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Fracture resulting from abnormal stress on normal bone = stress fracture

Fracture from normal stress on abnormal bone = insufficiency fracture

Scaphoid fracture site with highest risk for avascular necrosis (proximal or distal)? Proximal pole scaphoid fractures are at highest risk for AVN

Comminuted fracture at the base of the first metacarpal = Rolando fracture

Non-comminuted fracture at base of the first metacarpal = Bennett fracture

> The pull of which tendon causes the dorsolateral dislocation in a Bennett fracture? The abductor pollicus longus tendon.

Avulsion fracture at the base of the proximal phalanx with ulnar collateral ligament disruption = Gamekeeper's thumb.

> Same fracture but adductor tendon becomes caught in torn edge of the ulnar collateral ligament? Stener's lesion. If Stener's lesion is present this won't heal on its own so you need surgery. You shouldn't image a Gamekeeper's thumb with stress views because you can convert it to a Stener's lesion. Image with MRI instead.

Distal radial fracture with dorsal angulation = Colle's fracture (C to D= Colle's is Dorsal)

Distal radial fracture with volar angulation = Smith's fracture (S close to V alphabetically so Smith's is Volar)

Fracture commonly associated with posterior elbow dislocation? Capitellum fracture

Fracture of radial head with anterior dislocation of the distal radioulnar joint = Essex-Lopresti Fracture

Fracture of the proximal ulna with anterior dislocation of the radial head = Monteggia fracture

Fracture of the distal radius with anterior dislocation of the ulna at the distal radioulnar joint = Galeazzi fracture

> MUGR= Montaggia is fracture of the Ulna (MU) and Galeazzi is fracture of the Radius (GR)
>
> MonteggiA has an A which is proximal in the alphabet and Monteggia is a proximal fracture with a proximal dislocation
>
> GaleaZZi has two Zs which are distal in the alphabet and a Galeazzi fracture is distal with a distal dislocation

Pediatric elbow fracture that can mimic the trochlear ossification center = Medial epicondyle avulsion fracture

> CRITOE – I ossifies before T, so if you have a radiograph missing the internal epicondyle ossification but you apparently have trochlear ossification, this is actually an avulsion fracture, most commonly a medial epicondyle avulsion fracture

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C = Capitellum (forms around 1 year of age)

R = Radial head

I = internal epicondyle

T = trochlea

O = olecranon

E = external epicondyle (forms around 10-11 years of age)

Fractures associated with an anterior inferior shoulder dislocation = Hill Sachs fracture (posterolateral humeral head impaction fracture), bankart fracture (soft vs bony lesion) at anteroinferior glenolabrum complex, and greater tuberosity avulsion fracture

Posterior shoulder dislocation is most commonly associated with which fracture: reverse Hill Sachs fracture (anteromedial humeral head impaction fracture—need surgery to prevent AVN)

Femoral neck fracture location associated with a stress fracture = medial side

Femoral neck fracture location associated with bisphosphonate use = lateral side

Displaced intracapsular femoral head fracture may result in AVN due to disruption of which artery? Circumflex femoral artery. Higher degree of displacement = higher risk of AVN

Are avulsion fractures more common in adults or kids? Answer is kids. In adults, bones are typically stronger then tendons so you will tear the tendon first. In kids, tendons may be stronger then bones so you will avulse the bone before you tear a tendon.

An avulsion fracture of the lesser trochanter in an adult should make you think of what? Answer is a pathologic fracture…because adults don't normally get an avulsion fracture (see above).

Name the muscle causing the avulsion fracture

Iliac crest = abdominal muscles

Pubic symphysis = adductor muscles

Anterior superior iliac spine = sartorius

Anterior inferior iliac spine = rectus femoris

Ischial tuberosity = hamstrings

Greater trochanter = gluteal muscles

Lesser trochanter = iliopsoas

Honda sign denotes which fracture? Sacral insufficiency fracture. Increased risk after pelvic radiation or hip arthroplasty. Look for this sign on a bone scan.

Avulsion fracture of the lateral tibial plateau = Segond fracture.

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Segond fracture is a sign of what additional injury? ACL tear (75%), occurs with internal rotation

Medial tibial plateau avulsion fracture = reverse segond fracture

Reverse segond fracture is a sign of what additional injury? PCL tear, occurs with external rotation

Tibial plateau fractures are most common laterally or medially? Lateral tibial plateau fractures are most common

Classification system for tibial plateau fractures? Schatzker classification (Types 1 through 6), Type 2 is most common which is a split and depressed lateral tibial plateau fracture

The most common long bone fracture is = tibial shaft fracture

Salter-Harris type 3 fracture through the anterolateral aspect of the distal tibial ephiphysis = Tillaux fracture

Mechanism is that the medial growth plate fuses in a teenager before the lateral growth plate so the lateral aspect is prone to avulsion as it is not fully fused

Salter-Harris type 4 fracture with a vertical component through the tibial ephiphysis, a horizontal component through the physis, and an oblique component through the metaphysis = Triplane fracture

Unstable fracture involving the medial tibial malleolus and/or disruption of the distal tibiofibular syndesmosis (deep deltoid ligament) consider which fracture= Maisonneuve fracture. Look for a widened medial ankle mortis. If you see this the next step is? Get radiographs of the proximal fibula to show the fracture of the proximal fibular shaft. Maisonneuve fracture is an unstable medial malleolar fracture with associated proximal fibular shaft fracture.

Bilateral calcaneal fractures = Casanova fracture. Next step on board exams? Plain films of the spine to look for compression and/or burst fractures from axial loading. Results from? Jumping from a height and landing feet first.

If Bohler's angle is <20 degrees, you should worry about which type of fracture? Calcaneal fracture

Bohler's angle is a line between the anterior and posterior boarders of the calcaneus on the lateral view

Non-avulsed fracture of the base of the 5th metatarsal = Jones fracture

Treat with a cast

Avulsion fracture of the base of the 5th metatarsal = more common than Jones fracture, classic history is acute 5th metatarsal fracture in a dancer. If the fracture extends to the articular surface it is an avulsion fracture, if the fracture does not extend to the articular surface it is a Jones fracture. Jones fractures are typically horizontal in orientation and are prone to non-union (50%) whereas avulsion fractures heal better.

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> 5th metatarsal stress fractures are difficult to heal and are high-risk to progress to a complete fracture

Most common fracture associated with a LisFranc injury? Base of 2nd metatarsal fracture (Fleck Sign)

> You see a small fleck of bone in the widened space between the base of the 1st and 2nd metatarsals as the 1st metatarsal goes medial and the 2nd-5th metatarsals go lateral

Most common site of stress fracture in young athletes? Tibial stress fracture

> Tibial stress fractures most common on compressive side (posteromedial tibia)
>
> If stress fracture on tensile side (midshaft anterior) these have worse healing

Compressive side stress fractures heal well as bones are constantly in opposition

Tensile side stress fractures have more difficulty to heal.

> Femoral stress fractures tend to be compressive in youth (heal well) and tensile in older adults (don't heal well).

Older woman with sudden pain after arising from a seated position? SONK = spontaneous osteonecrosis of the knee—a misnomer as this is really an insufficiency fracture most commonly of the medial femoral condyle NOT osteonecrosis. Usually unilateral and no history of trauma but is often associated with a meniscal injury (can happen in younger people after meniscal surgery)

Runners running on hard surfaces are prone to which location of stress fracture in the foot? Navicular stress fracture. Analogous to the scaphoid the navicular bone is at high risk of AVN with a displaced fracture

> Navicular osteonecrosis = Kohler's disease

Metatarsal stress fractures = March fracture—think military recruits marching all day

The most commonly fractured tarsal bone = calcaneal bone, stress fractures tend to be intra-articular (75%). The stress fracture line runs perpendicular to the trabecular lines

High risk locations for stress fractures to progress to complete/displaced fractures? Tensile side of femoral neck, transverse patellar fractures (longitudinal patellar fracture is lower risk), anterior tibial midshaft fracture, 5th metatarsal fracture, talus fracture, navicular fracture, sesamoid great toe fracture

What is the name for lucent bands that traverse bones at right angles to the cortex? Looser zones. When you see these think insufficiency fractures associated with osteomalacia or Rickets

Most common location for fractures in setting of osteoporosis? Spine, then hip, then wrist

Insufficiency fracture of soft bone in femur or tibia in patient with Paget's disease = banana fracture

Warning signs for pathologic fractures:

> Avulsion of the lesser trochanter (pathologic fracture present); any lesion with >50% or >3 cm of cortex missing, any vertebral lesion encompassing >50% of vertebral body, any femoral neck lesion are at risk to develop pathologic fracture

Secondary signs of ACL injury = deep notch sign, bone contusions, segond fractures (You're going to need a segond ACL if you have a segond fracture)

Avulsion fracture of the proximal fibula = arcuate sign. This is avulsion at the insertion of the arcuate ligament complex (fibular collateral ligament, biceps femoris tendon, or both) and is (90%) associated with cruciate ligament injury.