

Introduction to Orthopedic

Dr. Belal Al-zu'bi

Assistant Professor, Mutah University
Orthopedic Sports Medicine, Arthroscopy,
Foot and Ankle

Bone Histology

Bone consists of :

1. Cells:

osteoblasts

osteoclasts (from monocyte/macrophage cell lineage)

osteocytes

2. Extracellular matrix:

A. Organic (35%) collagen fibers

B. Inorganic (65%) hydroxyapatite

Bone can be classified based on both anatomy and structure

Anatomic

1. Long bones
2. Short bones
3. Flat bones
4. Sesamoid bones
5. Irregular bones

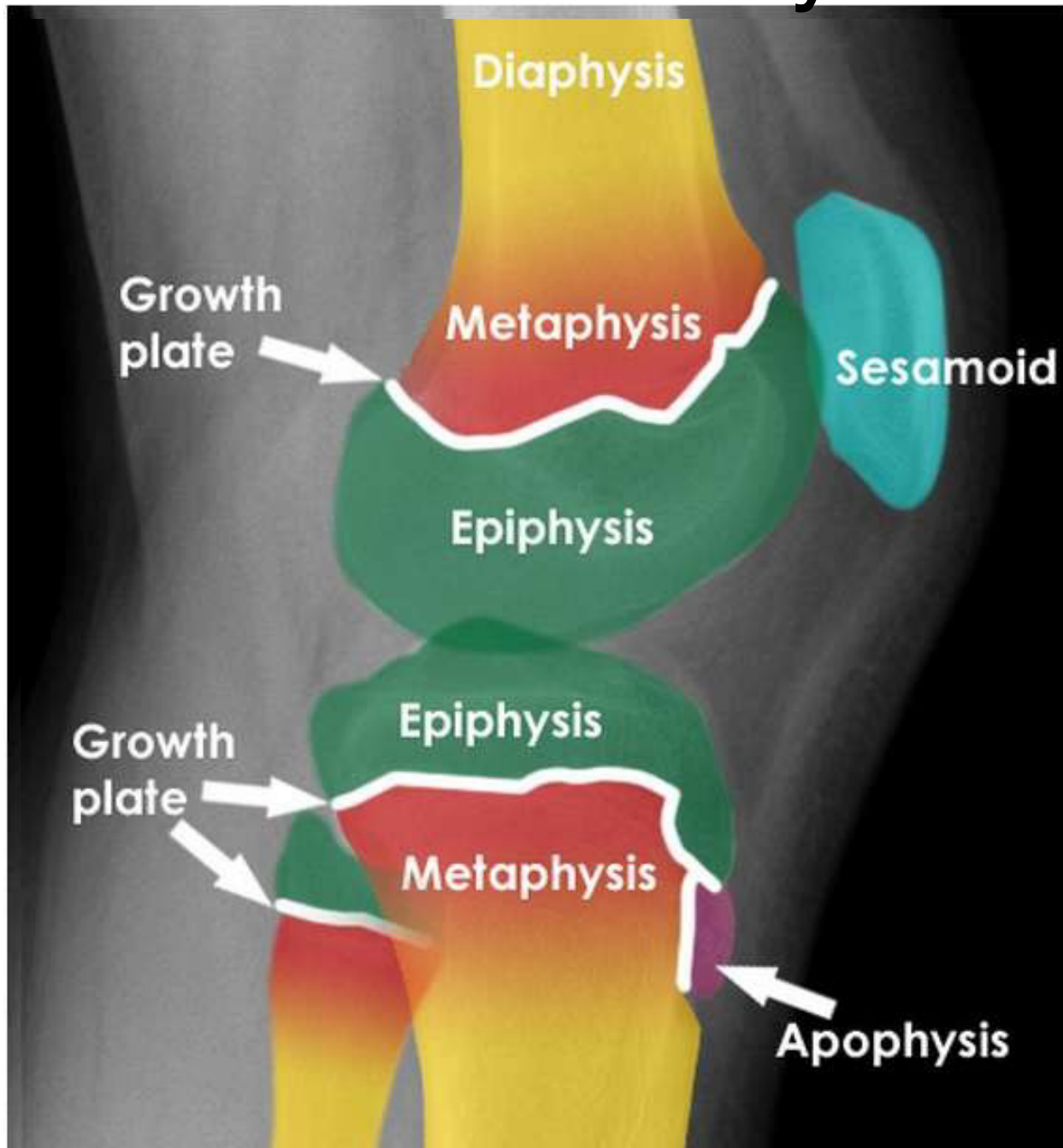
Structure

- Macroscopic level
 1. Cortical
 2. Cancellous
- Microscopic level
 3. Lamellar
 4. Woven bone

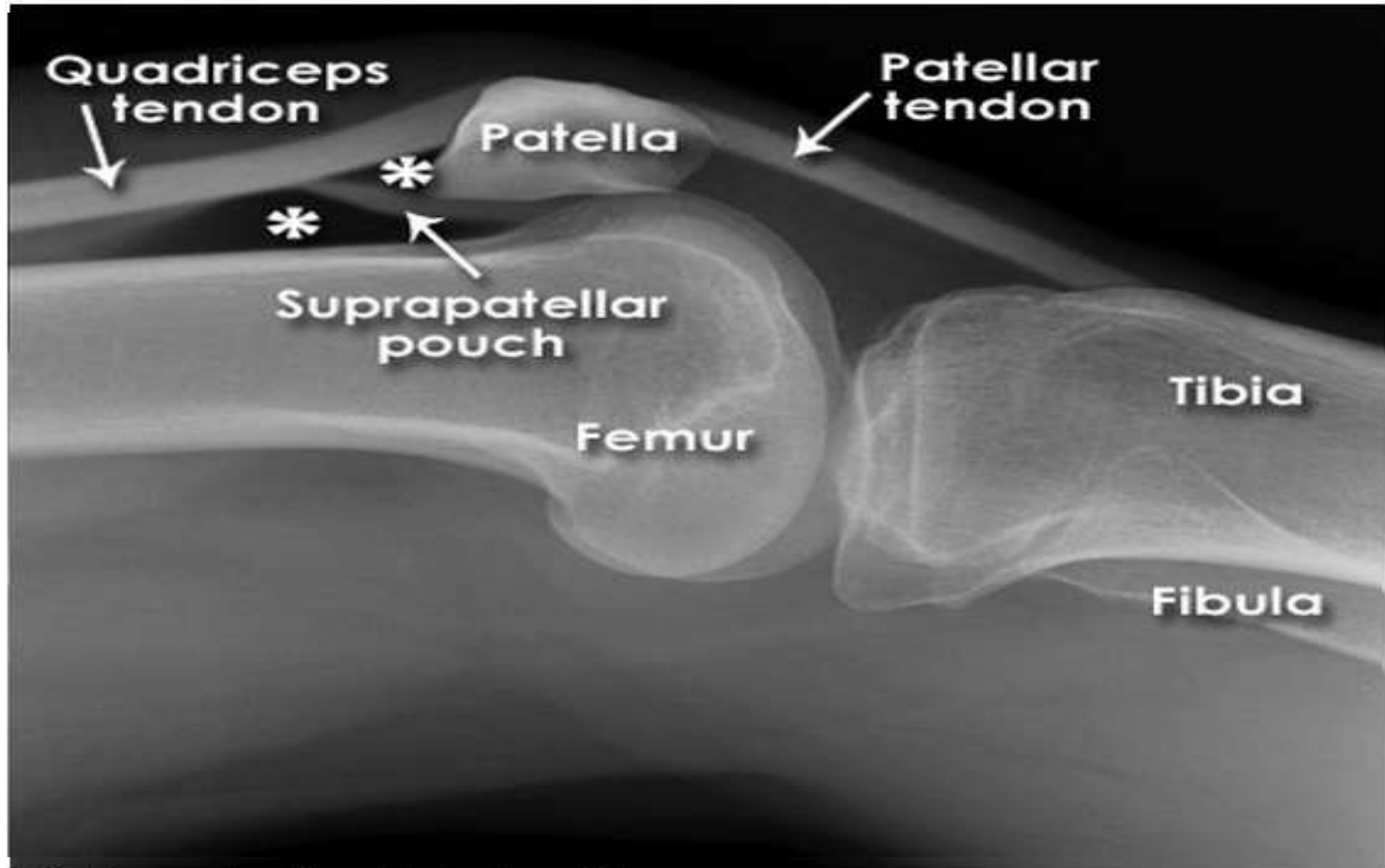
Types of Bone

- Lamellar Bone
 - Collagen fibers arranged in parallel layers
 - Normal adult bone
- Woven Bone (non-lamellar)
 - Randomly oriented collagen fibers
 - In adults, seen at sites of fracture healing, tendon or ligament attachment and in pathological conditions

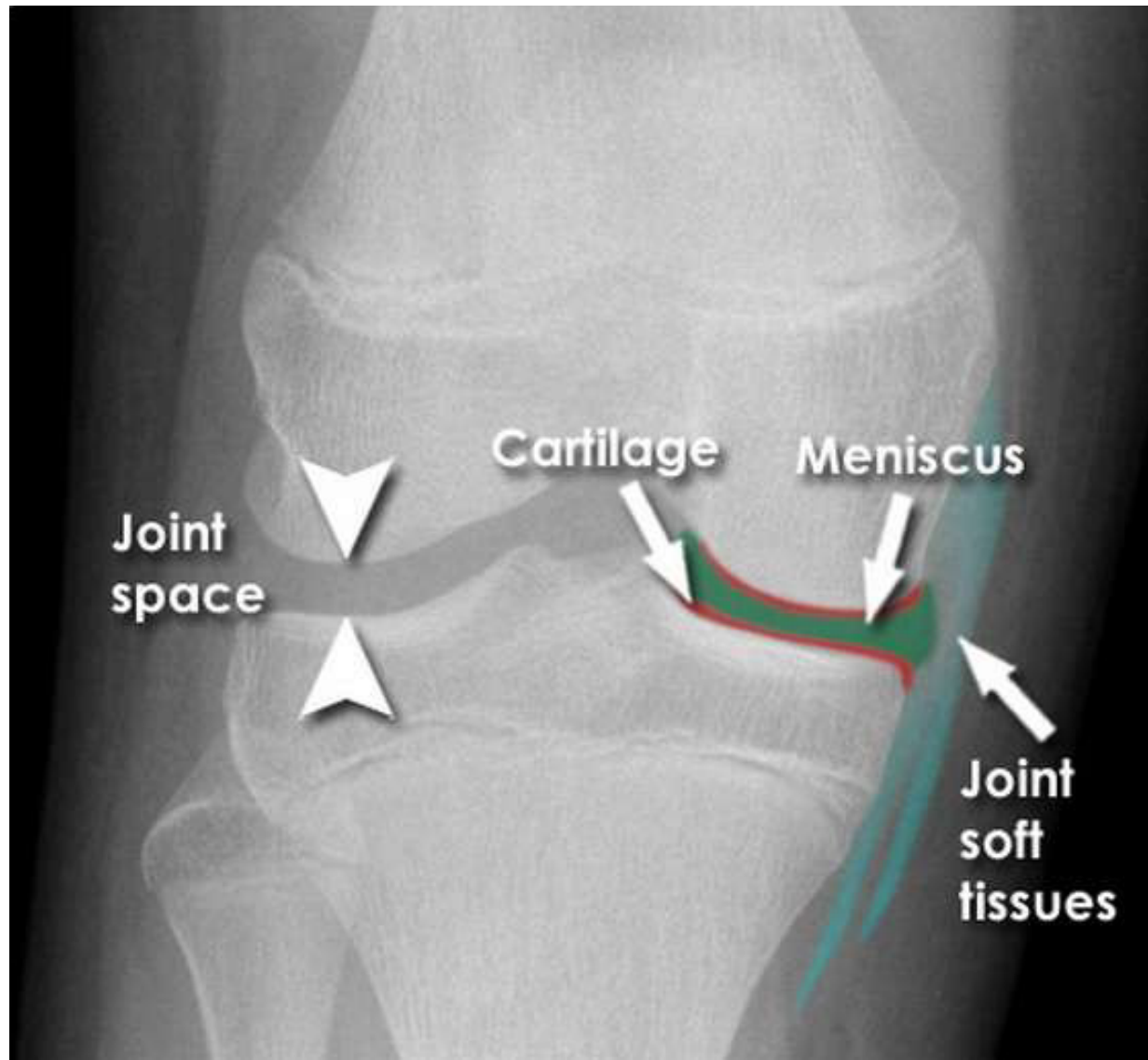
Bone Anatomy



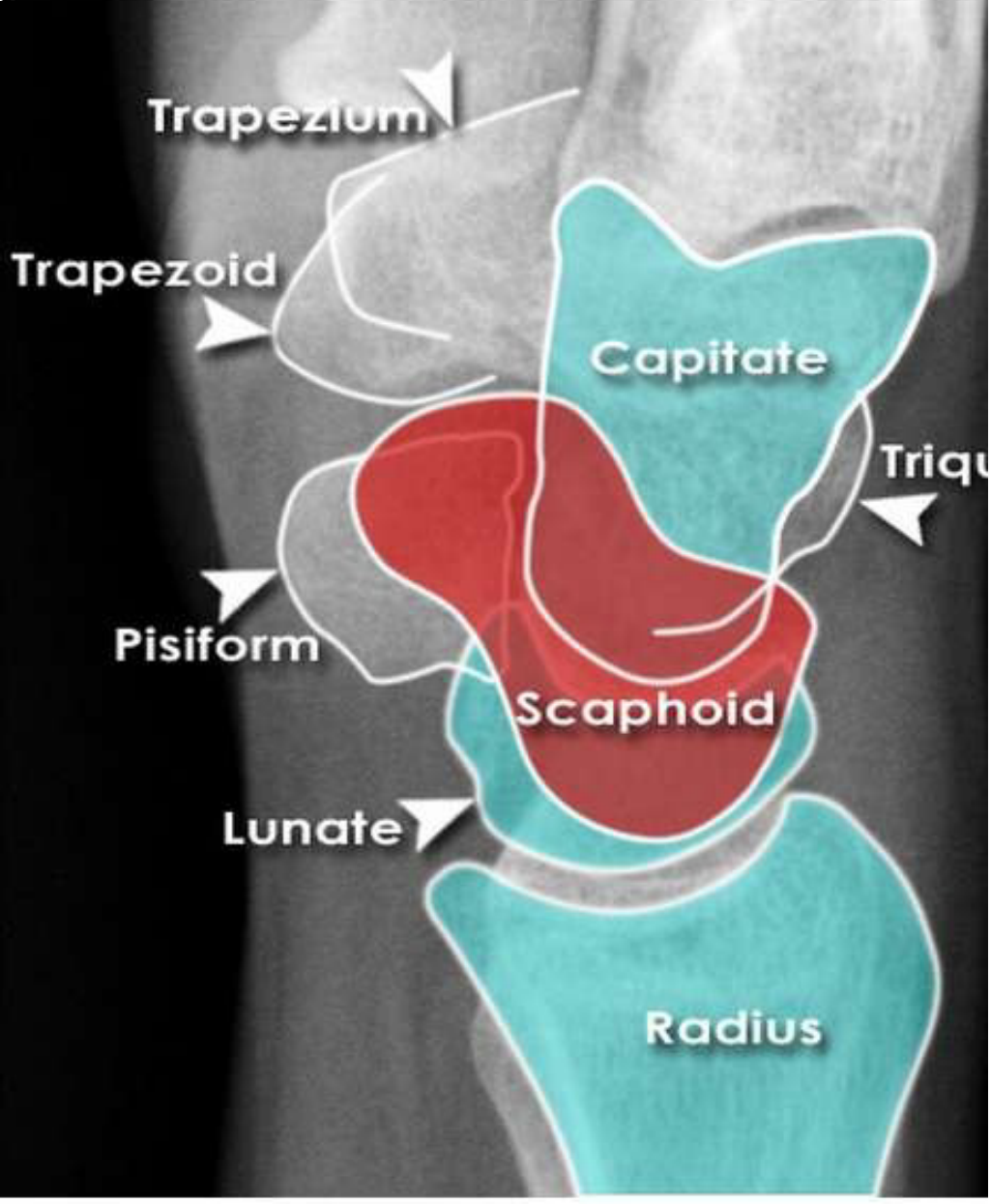
Knee - Normal



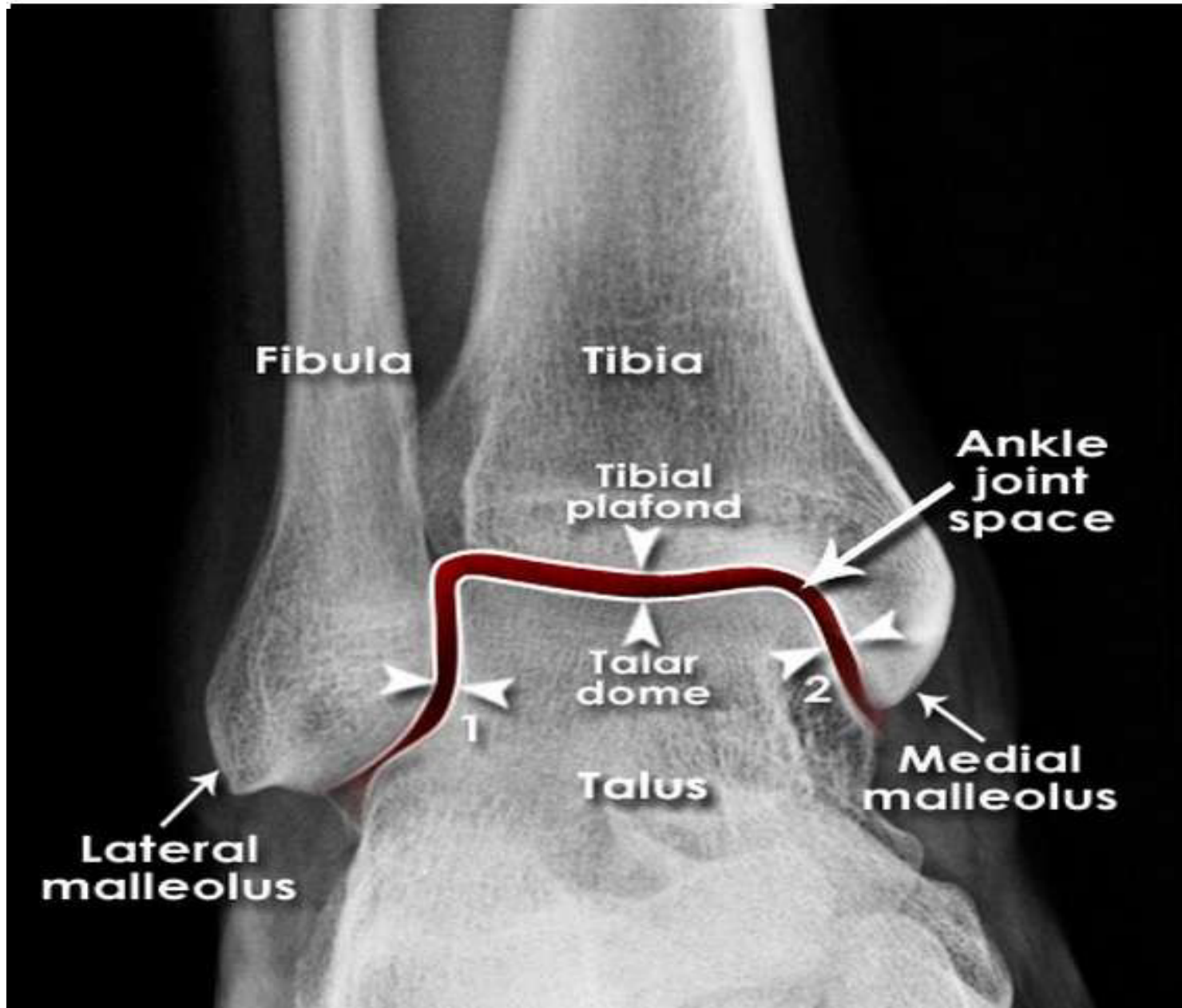
Joint Anatomy



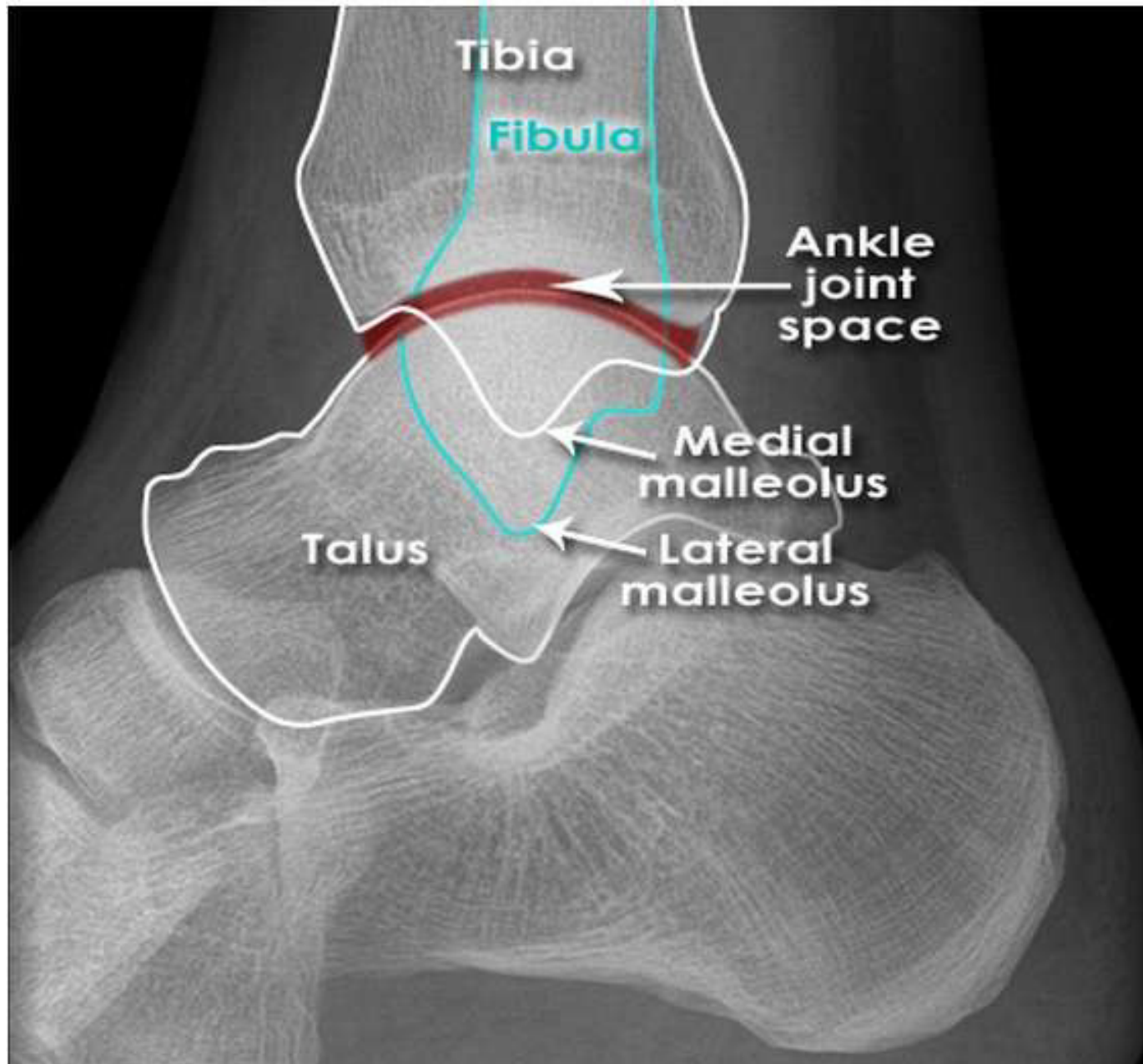
Wrist - Normal



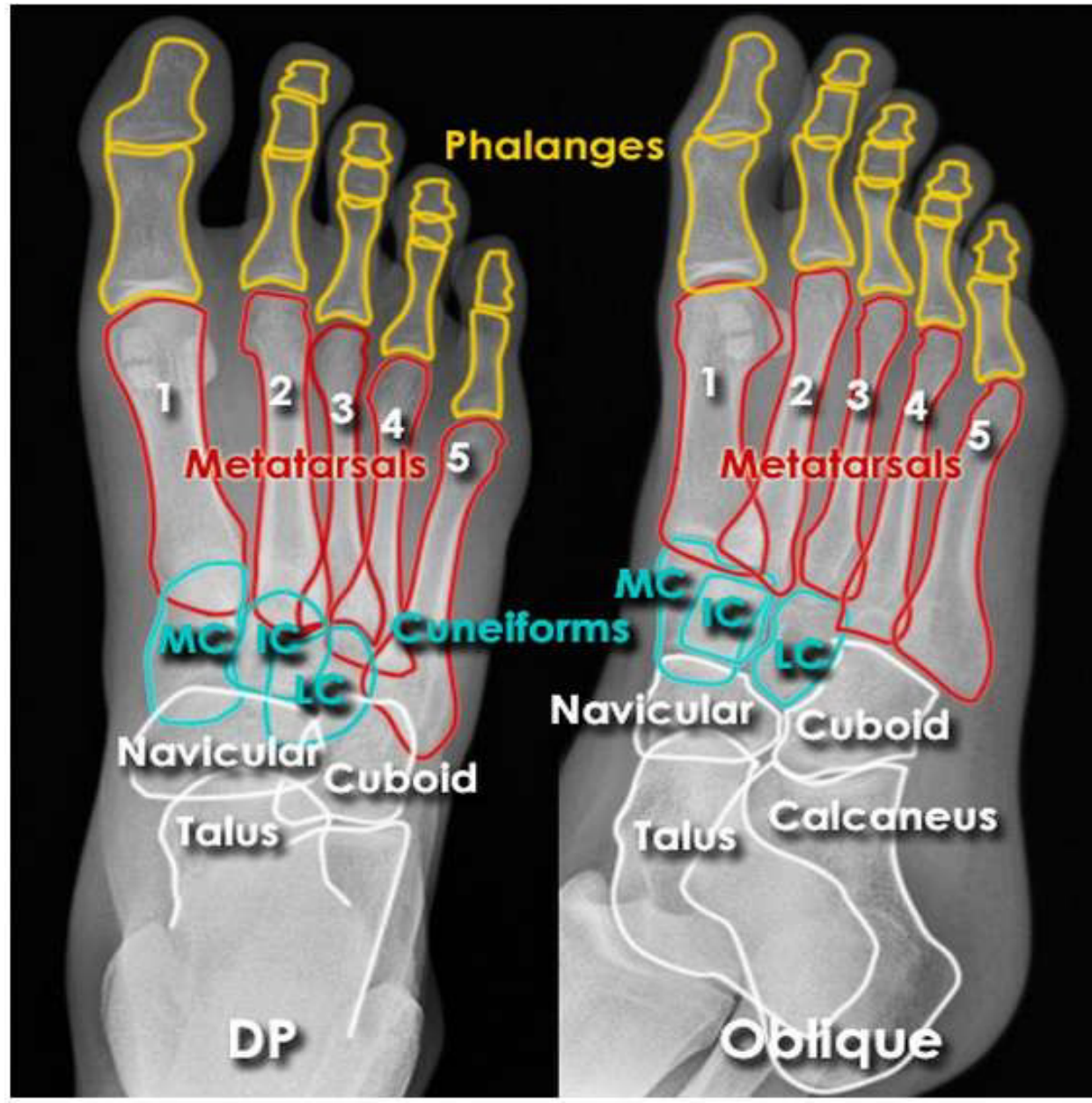
Ankle - Normal



Ankle - Normal



Foot - Normal



Skeletal conditions

- Fractures and trauma
- Infection
- Tumors
- Structural anomalies
- Degenerative joint conditions

ACUTE ORTHOPEDIC EMERGENCIES

- Open fractures.
- Multiple long bone fractures & pelvic fractures.
- Major joint dislocations, e.g. Knee, hip.
- Fractures and dislocations with evidence of neurovascular compromise.
- Compartment Syndrome.
- Septic joint & Osteomyelitis.

All the above conditions need prompt and timely action or the patient may lose the limb or even life.

No patient ever died of a broken bone

While the expert and expeditious care of orthopaedic trauma directly bears upon the patients morbidity and eventual functional recovery, the question of patients survival must be addressed prior to any orthopaedic consideration.

Life, limb, wound, fracture

BLS



Basic Life Support
for Healthcare Providers



ATLS program.

- Treat the greatest threat to life.
- The lack of definitive diagnosis should never impede the application of an indicated treatment.
- Detailed history was not essential to begin the evaluation and treatment.



Basics of Trauma Assessment

- Preparation
- Triage
- Primary Survey (**A,B,C,D and E**)
- Resuscitation
- Secondary Survey
- Monitoring and Evaluation, Secondary adjuncts
- Transfer to Definitive Care

Polytrauma?

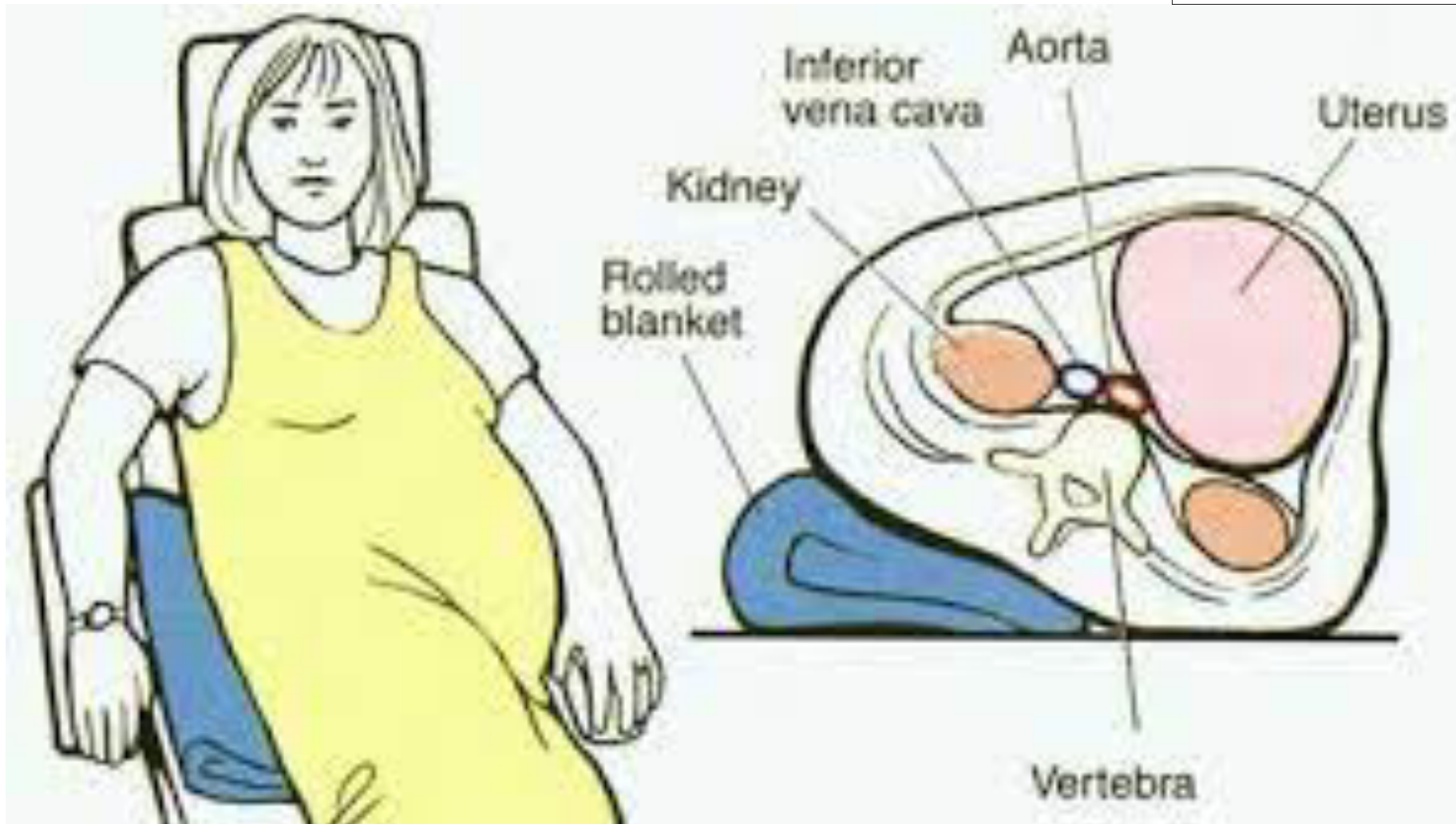


priorities of saving life, saving limb, and disability-limiting surgery



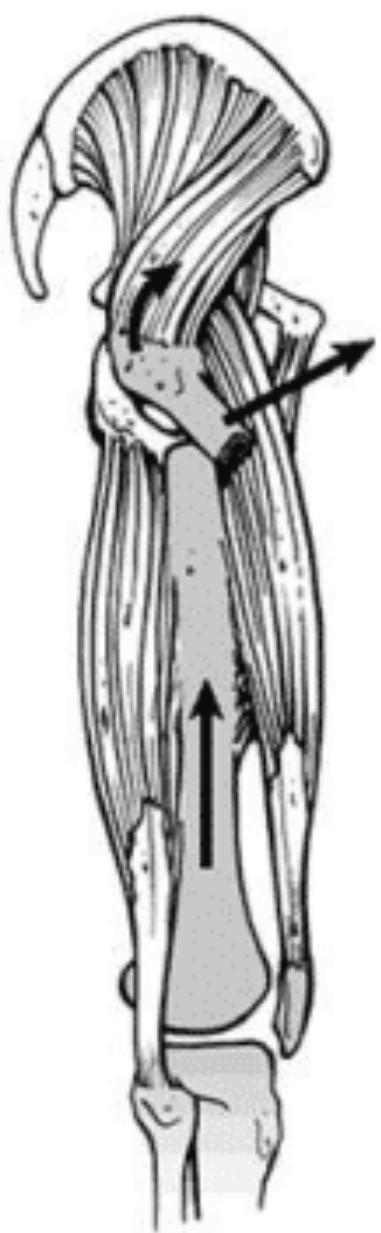
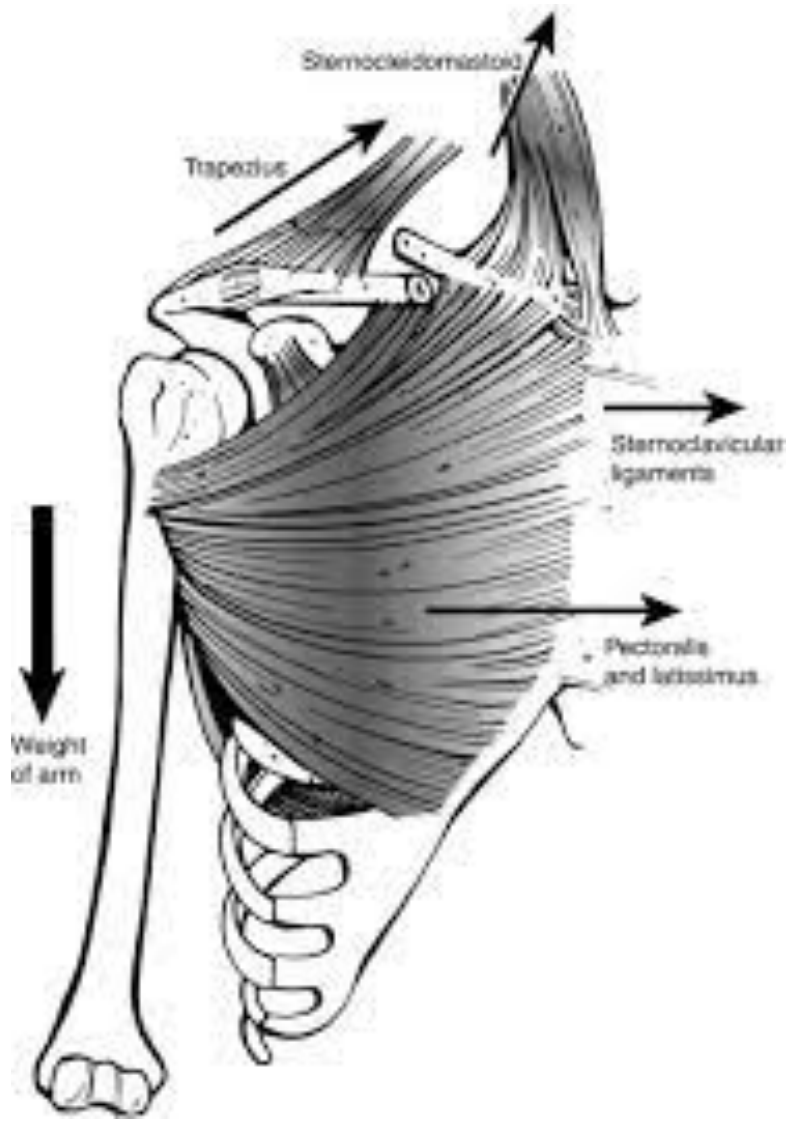


ILLUSTRATION BY JOHN KALAMELOU



Description of fractures

- Fracture: discontinuity of bone (cortex).
- Fractures can be categorized in several ways, pathologic or traumatic, stress, location in bone, mechanism of injury, status of soft tissue...etc.



Clinical features of fractures:

- Pain and tenderness.
- Loss of function.
- Deformity.
- Abnormal mobility and crepitus.
- Neurovascular injury.
- X-ray findings.

Complication of Fractures

Local:

• Early:

- Compartment syndrome
- Neurovascular injury
- Infection

• Late:

- Mal/nonunion
- Avascular necrosis (AVN)
 - Osteomyelitis
- Post-traumatic arthritis

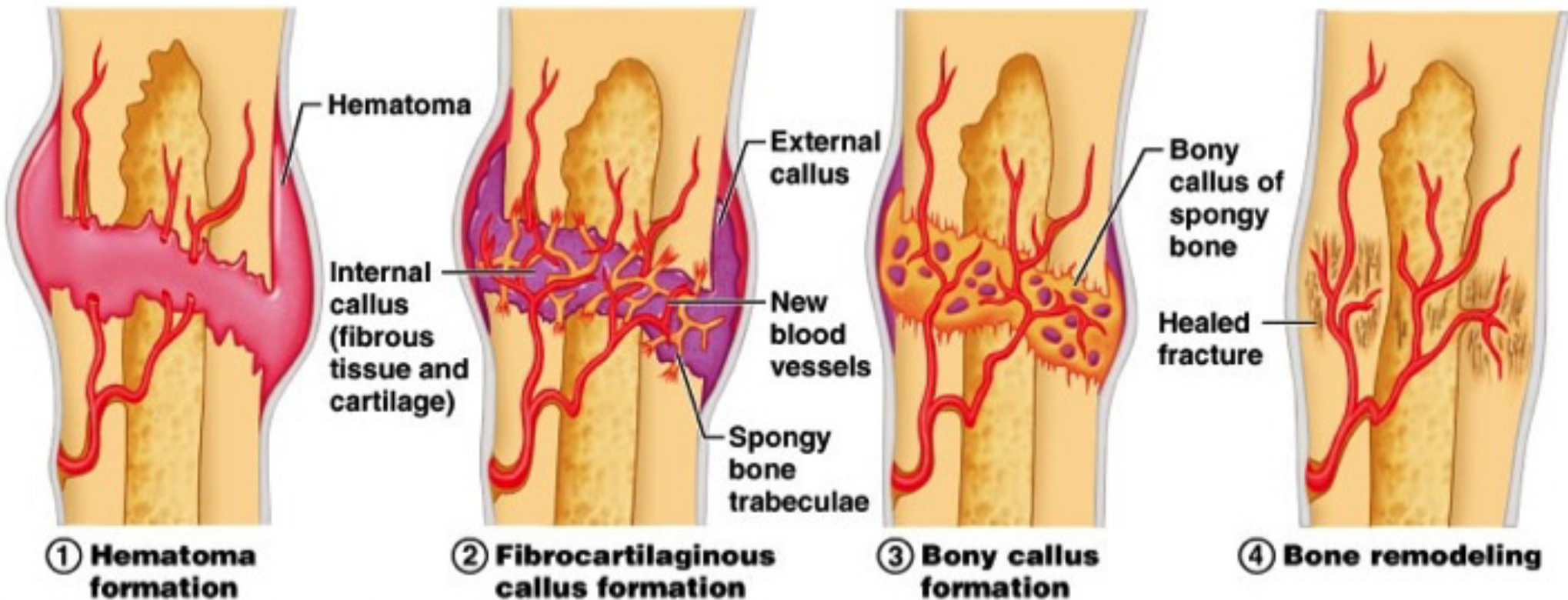
Complication of Fractures

Systemic:

- Deep vein thrombosis
- Pulmonary embolism
- Acute respiratory distress syndrome (ARDS)
- Hemorrhagic shock

Treatment of fracture

- **Reduction:**
closed or open.
- **Immobilization:**
traction, cast, external fixation,
internal fixation.
- **Rehabilitation.**



Biological factors

Patient factors

Age

Medical comorbidities

Functional status

Nutritional status

Immunocompromise

Tissue/local factors

Skeletal loss

Soft tissue loss

Nerve function

Vascular function

Growth factors

Hormonal factors

Soft tissue integrity

Microbiological load/contamination

Local pathological conditions

Mechanical factors

Injury/surgical factors

Mechanism/energy level

Skeletal loss

Soft tissue loss/attachments

Stability post-injury

Stability post-surgery, e.g. degree of immobilization

Anatomic location/bone type

Environmental factors

Smoking

Radiation

3R



Pathologic fractures.

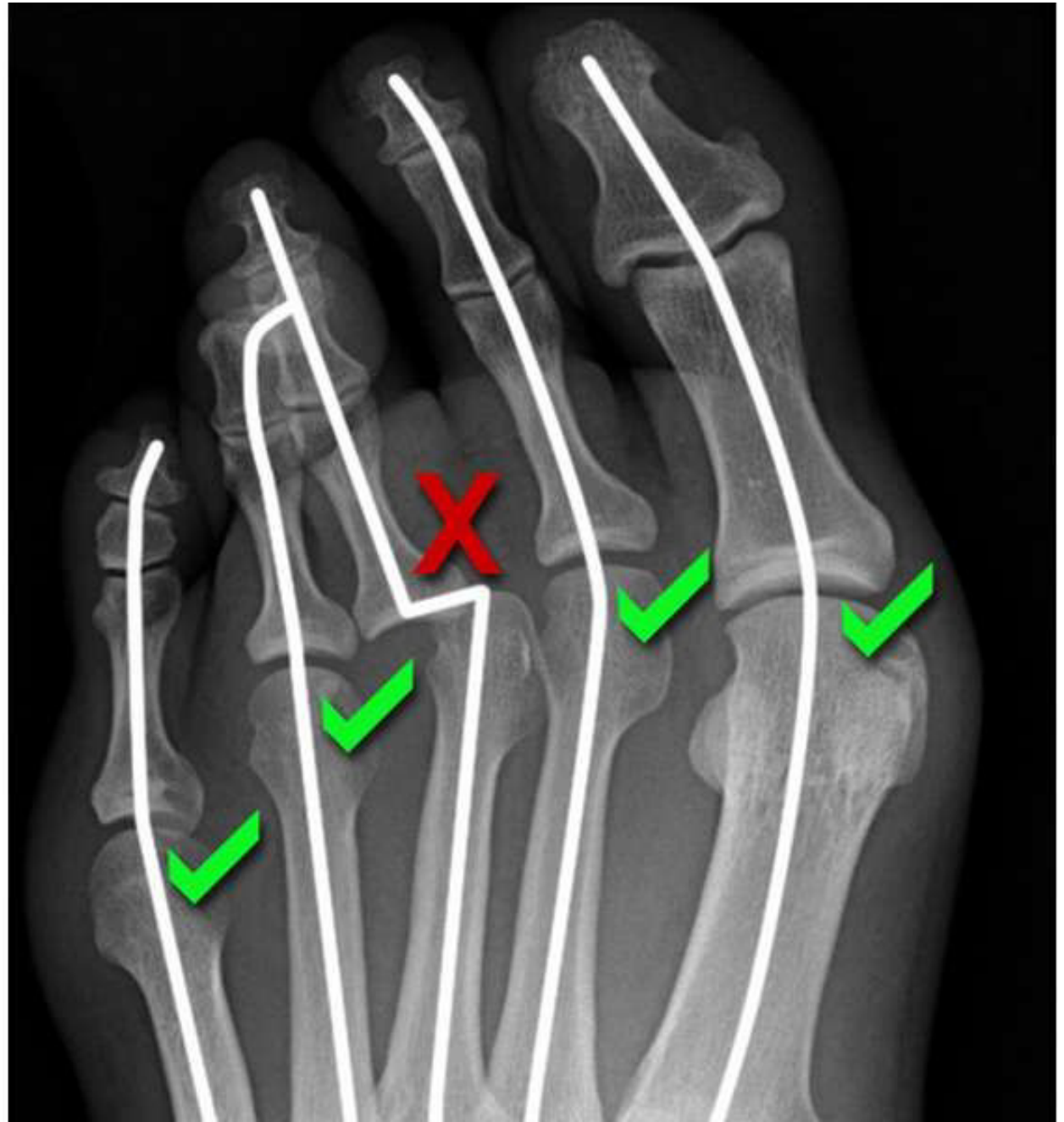
- A bone is broken through an area weakened by pre existing disease, by a degree of stress that would have left a normal bone intact.
- Underlying cause.
- Osteoporosis, metabolic, infection, malignancy...etc.

Stress fractures

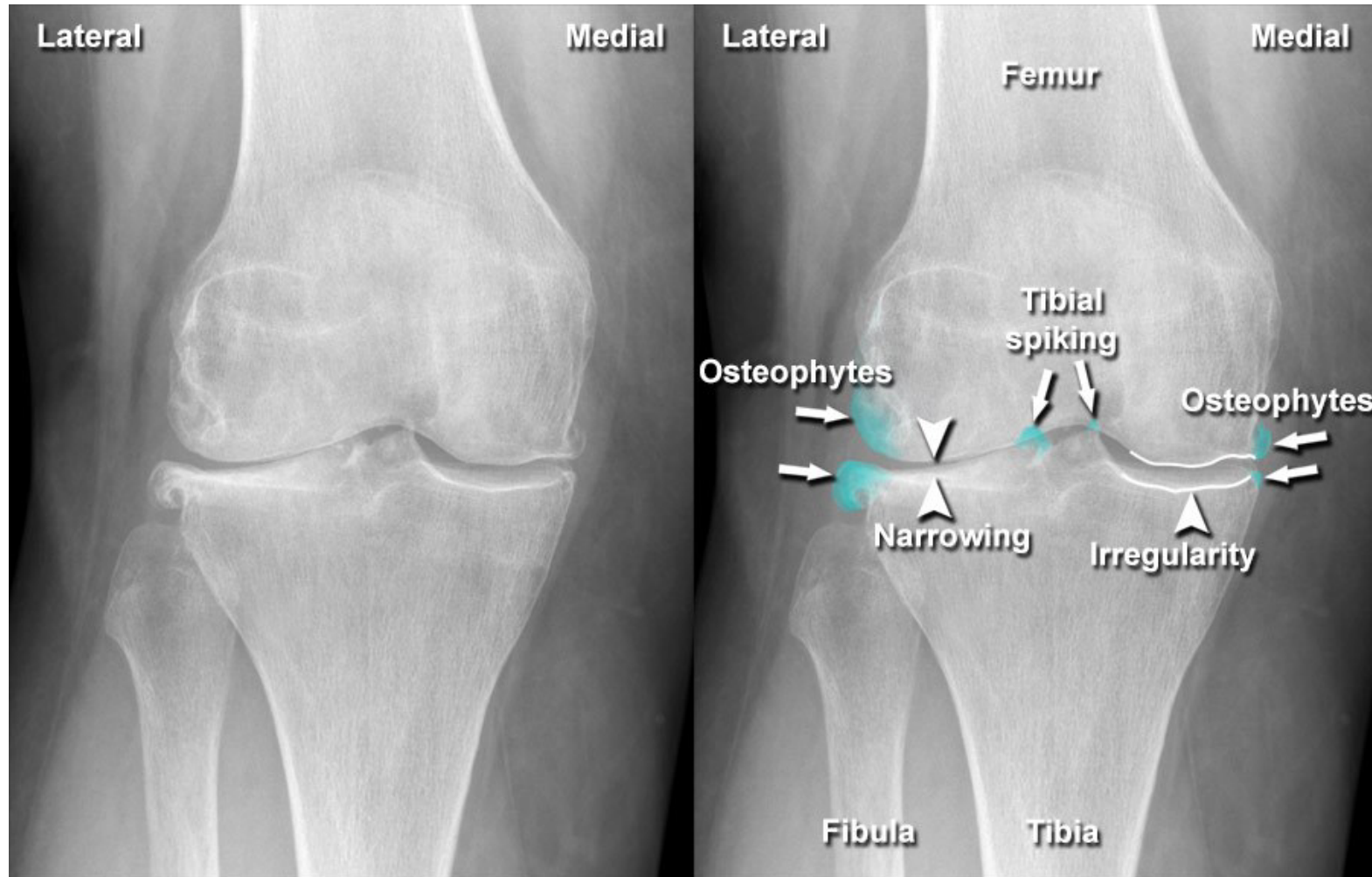
- Bone reacts to repeated loading.
- On occasion, it becomes fatigued and a crack develops, which may lead to a complete fracture.
- Military installations, ballet dancers, athletes.



Bone and joint alignment

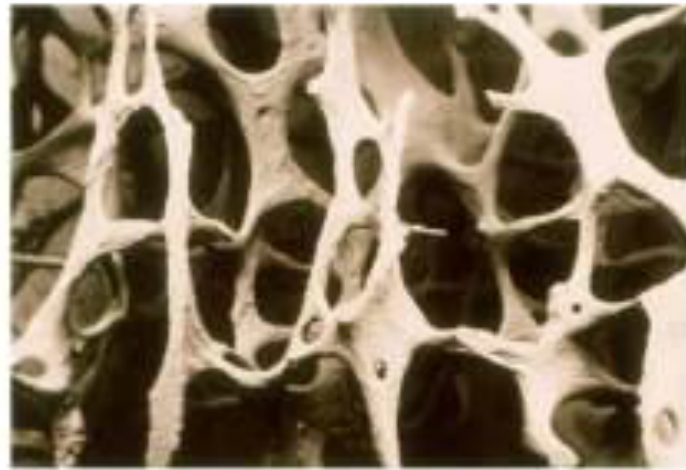


Osteoarthritis

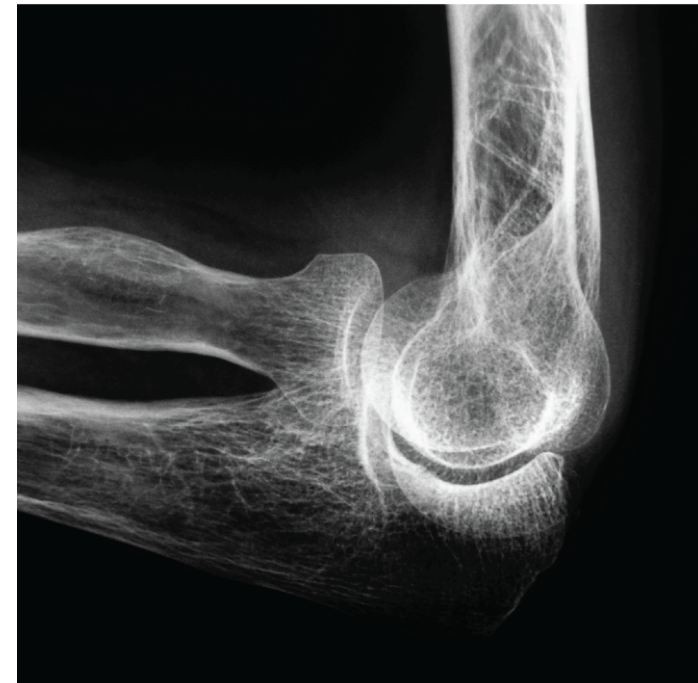




Normal Bone



Osteoporotic bone: one can see thinning of connecting bone and big spaces in the bone structure making the bone more fragile





Normal ↗



Osteopetrosis ↗
Incr'd density –









Day 1

Analgesia.

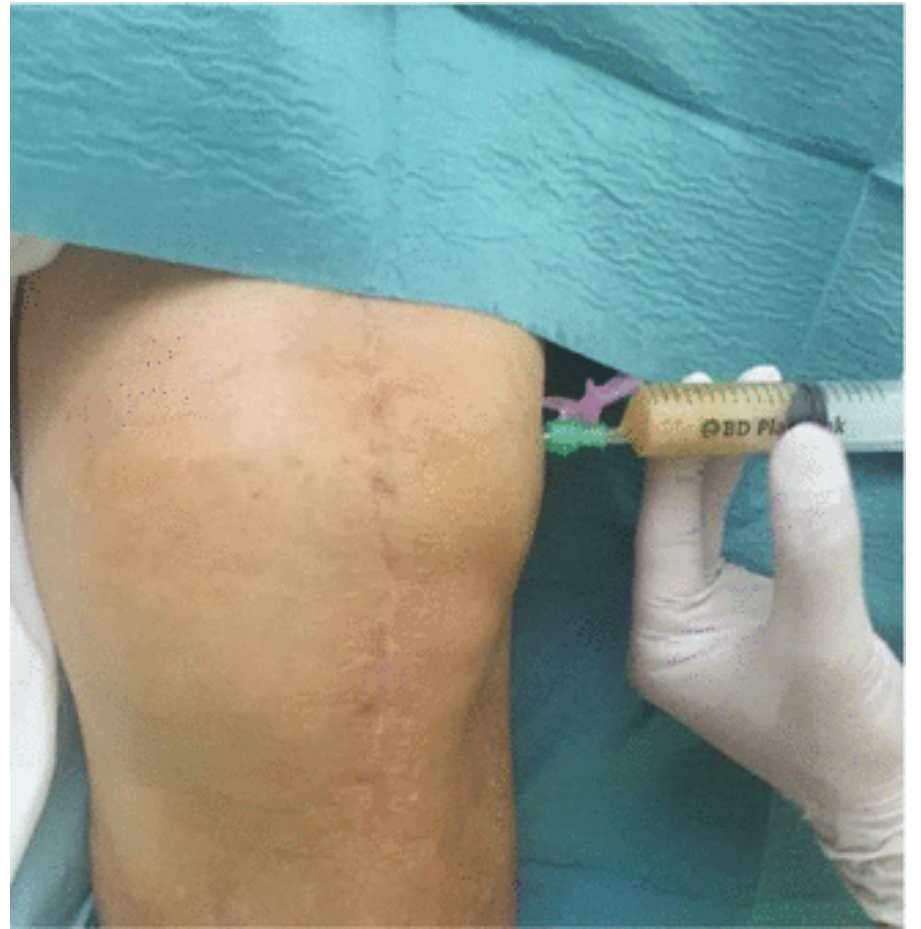
Anti tetanus toxoid.

Antibiotics.

Adequate Irrigation.

Dressing and casting.





1.



2.



3.



4.



Summary

Questions ???