

1- A/P of both knees:

- a. This is an A/P knee X ray (in standing position; you know this because it's written on the x-ray!) of both knees showing signs of osteoarthritis:
 - i. Narrowing of joint space bilaterally
 - ii. Subchondral bone sclerosis
 - iii. Subchondral cysts (likely below the sclerosis)- decreased bone density
 - iv. Osteophytes (look at margins)
 - v. Varus deformity (compare long axis of tibia to long axis of femur)
- b. Name, date, etc.
- c. Options for management:
 - i. Conservative (analgesia, decrease flexion, strengthening exercises, ice, etc.)
 - ii. No intra-articular injections! Most patients present late; therefore, they don't benefit much from intra-articular injections



2- A/P of hip (DDH):

- a. Draw H-line between the 2 triradiate cartilages (at the lower edge of the acetabulum and connect them)
- b. Draw acetabular index between medial and lateral edges of acetabulum, relative to H-line (normally <30 degrees); more than 30 degrees → Pavlik harness if <6 months, spica if >6 months.
- c. Draw Perkins line from lateral edge of acetabulum vertically. Prior to 1 year old, you may not see the secondary ossification center. Imagine where the head of femur will develop; medial to Perkins line is normal. Upper outer: dislocation; lower outer: subluxation (or high femoral anteversion; this is not important); if there is in-toeing gait,



know that you have to examine for 3 things: anteversion, DDH, metatarsus adductus.

d. Draw Shenton line:

3- A/P of hip (fracture in proximal end of femur):

- a. Intertrochanteric fracture
 - i. Stable or unstable
 - ii. Unstable: comminuted, reverse oblique, subtrochanteric extension, calcar involvement (posteromedial aspect of neck)
- b. Show that you went with the line of the bone to look for discontinuity (move from head backwards towards the greater trochanter)
- c. Center of gravity is at level of S2 (just anterior to it). Calca of femur neck is in this region and is the strongest bone in the body and withstands the greatest force.
- d. Femur fractures ALWAYS need surgery, regardless of the comorbidities to regain mobility ASAP.
- e. Baseline for mortality is 20%. + 5 for each risk factor/comorbidity
- f. Worst prognostic factor is poor mental status (i.e. dementia).
- g. Management: DHS (dynamic hip screw) if stable, cephalomedullary nail if unstable; Goal is for patient to regain mobility
- h. Neck shaft angle on average = 130 ± 7 degrees
- i. Hip fractures are osteoporotic fractures by definition
- j. Expected deformity: external rotation + shortening [this applies to all hip fractures]



4- A/P of hip: femur neck fracture on left side:

- a. Expected deformity: external rotation + shortening [this applies to all hip fractures]
- b. Lesser trochanter will be more prominent on the x-ray (because of external rotation), but not necessarily
- c. Foley's catheter
- d. Make sure to give analgesia, fluids
- e. Intracapsular fractures have less blood loss than extracapsular fractures due to tamponade effect
- f. Intertrochanteric: 1 L blood loss
- g. Regarding neck fractures: they are intracapsular and have the least blood loss due to tamponade effect
- h. Up to 2-3 L blood loss in femur shaft fractures
- i. Fixation in young and partial or total hip replacement in the elderly due to higher risk of AVN and non-union in the elderly.

- j. Life expectancy – 10 years = the age at which you begin arthroplasty (around 64 years)
- k. Partial hip has less risk of dislocation; but for young, active patients, do total hip replacement, or if there is high risk of osteoarthritis
- l. Trabecular lines:
 - i. Cancellous bone has compression forces and tension forces acting on it
 - ii. Compression forces → compression trabeculae on inner part of the proximal end of the femur
 - iii. Tension forces → tension trabeculae on outer part of the proximal end of the femur
 - iv. Osteoporosis: these show on the x-ray
- m. Min. amount of bone mass loss = 30% for there to be signs of osteoporosis on x-ray.
- n. Case: 60 y/o patient, felt his hip joint “pop”, could not walk, with pain on movement; do MRI, because more accurate than CT; look for edema.
- o. Femur neck fractures:
 - i. Baso-cervical
 - ii. Trans-cervical
 - iii. Sub-capital



- 5- **Know compartment syndrome (see below)**
- 6- **A/P and lateral left leg x-ray, showing distal leg fractures in both the tibia and fibula:**
 - a. Simple, transverse fracture
 - b. No bony contact
 - c. Displaced
 - d. Angulated (about 30 degrees on lateral view); know that up to 10 degrees is acceptable
 - e. Tibia fractures: reamed nail is the golden standard; plate is also acceptable
 - f. If there is open wound over the fracture → open fracture
 - i. Gustilo classification



1. I. <1 cm
 2. II. 1-10 cm
 3. III. >10 cm
 - a. A: no soft tissue coverage needed
 - b. B: some soft coverage needed (consult plastic surgery)
 - c. C: vascular injury
 - ii. Any farm injury, high-energy, high velocity injury (e.g. RTA) is considered III regardless of size
 - iii. Definitive Gustilo classification is inside the OR, not the ER.
- g. Compartment syndrome:**
- i. Clinical diagnosis, regardless of pressure measures; do fasciotomy on suspicion
 - ii. 4 compartments of leg:
 1. Anterior
 2. Lateral
 3. Deep Posterior
 4. Superficial Posterior
 - iii. Signs:
 1. Pain with passive movement of the tendons
 2. Pain out of proportion to injury → increased need for analgesia
 - iv. Most commonly in anterior compartment:
 1. Deep peroneal nerve (1st web space sensation)