

Lecture

4

FRACTURES #:

- **Loss of bone integrity from mechanical injury &/or diminished bone strength**
- **Most common pathology of bone:**
 - **Simple #: skin is intact**
 - **Compound #: communicates with overlying skin**
 - **Displaced #: ends are not aligned**
 - **Stress #: repetitive slowly progressive**
 - **Greenstick #: soft bone fracture**
 - **Pathologic #: bone abnormal (tumor)**

Types of Bone Fractures



Transverse



Linear



Nondisplaced



Displaced,
Compound



Spiral



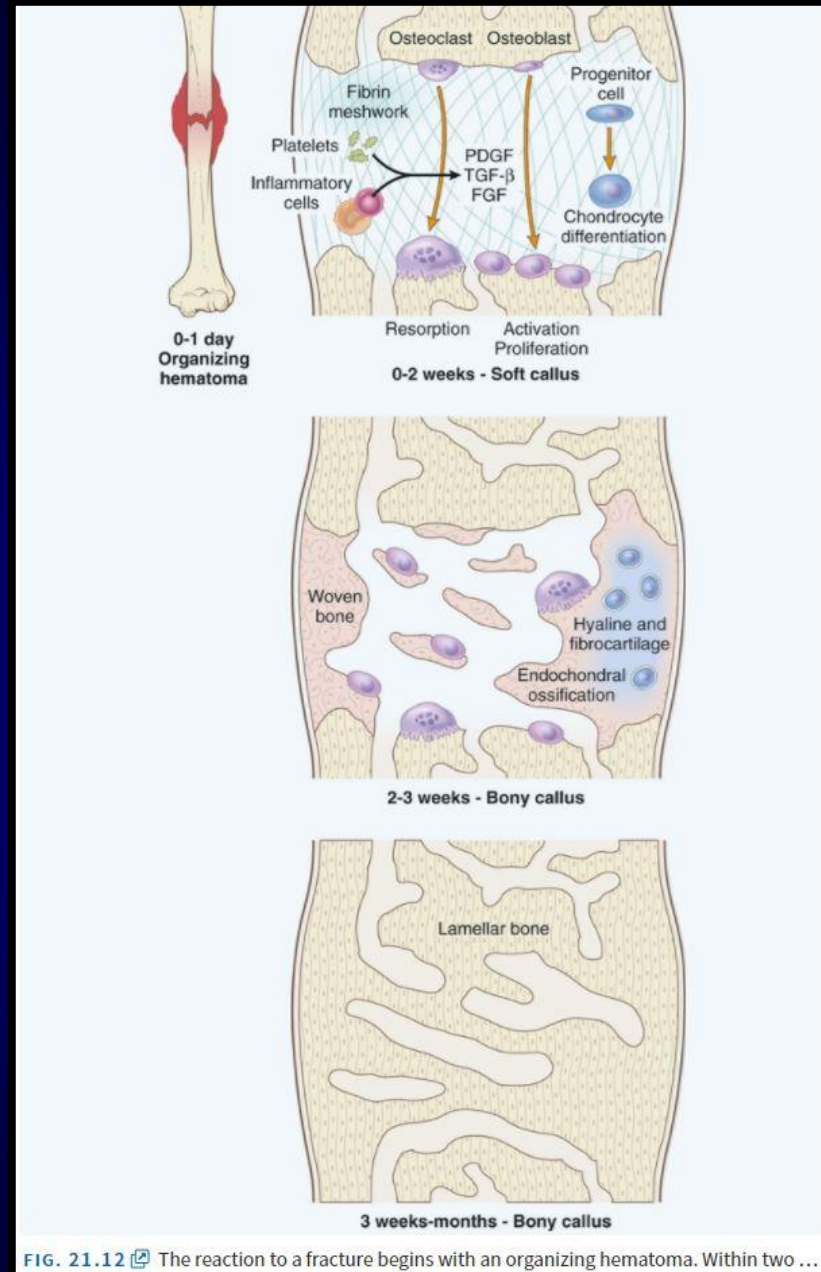
Greenstick



Comminuted

FACTORS IMPACTING PROPER HEALING:

- Displaced and comminuted #s
- Inadequate immobilization (delayed union or nonunion)
- Pseudoarthrosis
- Infection (open #s)
- Malnutrition
- Steroids/AIDrugs



OSTEONECROSIS (AVASCULAR NECROSIS)

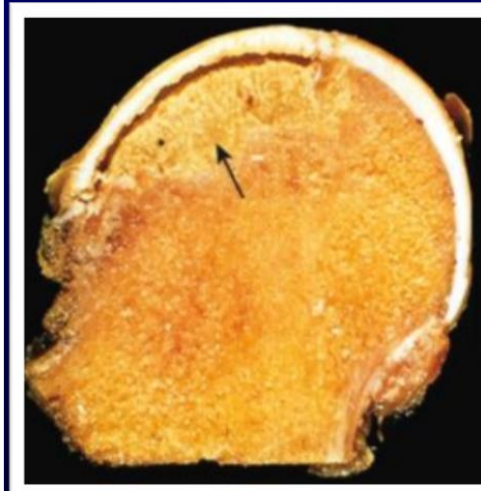
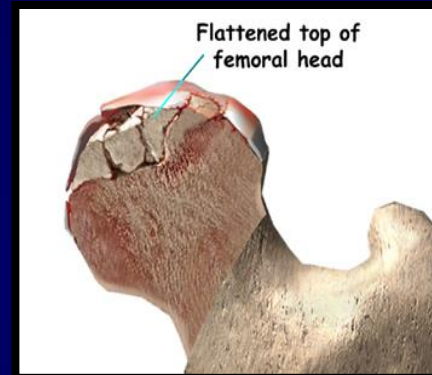
Infarction (ischemic necrosis) of bone and marrow

ASSOCIATED CONDITIONS:

- Vascular injury: trauma, vasculitis
- Drugs: steroids
- Systemic disease: Sickle
- Radiation

MECHANISM:

- Mechanical disruption
- Thrombotic occlusion
- Extravascular compression



OSTEOMYELITIS:

- Inflammation of bone/marrow due to infection
- Part of systemic infection or primary solitary focus (much more common)
- Any organism can cause osteomyelitis
- Pyogenic osteomyelitis: bacteria; *staph. aureus* (80-90%). *E. Coli*, *Pseudomonas* & *Klebsiella* are more common when UTI or IV drug abuse are present

PYOGENIC OSTEOMYELITIS:

- **Mechanism:** 1. Hematogenous spread (children). 2. Extension from contiguous site (adults, diabetic foot). 3. Direct implantation after compound # or orthopedic procedure
- **Neonates:** *Haemophilus influenzae* & *Group B strept*
- **Sicklers:** *Salmonella*
- **50% of cases:** no organisms isolated
- **Long bones:** metaphysis & epiphysis in adults; in children: epiphysis or metaphysis (not both)

PATHOLOGY

These are end-artery branches of the nutrient artery

acute inflammatory response due to infection

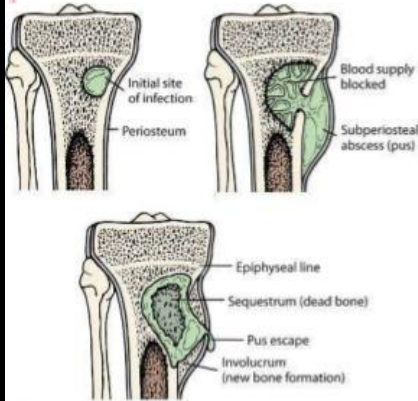
tissue necrosis, breakdown of bone

Obstruction

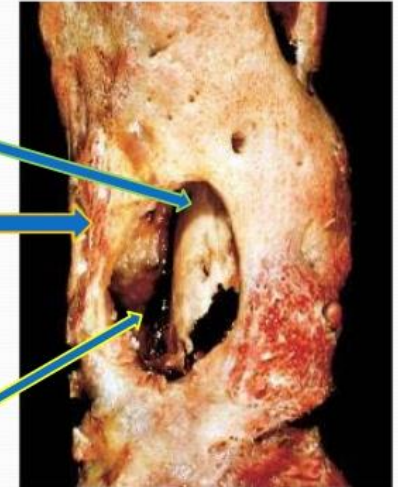
Avascular necrosis of bone

Squestra formation

Chronic osteomyelitis



- **Sequestrum** is the necrotic bone that is embedded in the pus/infected granulation tissue.
- **Involucrum** is the new bone laid down by the periosteum that surrounds the sequestra.
- **Cloaca** is the opening in the involucrum through which pus & sequestra make their way out.



Acute inflammation of marrow tissues

Spread of exudate along the marrow spaces

Thrombosis of vessels due to compression

Necrosis of bone

Liquefaction of necrotic tissues

Lifting of periosteum causing further necrosis

Finally ,Osteoclastic activity >>> SEQUESTRUM

ACUTE

PUS & NEUTROPHILS

CHRONIC

LYMPHOCYTES AND PLASMA CELLS

OSTEOMYELITIS

CLINICALLY:

- **Hematogenous OM: fever, malaise, chills, leukocytosis, throbbing pain locally**
- **Infants: subtle. Adults: local pain**
- **DX: high index of suspicion; X-ray maybe normal in early phases (should not wait till we see x ray lytic changes)**
- **Tx: admission, IV antibiotics and sometimes surgical drainage of pus**

CHRONIC OSTEOMYELITIS:

- 5-25% of Acute OM persists as chronic OM
- Very bad debilitating disease

Causes:

- Delay in diagnosis
- Extensive necrosis
- Inadequate therapy (A. biotics or surgery)
- Weakened host immunity

COMPLICATIONS OF CH. OM:

- Pathologic #s
- Secondary amyloidosis
- Endocarditis
- Sepsis
- SQ. cell Ca of draining sinus
- Sarcoma of bone

MYCOBACTERIAL OSTEOMYELITIS:

- **Used to be a disease of developing countries**
- **Now: more cases in developed countries: immigration and immunocompromised pts**
- **1-3% of pts with pulmonary or extrapulm TB: can have bone involvement**
- **Hematogenous or direct spread**
- **Clinically: maybe subtle and chronic course**
- **Pathology: necrotizing (caseating) granulomas**

TB SPONDYLITIS (POTT DISEASE):

- Destructive spine TB
- Difficult to treat
- May lead to #s, neurologic deficit, scoliosis, kyphosis

