

Introduction to Orthopedics

● Sesamoid bone

- Is a bone embedded within a tendon. The kneecap “patella” is the largest sesamoid bone in the body. Sesamoids act like pulleys, providing a smooth surface for tendons to slide over, increasing the tendon's ability to transmit muscular forces.
- Derived as OS
- In the hand—two sesamoid bones are commonly found in the distal portions of the first metacarpal bone (within the tendons of adductor pollicis and flexor pollicis brevis). There is also commonly a sesamoid bone in distal portions of the second metacarpal bone.
- In the wrist—The pisiform of the wrist is a sesamoid bone (within the tendon of flexor carpi ulnaris). It is not present at birth and generally develops at the age of 9–12.
- In the foot—the first metatarsal bone usually has two sesamoid bones at its connection to the big toe (both within the tendon of flexor hallucis brevis). One is found on the lateral side of the first metatarsal while the other is found on the medial side. In some people, only a single sesamoid is found on the first metatarsal bone.
- In the neck—Although the hyoid bone is free floating, it is not technically a sesamoid bone. All sesamoid bones form directly from the connective tissue found in tendons and ligaments. By contrast, the hyoid bone forms from a cartilaginous precursor like most other bones in the body.
- In the ear—the lenticular process of the incus is a sesamoid bone and therefore is considered the fourth ossicle of the middle ear.
- Clinical significance: Sesamoid bones have a very limited blood supply. They are very difficult to heal when not treated early and often lead to avascular necrosis (bone death from lack of blood supply)



● Gait

- Gait, there is stance phase and swing phase
- High steppage gait → neurological
- Antalgic gait → pain in leg, acute, stance phase is shorter than swing phase
- Trendelenburg gait:
 - Hip pathology, muscle weakness
 - One side
 - The side that pt swing toward is the side of weakness during walking
 - The Trendelenburg gait pattern (or gluteus medius lurch) is an abnormal gait caused by weakness of the abductor muscles of the lower limb, gluteus medius and gluteus minimus. People with a lesion of superior gluteal nerve have weakness of abducting the thigh at the hip.
 - During the stance phase, the weakened abductor muscles allow the pelvis to tilt down on the opposite side. To compensate, the trunk lurches to the weakened side to attempt to maintain a level pelvis throughout the gait cycle. The pelvis sags on the opposite side of the lesioned superior gluteal nerve.
 - When standing on the right leg, if the left hip drops, it's a positive right Trendelenburg sign (the contralateral side drops because the ipsilateral hip abductors do not stabilize the pelvis to prevent the drop). "When the patient walks, if he swings his body to the right to compensate for left hip drop, he will present with a compensated Trendelenburg gait; the patient exhibits an excessive lateral lean in which the thorax is thrust laterally to keep the center of gravity over the stance leg."
- Waddling gait:
 - Bilateral trendelenburg gait
- Gluteus maximus:
 - Extension of hip and external rotation
- Gluteus minimus and medius:
 - Abduction and internal rotation

● Compartment syndrome

- Increased pressure within one of the body's compartments results in insufficient blood supply to tissue. There are two main types acute and chronic. The leg or arm are most commonly involved.
- Symptoms of acute compartment syndrome may include severe pain "out of proportion to the injury", decreased ability to move, numbness, typical posture to reduce the tension in the involved compartment
- Signs include tense swelling and severe pain upon passive stretching of the involved compartment
- Pulselessness, Poikilothermia (perishing cold), and pallor are very late signs
 - 2 compartments in arm
 - 3 compartments in forearm
 - 10 compartments in hand
 - 9 compartments in foot
 - 3 compartments in thigh

- 4 compartments in leg
- Presence of pulses does not exclude vascular injury

• Life>limb>wound>fracture

- Limb in regard with blood supply
- Wound in regard with soft tissue, as soft tissue is the source of blood supply for the bone, also wound is a source of infection

• Pulses

- **Upper limb:**
 - Axillary pulse: located inferiorly of the lateral wall of the axilla
 - Brachial pulse: medial to biceps tendon, located on the inside of the upper arm near the elbow, frequently used in place of carotid pulse in infants (brachial artery)
 - Radial pulse: located on the lateral of the wrist (radial artery). It can also be found in the anatomical snuff box. The radial artery lies superficially in front of the distal end of the radius, between the tendons of the brachioradialis and flexor carpi radialis. Lateral/radial to the tendon of the flexor carpi radialis
 - Ulnar pulse: located on the medial of the wrist (ulnar artery) lateral/radial to the tendon of the flexor carpi ulnaris
- **Lower limb:**
 - Femoral pulse: located in the inner thigh, ½ inch below the mid-inguinale point, halfway between the pubic symphysis and anterior superior iliac spine (femoral artery) against head/neck of femur
 - Popliteal pulse: Above the knee in the popliteal fossa, found by holding the bent knee. The patient bends the knee at approximately 124°, and the physician holds it in both hands to find the popliteal artery in the pit behind the knee (Popliteal artery).
 - Dorsalis pedis pulse: located on top of the foot, immediately lateral to the extensor of hallucis longus (dorsalis pedis artery) against the navicular bone.
 - Posterior tibial pulse: located on the medial side of the ankle, 2 cm inferior and 2 cm posterior to the medial malleolus (posterior tibial artery). It is easily palpable over Pimenta's Point at medial malleolus

- Anterior ankle mnemonic that refers to the order of the ankle tendons that pass under the extensor retinaculum of the ankle running from medial to lateral is:

Tom Hates Ducks

T: tibialis anterior

H: extensor hallucis longus

D: extensor digitorum longus

Tom Has Very Nice Dogs and Pegs

Tib ant, EHL, Vessel, Nerve, EDL, Peroneus Tertius

- Posterior ankle Mnemonics that can be used to remember the anatomy of the ankle tendons from anterior to posterior as they pass posteriorly to the medial malleolus under the flexor retinaculum in the tarsal tunnel include:
 - Tom, Duck And Very Nervous Harry (Tom Does Very Nice Hats)**
 - T: tibialis posterior
 - D: flexor digitorum longus
 - A: artery (posterior tibial)
 - V: vein (posterior tibial)
 - N: nerve (tibial)
 - H: flexor hallucis longus

- Fracture: bone fracture (sometimes abbreviated FRX or Fx, Fx, or #) is a damage in the continuity of the bone. A bone fracture may be the result of high force impact or stress, or a minimal trauma injury as a result of certain medical conditions that weaken the bones, such as osteoporosis, bone cancer, or osteogenesis imperfecta → pathologic fracture
 - Give analgesia in fracture
 - Fracture types
 - *Intra vs extra articular
 - *Extra vs intra capsular

- Dislocation
 - joint dislocation, also called luxation, occurs when there is an abnormal separation in the joint, where two or more bones meet. A partial dislocation is referred to as a subluxation.
 - Dislocation: Complete loss of joint congruity
 - Subluxation: Partial loss of joint congruity

- Rx of any fracture
 - Reduction
 - Immobilization
 - Rehabilitation

- Rule of 2 in fracture x-ray
 - Two views
 - Two joints
 - Two limbs → pediatric, to compare, especially around growth plates
 - Two occasions → scaphoid fracture, as the fracture line may need time to appear on x ray

- Tarsal bones, the tarsus articulates with the bones of the metatarsus, which in turn articulate with the proximal phalanges of the toes.
 - position of the tarsal bones from superior to inferior, medial to lateral in a right foot:

The Cab in New Mexico Is Land Cruiser

- Mnemonic
 - T: talus
 - C: calcaneus
 - N: navicular
 - M: medial cuneiform
 - I: intermediate cuneiform
 - L: lateral cuneiform
 - C: cuboid

- In trauma the most important x-rays are:
 - AP chest
 - AP pelvis
 - Lateral c spine
- Mnemonics of the carpal bone describe the position of the carpal bones from lateral to medial in the proximal row and then the distal row:

Sam Likes To Push The Toy Car Hard

She Looks Too Pretty Try To Catch Her

- Mnemonics
 - S: scaphoid
 - L: lunate
 - T: triquetrum
 - P: pisiform
 - T: trapezium
 - T: trapezoid
 - C: capitate
 - H: hamate

- Scaphoid one of the few bones that blood supply comes from distal to proximal.
- vertebral column usually consists of 33 vertebrae: 24 presacral vertebrae (7 cervical, 12 thoracic, and 5 lumbar) followed by the sacrum (5 fused sacral vertebrae) and the coccyx (4 frequently fused coccygeal vertebrae)
 - Nerve roots above corresponding cervical vertebra, except nerve root 8 below
 - Other Nerve roots below corresponding vertebra
- Elbow joint
 - Ulnohumeral
 - Radiohumeral
 - Proximal radioulnar
- In forearm and below
 - You can use ulnar side or radial side instead of lat or med
- Wrist
 - Radiocarpal
 - Ulnocarpal
 - Distal radioulnar

