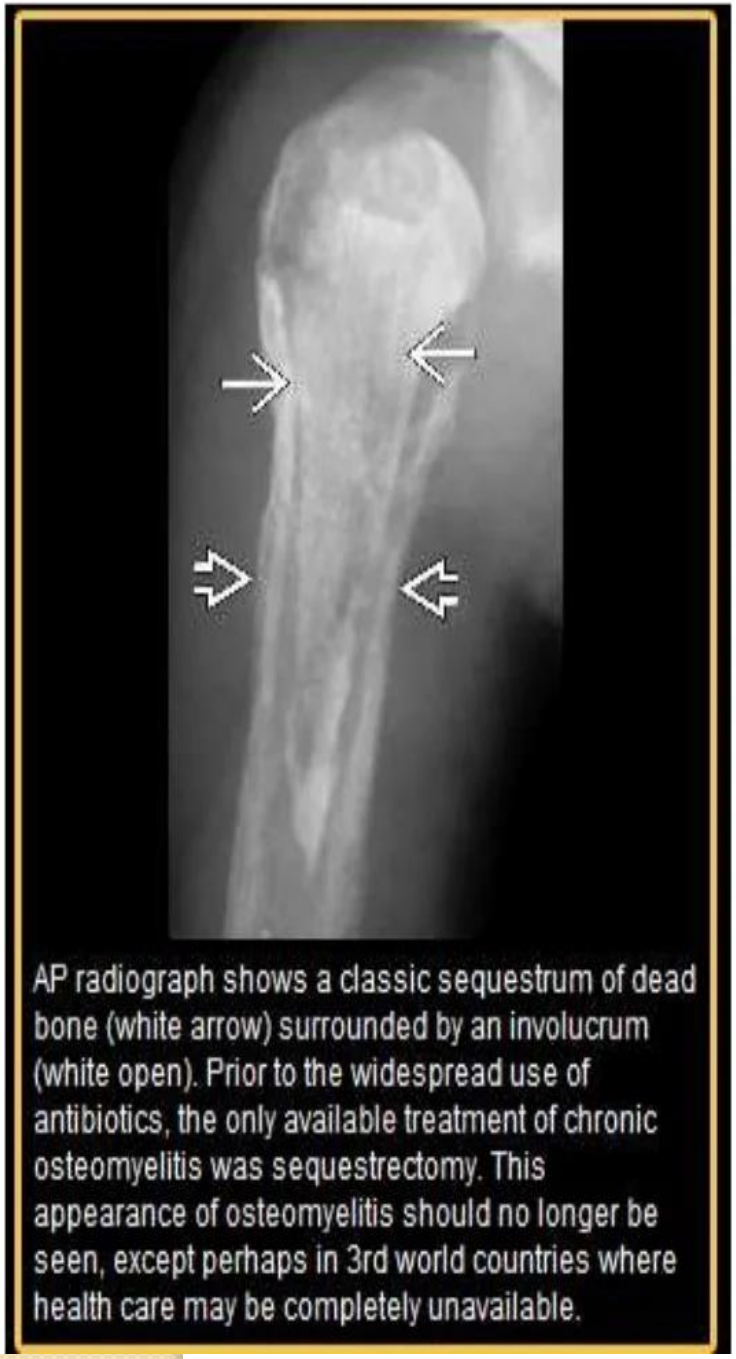
Subacute Osteomyelitis

- Longer history and less virulent organism
- Insidious onset, mild symptoms
- Pain is the most consistent symptom
- Usually no constitutional symptoms

Chronic Osteomyelitis

- Definition:
- Clinical Features:
  - Pain, fever, and tenderness during exacerbations.
- Hall Mark:
  - Chronic continuous or intermittent discharging sinuses.
  - Pathological fractures.
  - Sequestrum
  - cloaca

- **SEQUESTRUM:** Dead bone which is denser than the surrounding bone resulting from the cortical & medullary infarcts. It is the hallmark of active infectious process.
- **INVOLUCRUM:** Periosteal new bone which is formed in an attempt to wall off the infective process.
- **CLOACAE:** are defects in the involucrum which allow the continued discharge (decompression) of inflammatory products from the bone. Most frequently associated with chronic osteomyelitis.



AP radiograph shows a classic sequestrum of dead bone (white arrow) surrounded by an involucrum (white open). Prior to the widespread use of antibiotics, the only available treatment of chronic osteomyelitis was sequestrectomy. This appearance of osteomyelitis should no longer be seen, except perhaps in 3rd world countries where health care may be completely unavailable.

Chronic Osteomyelitis

Types

- A complication of Acute Osteomyelitis
- Post traumatic
- Post operative

Chronic Osteomyelitis

Organisms

- Usually mixed infection
- Mostly *Staph aureus, E. Coli, Strep pyogenes, Proteus*

CHRONIC OSTEOMYELITIS

- **FACTORS RESPONSIBLE FOR CHRONICITY-**

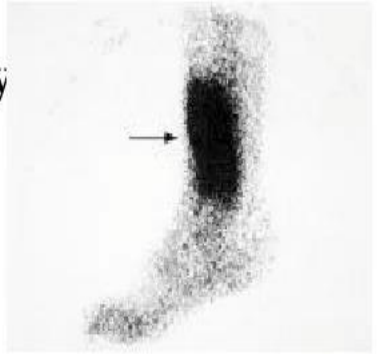
1) General factors: nutritional status, vascular disease, DM
2) Local factors: foreign body, sinus
3) Virulence of organism
4) Treatment: delayed, inadequate, inappropriate or non-compliance to treatment
5) Risk factors- prosthesis, penetrating trauma

Chronic Osteomyelitis

Investigations

- Lab tests
- Culture and sensitivity
- Biopsy
- Plain X-ray:

  Bone rarefaction surrounded by the dense sclerosis, sequestration and cavity formation



- Sinogram
- Bone scan and gallium scan

  To detect chronic multifocal osteomyelitis

- CT Scan and MRI

- Medical Management:
  - Antibiotics : 6 weeks.
- Surgical Management
  - Debridement/curretage
  - Sequestrectomy
  - Stabilization
  - Antibiotics according to culture sensitivity.
  - Management of deformities if any.

Chronic Osteomyelitis

Complications

- Recurrence and Recurrence and Recurrence
- Pathological fractures
- Growth disturbance
- Amyloid disease
- Epidermoid carcinoma of the fistula

Acute Septic Arthritis

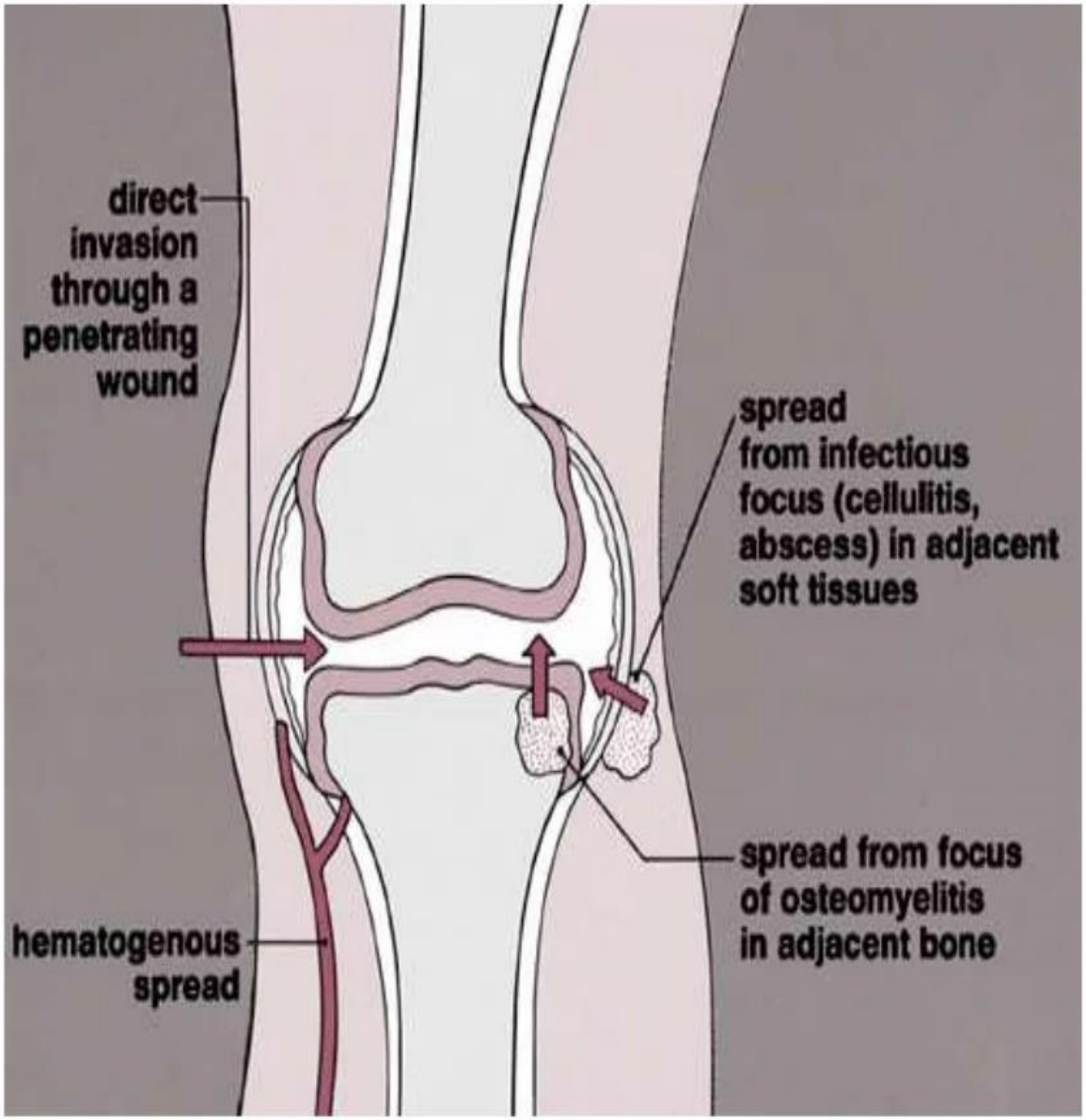
- Large joints
- 50% of cases in children <3 years
- The hip joint is the common site in <3years
- The knee joint is more common in older children

Acute Septic Arthritis

Organisms

- *Staphylococcus aureus*
- *Streptococcus pyogenes*
- *Escherichia coli*
- *Haemophilus influenzae*

ROUTES OF INFECTION



Clinical Feature

- Pain
- Red hot swollen joint
- Severe pain with movement
- Localized tenderness
- Constitutional symptoms.

Acute Septic Arthritis

Investigations

- Lab tests/ cultures
- Aspiration:

  If WBC >50,000 with >90% PMNLs suspect septic arthritis even if culture is negative
- Plain X-ray
- Bone scan and Gallium scan
- Ultrasound

MANAGEMENT

- Admit
- Fluid Resuscitation
- Analgesia
- Splinting in anatomical position
- Hx, Ex & Investigation
- Antibiotics
- Surgery:
  - Pus found
  - No improvement in 24-48 hours with Antibiotics.

TUBERCULAR INFECTIONS OF BONES AND JOINTS

Skeletal Tuberculosis

- Spine- 50%
- Arthritis- 30%
- Osteomyelitis- 19%
- Tenosynovitis/ Bursitis- 1%

Differences between tubercular and pyogenic arthritis

	Tuberculous arthritis	Pyogenic arthritis
Progression	Slow	Rapid
Bone erosion	Peripheral	Central
Joint space loss	Gradual	Early
Bony proliferation (sclerosis, periostitis)	more	Less
Ankylosis	fibrous	bony

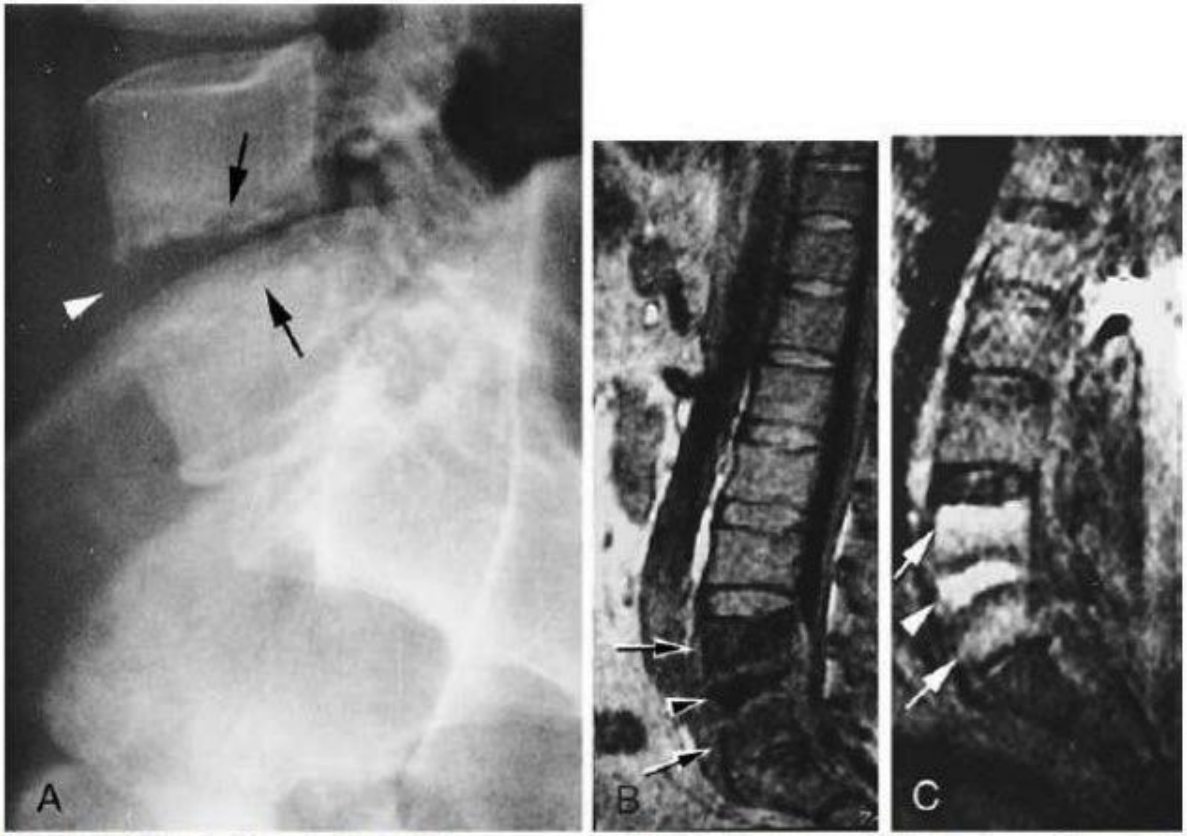


Figure 12-15 **LUMBAR SPINE INFECTION. A. Plain Film.** Note that at the L4–L5 interspace there is loss of disc space (*arrowhead*) and vertebral body endplates (*arrows*). **B. T1-Weighted MRI, Sagittal Lumbar.** Note that the signal is diffusely decreased (*blackened areas*) throughout the L4 and L5 vertebral bodies owing to marrow inflammation (*arrows*). The L4 intervertebral disc exhibits a low signal compared with adjacent discs (*arrowhead*). **C. T2-Weighted MRI, Sagittal Lumbar.** Note that on this study the signal throughout the L4 and L5 vertebral bodies is high (*whitened areas*), consistent with edema (*arrows*). Similarly, the L4 intervertebral disc is of high signal intensity owing to edema (*arrowhead*). *COMMENT:* These MRI findings are quite specific for disc infection: low signal on T1-weighted studies and high signal on T2-weighted studies. (Courtesy of Craig P. Church, DC, DACBR, Toledo, Ohio.)

THANK YOU