MSS
Paget disease and osteomyelitis

Dr. Eman Kreishan, M.D.

9-3-2026

Paget disease

- Chronic disease of bones with episodes of increased bone resorption (osteoclast activity, osteolytic phase)
  followed by excessive mixed osteoblast and osteoclast activity (mixed phase)
  leading to disordered, poorly formed bone with increased density (osteosclerotic phase) and increased likelihood of fractures .

- It affects individual over 40 with slight male predilection.
- Etiology : unknown, Occasionally hereditary influence is noted on chromosome 18q.

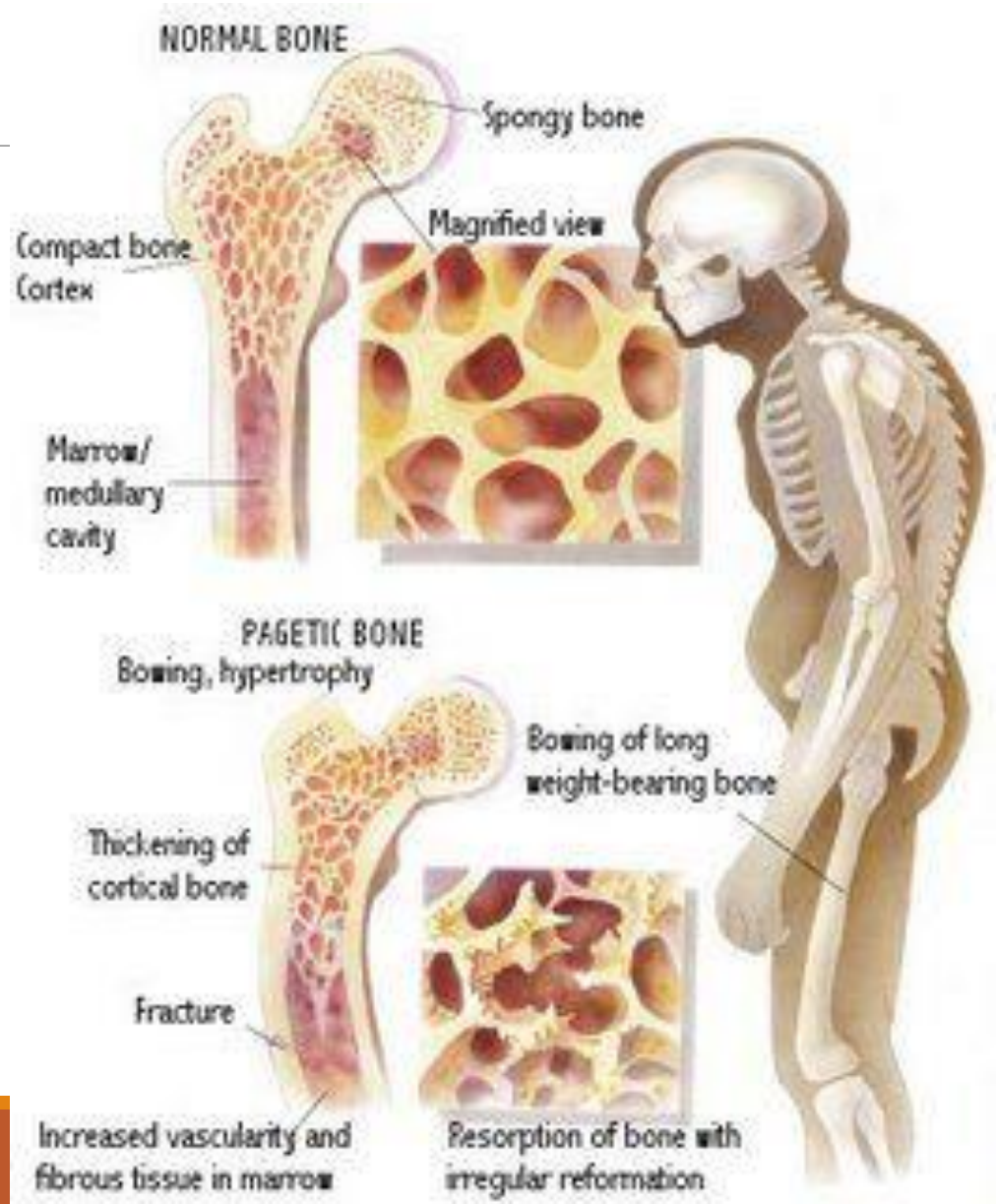
Sites

- Patients can present as polyostotic (multiple bones) or monostotic (one bone)
- Most common sites:
  - Spine and pelvis (30 - 75%)
  - Sacrum (30 - 60%)
  - Skull (25 - 65%)
  - Femur (25 - 25%)
- Rare in hands / feet, ribs, fibula

So Paget disease …..

Accelerated bone turnover making disordered bone.

Bone turnover rate increased as much as 20 times normal.



PATHOPHYSIOLOGY

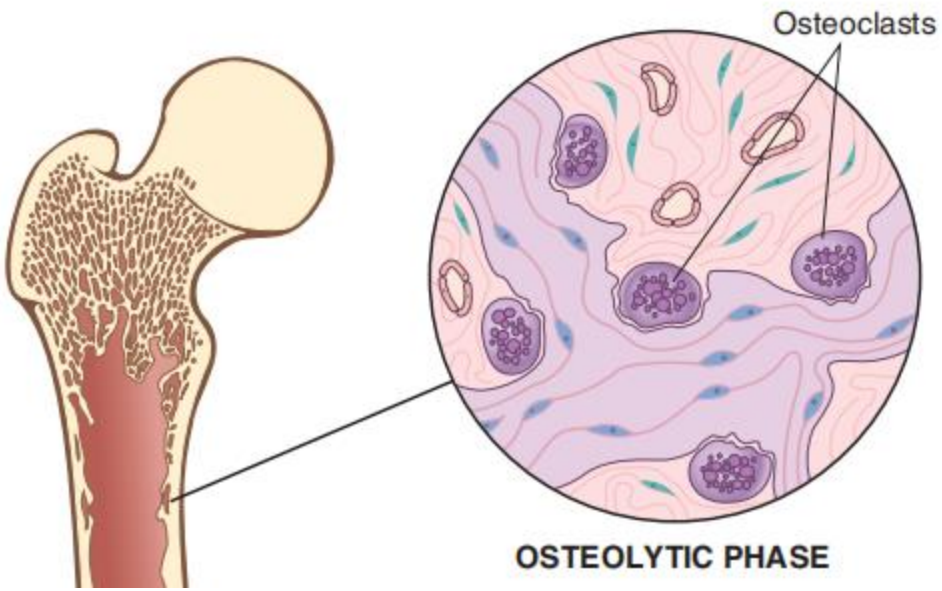
•Believed to be a disease of osteoclasts.

•Genetic and environmental problems can lead to disruption in osteoclast differentiation and activation.

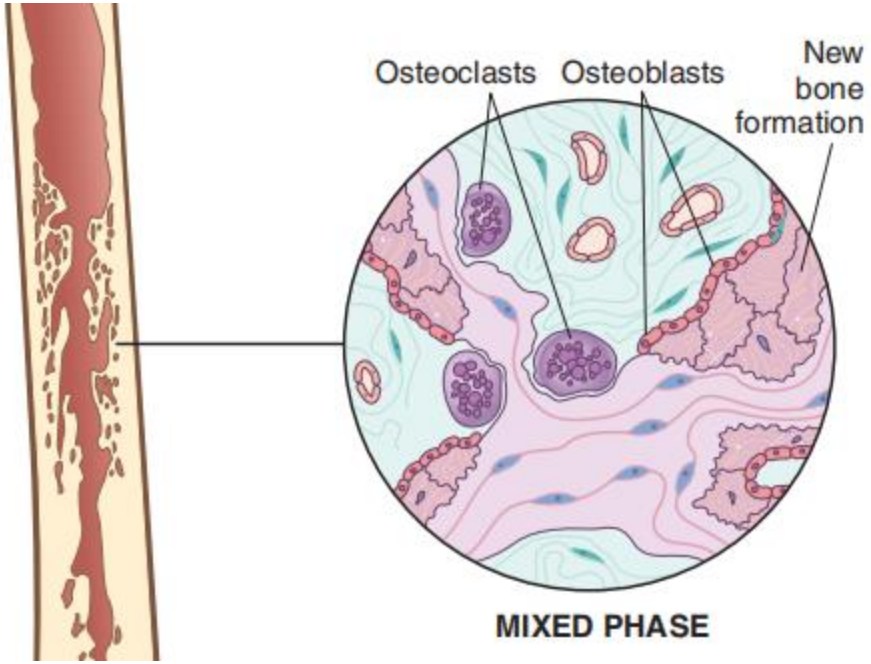
Phases

- Paget's disease histology progress through three phases:

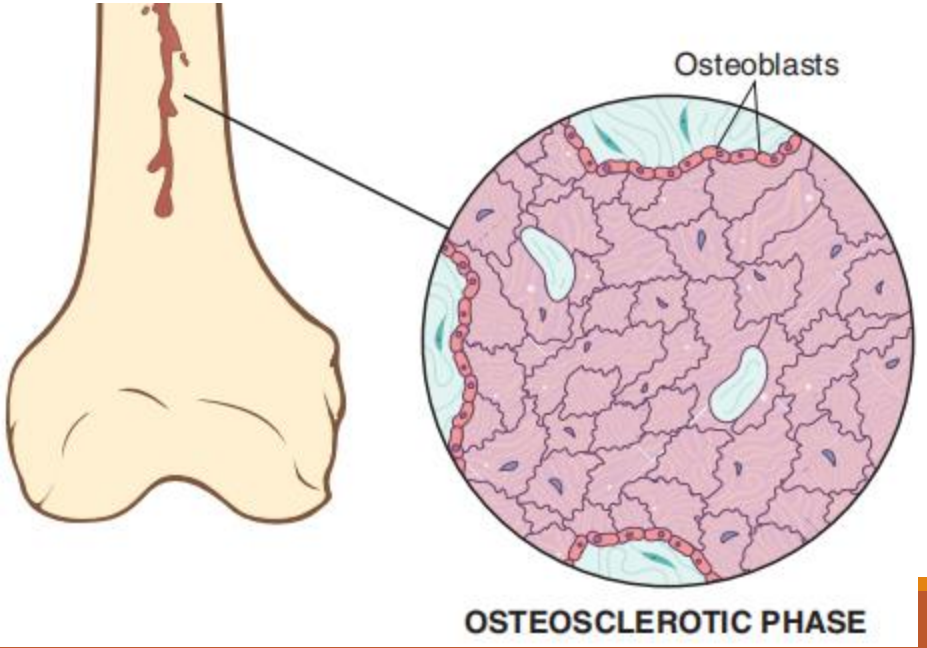
- At a given time, multiple stages of disease may be demonstrated in different skeletal regions of same patient.



osteocytic (early, acute phase).



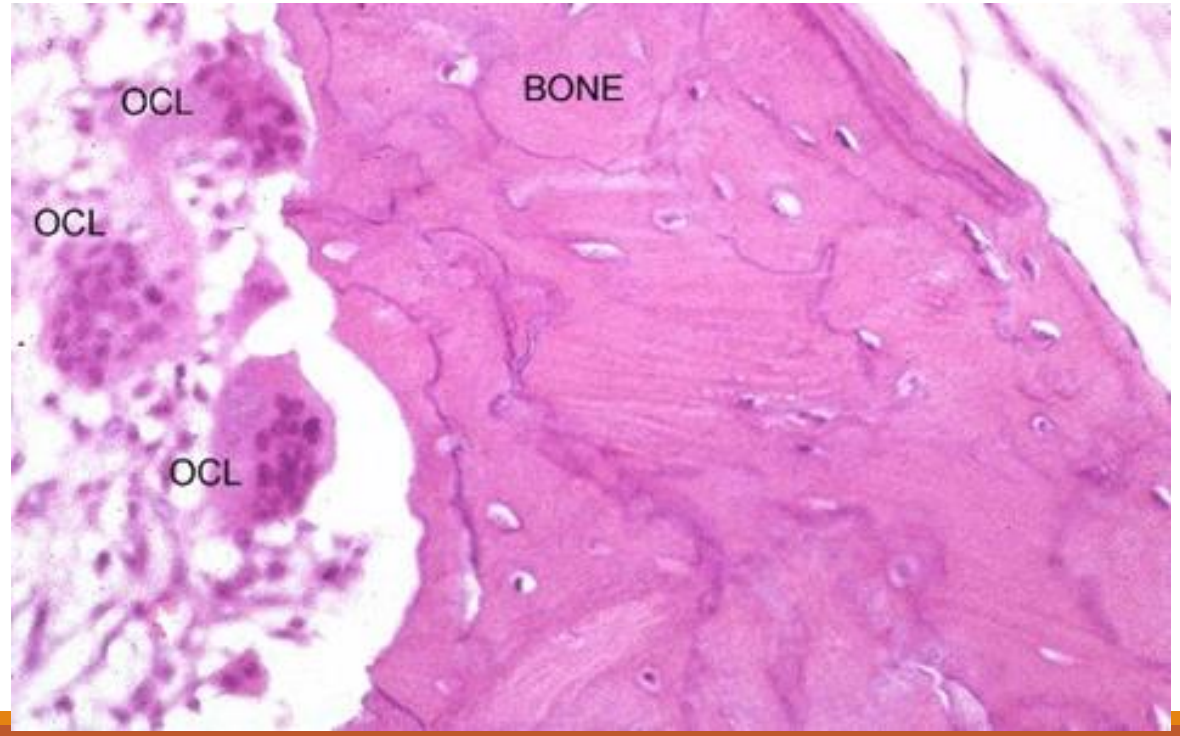
mixed osteolytic and osteoblastic (intermediate phase).



sclerotic phase (late, burnt-out).

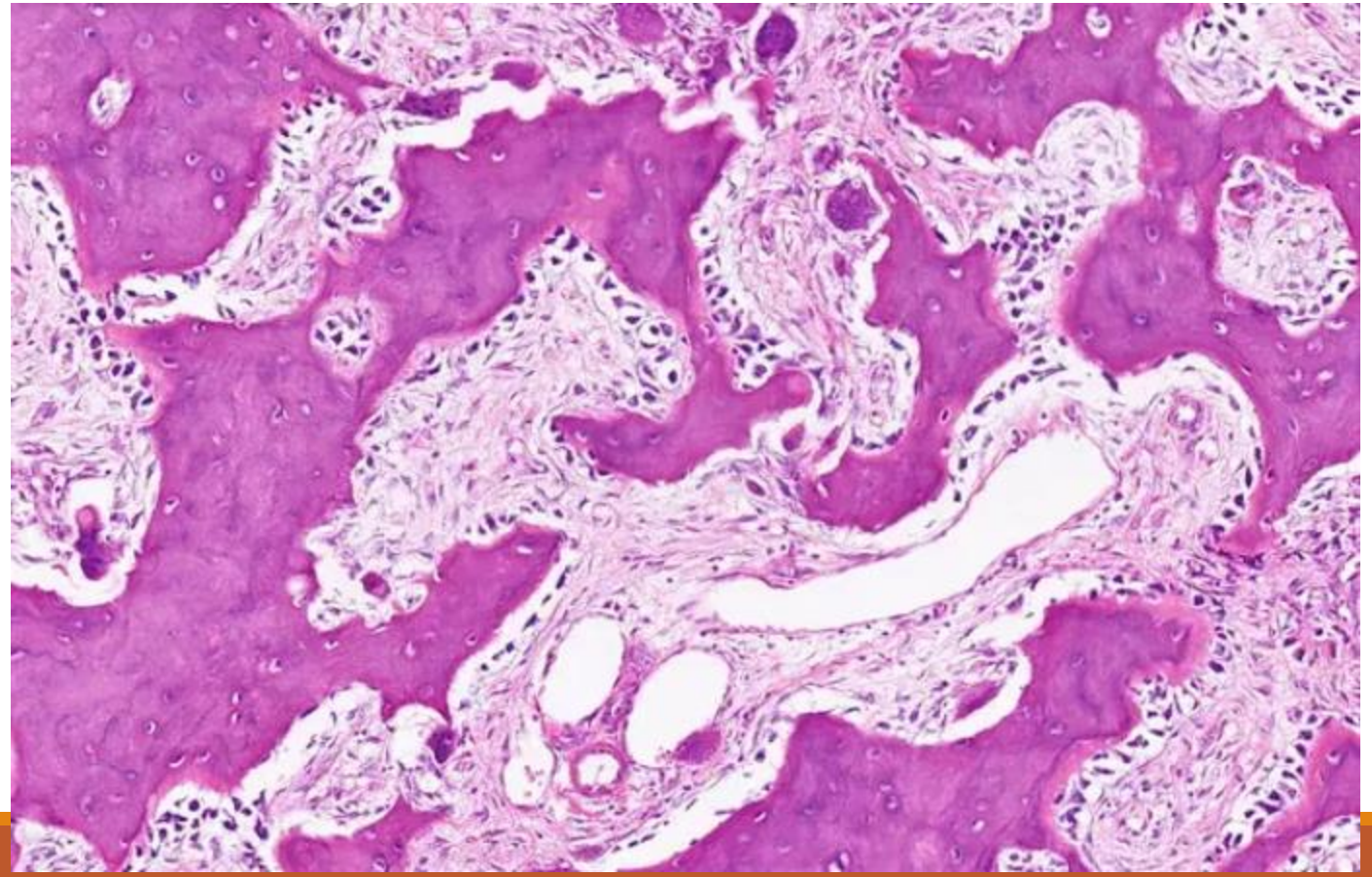
LYTIC PHASE

- Disease begins with lytic phase.
- The bone is resorbed by osteoclasts that are more numerous, larger and have more nuclei (up to 100).



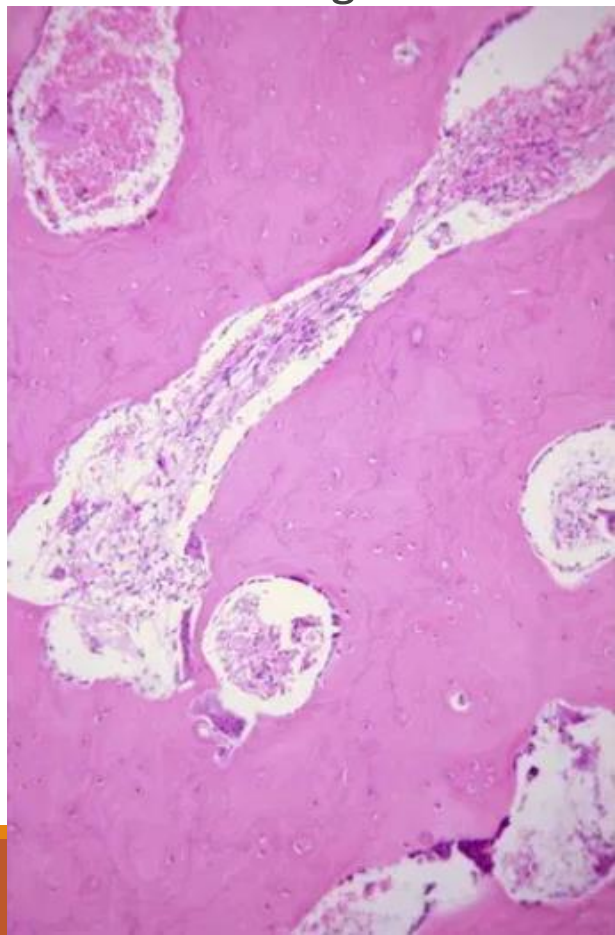
Mixed Lytic and Blastic phase

Rapid increase in bone formation from numerous osteoblasts.



Sclerotic Phase

The bone formation dominates and has a disorganized woven pattern and is weaker than normal bone. Woven pattern allows the bone marrow to be infiltrated by blood vessels leading to hyper vascular bone state.

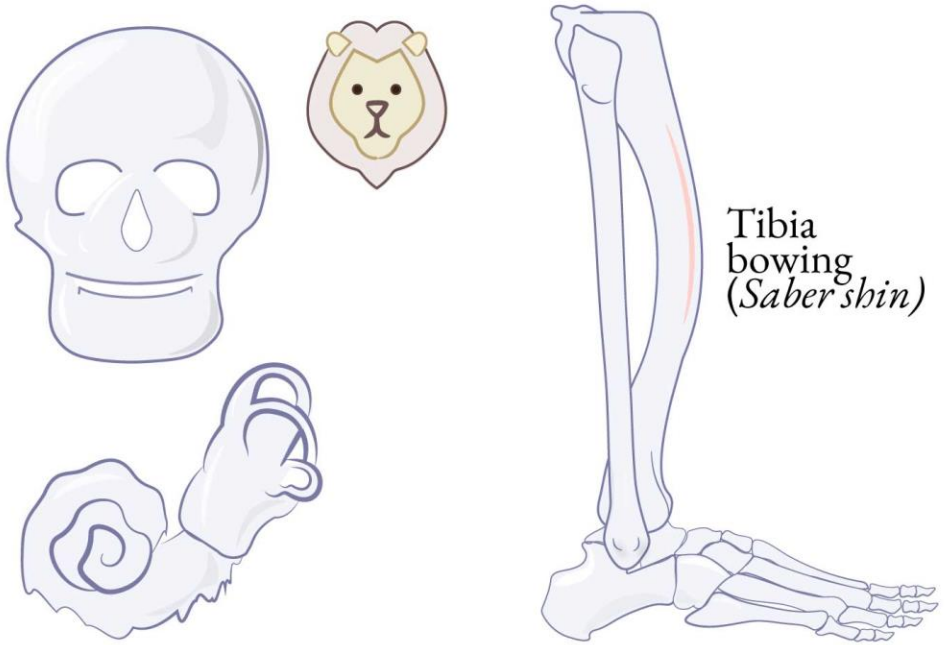


Clinical presentation

- Initial presentation is commonly after pathologic fracture or Incidental finding after imaging studies or serum alkaline phosphatase for other reasons

- Bone pain and deformities
- Bone overgrowth or deformity can cause osteoarthritis.

Paget's Disease (Osteitis Deformans)



BIG LIONS Have **H**eart failure

Bone pain
Increased bone density
Giant osteoclasts

Lion face
Increased Alk phos.
Osteolytic/sclerotic X-Ray
Nerve compression
Saber shin

Hearing loss
Heart failure (high-output)

Complications

- Neurological complications – nerve root compression.
- Skull involvement- deafness and basilar invagination cranial nerve disorders.
- Sarcomatous degeneration – Osteosarcoma.
- Increased bone vascularity – high output cardiac failure.

Investigations

- Serum Alkaline phosphatase will be increased.
- Serum calcium and phosphate levels will be normal.
- X-RAYS: Long bones (bowing thickening of cortex).

TREATMENT

- At this time there is no cure for Paget's disease, therefore treatment is designed to control the symptoms and prevent complications.

- Goals of treatment:
  - Suppression of Active disease.
  - Relief of Pain Prevention of Deformity and fractures.
  - High output cardiac dysfunction.
  - Reducing the Sarcomatous transformation

Osteomyelitis

severe persistent infection of bone and bone marrow .

Types of osteomyelitis:

1. Post traumatic osteomyelitis: (47% cases)
2. Osteomyelitis due to vascular insufficiency: (34% cases)
3. Osteomyelitis due to hematogenous spread: (19%)
4. Osteomyelitis post infection of prosthetic joints

Classification

Acute osteomyelitis:	**Childhood osteomyelitis: long bones of the legs and upper arms.**	**Pyogenic osteomyelitis**
Chronic osteomyelitis:	**Adults osteomyelitis: bones of the vertebrae.**	**Tuberculous osteomyelitis**

Pathogenesis

Bacteria form a biofilm
in the metaphysis **(primary focus)**

Biofilms protect bacteria
from host immune response

Abscess in metaphysis

Sub periosteal abscess

Sequestrum formation (bone deat

Involucrum formation
(New brittle bone formation)

Pus perforates periosteum
and forms **abscess in soft** tissues

Factors affecting pathogenesis

1. Virulence of the infecting .
2. Underlying disease.
3. Immune status of the host.
4. Type, location and vascularity of the bone.
5. **Factors that compromise bone integrity**: • Trauma • Surgery • Presence of foreign bodies • Placement of prostheses Leads to the onset of bone infection

Chronic osteomyelitis

- Longstanding infection of bone lasting months to years; characterized by low grade inflammation and presence of dead bone or fistulous tract.

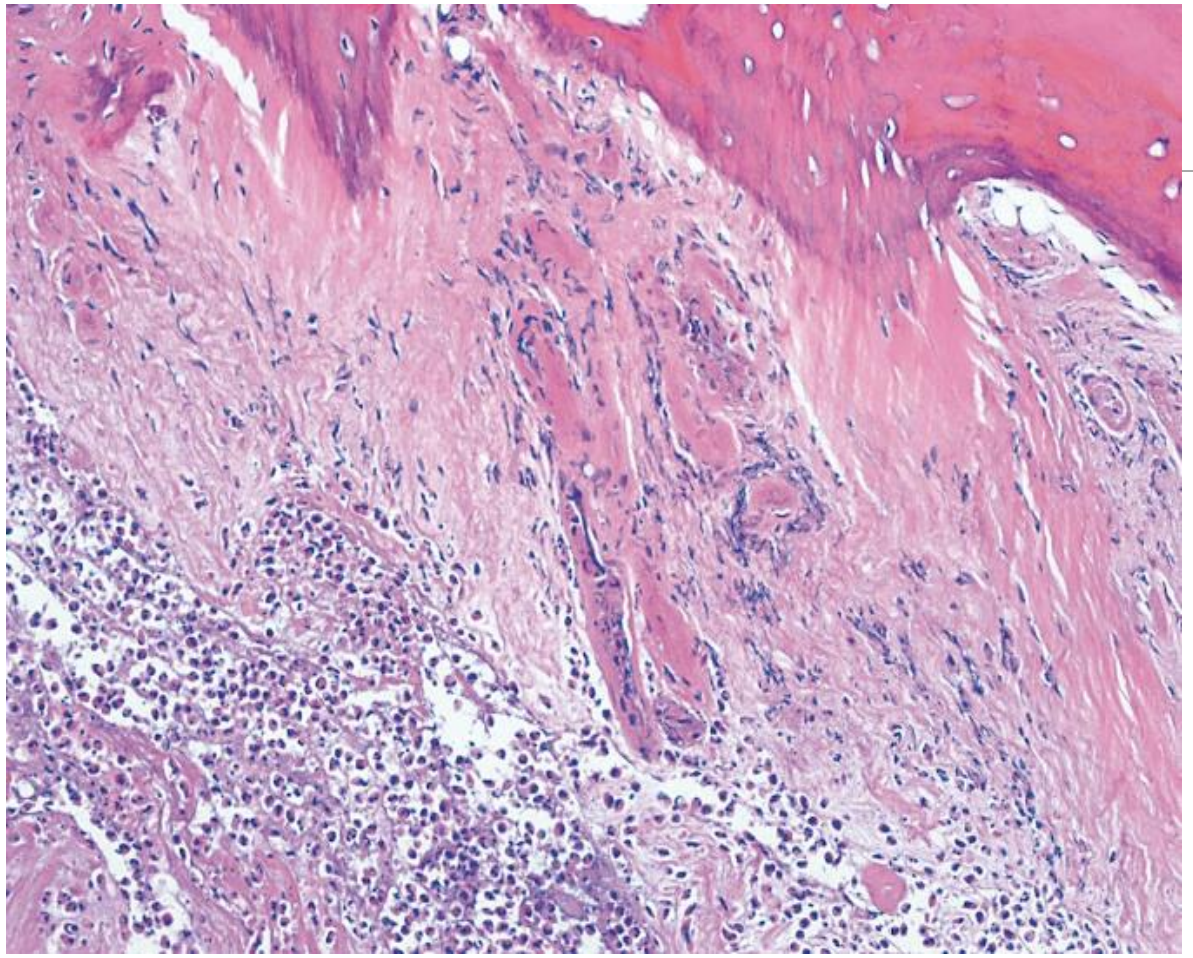
- The infected foci within the bone are surrounded by sclerotic, relatively avascular bone covered by a thickened periosteum and scarred muscle and subcutaneous tissue.

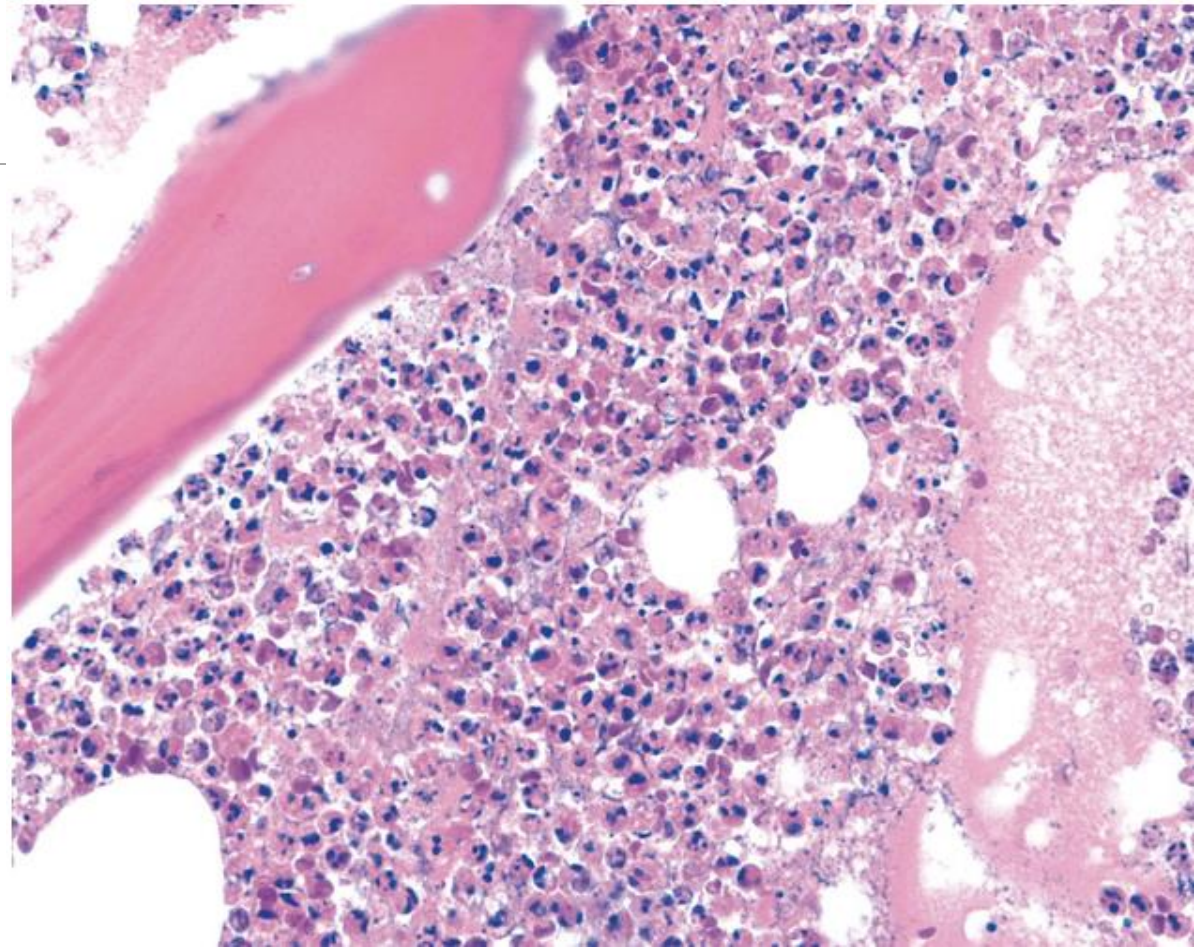
- This avascular envelope of scar tissue leaves systemic antibiotics essentially ineffective.

Factors leading to chronic osteomyelitis

- Trauma
- Diabetes
- Prosthetic orthopaedic device
- Peripheral vascular disease
- Chronic joint pain
- i/v drug abuse
- Immunosuppression
- Alcoholism

Microscopic (histologic) description





- Inflammatory infiltrate rich in plasma cells
- Fibrosis, variable
- Granulomas, in cases of tuberculosis or fungal infection

Etiology

- Penetrating wound, open fracture: ***Staphylococcus aureus***
- In dwelling prosthetic device: ***Staphylococcus epidermidis***
- Intravenous drug users: ***Pseudomonal infections.***
- Gastrointestinal or genitourinary infections: ***Escherichia coli* & others**
- Tooth abscess, gingival disease, dental extraction: ***Streptococcus viridans***
- Mycobacterium tuberculosis: **Bone tuberculosis**
- Sickle cell disease: ***Salmonella* species** in the West

  Staphylococcus aureus in Middle East &Africa

Clinical presentation

- Fever, chills, irritability, fatigue.
- Tenderness, redness, and warmth in the area of the infection.
- Swelling around the affected bone.
- Lost range of motion.
- The symptoms for acute and chronic osteomyelitis are very similar

Osteomyelitis complications

1. **Bone death (osteonecrosis):** An infection can impede blood circulation within the bone, leading to bone death.
2. **Septic arthritis:** In some cases, infection within bones can spread into a nearby joint.
3. **Impaired growth:** In children, the most common location for osteomyelitis is in the softer areas, called growth plates, at either end of the long bones of the arms and legs. Normal growth may be interrupted in infected bones.
4. **Skin cancer:** If osteomyelitis has resulted in an open sore that is draining pus, the surrounding skin is at higher risk of developing squamous cell cancer

Treatment

Surgery to remove dead bone (sequestrum)

Antibiotics.