Trauma

Test Taking Strategies

- Keep it simple, ABEM only tests core fundamental topics
- Look for elephant/clues in question (abnormal vitals, red flags)
- Read question stem → make diagnosis → read/answer question → look for answer choice

Primary Survey: ABCDE

KEY POINT: *First* do A, *then* do B, *then* do C, etc. DO THEM IN ORDER!

Airway

- Look for: head injury + GCS <8, can't protect airway, impending airway compromise
- Red flags: absent gag, bleeding/secretions, facial burns/swelling, carbonaceous sputum, stridor, abnormal voice, inability to talk, foreign body
- Tx: **INTUBATE**, **c-spine precautions**, O2, position, suction, oral airway

Breathing

- Look for: tension pneumothorax (ptx), massive hemothorax, flail chest, ETT malfunction
- Red flags: tracheal deviation, JVD, ↓ breath sounds, SQ air, abnl chest movement, multiple rib fracture (fx)
- Tx: **If tension → needle**; if not, chest tube, O2, pulse ox, intubate

Circulation

- HYPOVOLEMIC SHOCK #1 in trauma, but think about other causes too
- Obstructive: tension ptx, tamponade
- Neurogenic: brain, spinal cord injury (warm shock)
- Cardiogenic: myocardial injury
- Distributive: cyanide/CO poisoning
- Red flags: bleeding, ↓ pulses, ↓ hemoglobin, shock vitals, ↓ breath/heart sounds, neuro deficit
- Tx: large bore IVs, IVFs, blood, pericardiocentesis, thoracotomy, needle/chest tube
- Don't forget pelvic binder and c-spine!
- ***Pearl**: if you can't wait…**O+ for men, O- for women**

- ***Pearl**: **Beck's triad** = hypotension + muffled heart sounds + JVD = tamponade

ACS Classification of Hemorrhagic Shock

- **Class I = Normal Vitals**
- **Class II = normal BP**…and tachy + ↓ pulse pressure
- **Class III = hypotension**…and tachy + ↓ pulse pressure
- **Class IV = altered mental status**…and hypoTN + tachy + ↓ pulse pressure

Disability

- Look for: CNS injury, herniation
- Red flags: focal neuro deficit, abnl pupil, posturing
- Tx: spine precautions, ↓ ICP maneuvers (↑ head of bed, mannitol/ hypertonic saline), stat imaging, neurosurgery consult
- ***Pearl**: GCS…know it!!!
- ***Pearl**: **Decorticate = arms flexed**; **Decerebrate = arms extended**
- Which is which? deCOURTicate (looks like pleading in court)
- Which is worse? Decerebrate (looks like a mannequin…"one step closer to death")
- ***Pearl**: Cushing's reflex (2/2 ↑ ICP) = HTN, bradycardia, irreg breathing
- CPP = MAP – ICP
    - **If ICP goes up, MAP must go up to maintain CPP → HTN**
    - When you **herniate, you push on vagus and respiratory center → bradycardia + irreg breathing**
    - **-4 Bs: Brain, ↑ BP, Bradycardia, Breathing (irreg)**

Exposure

- **Strip-Flip-Touch-Smell**
- Look for: additional injuries, gluteal/perineal injury, prevent hypothermia

Fast Exam

- Blood in RUQ = anechoic stripe in Morison's pouch (between liver/kidney)
- Blood in LUQ = perisplenic or splenorenal anechoic fluid

HIGH YIELD

- Vitals are abnormal for a reason
- A then B then C
- Beck's triad
- Cushing's reflex = 4 Bs
- Classes of hemorrhagic shock
- GCS…just gotta know it

Head Trauma

- Tested diagnoses: scalp laceration, intracranial injury, skull fracture
- Potential for underlying fracture, foreign body, or intracranial injury
- Scalp laceration pearls: look for fracture; close galeal defects; don't need to shave; can bleed a lot (especially kids)

Epidural hematoma

- Dura peeled off skull; arterial blood from middle meningeal artery rupture; associated with temporal bone fx; **balloons out**.
- Other facts: lucid interval; less common; dilated ipsilateral pupil; **better prognosis because can be evacuated; less underlying injury**
- THINK: kid with red balloon

Subdural hematoma

- SUBdural, so dura remains attached to skull; venous blood from torn bridging veins
- Other facts: banana-shaped; altered mental status; more common; worse prognosis; associated with alcoholism and advanced age
- THINK: old man with flaccid banana

Traumatic subarachnoid hemorrhage

- Has typical SAH appearance on CT: blood in sulci/fissures/cisterns
- Contusion is contained intracerebral hematoma

For all of these, reverse anticoagulation and call neurosurgery!

Herniation

- Most common is subfalcine herniation: part of **frontal lobe** passes under falx cerebri
    - Causes **abnormal gait** (think of homunculus—where are the legs?)
- More often tested is uncal herniation: uncus of **temporal lobe** passes under cerebellar tentorium
    - Pushes on **cranial nerve 3** and dilates pupil ("down and out" if total palsy); **ipsilateral hemiparesis**; coma and **death** if extends to brainstem
- Tonsillar herniation is very rare: brainstem basically dies; coma/death
- Cushing reflex = hypertension + bradycardia + irregular breathing
- Cerebral perfusion pressure = MAP - intracranial pressure, so with increasing ICP the body raises BP until vagal reflex causes drop in heart rate. Also affects respiratory centers.
- Management: intubate and call neurosurgery

Basilar skull fracture

- Red flags: temporal bone fracture, raccoon eyes (spare tarsal plates), hemotympanum, Battle's sign, CSF leak, hearing problems or vertigo, CSF ring sign on patient's bed sheet
- Management: CT (so-so sensitivity) + consult (neurosurgery vs ENT)
- Diagnosis is really **clinical**; CT is to look for associated intracranial injuries
- Petrous portion of temporal bone lies close to mastoid and ear; hence hearing problems, hemotympanum
- Pearls: males, teens to 30s, drugs/alcohol; clinical diagnosis; CT/x-ray often negative in basilar skull fx
- Antibiotic prophylaxis for CSF leak controversial, not often tested. Most leaks spontaneously resolve.

HIGH YIELD

- Epidural = artery = balloon
- Subdural = venous = banana
- Cushing's reflex = four B's (brain, bradycardia, blood pressure, breathing)
- Basilar skull fracture = clinical diagnosis

Face trauma

- Tested diagnoses: Le Fort Fx, mandibular Fx, orbital Fx (Also dental, ophtho, otologic injuries; covered later)

Le Fort fractures

- I: **palate** is mobile
- II: **nose** is mobile (as is palate)
- III: **face** is mobile
- Fracture patterns: I right below nose, II through inferior orbits, and III through zygomatic arch

Mandibular fracture

- Condyles are most common site
- Red flags: mandibular pain, malocclusion, trismus, decreased TMJ motion, lower lip paresthesia (mandibular nerve injury)
- Management: panorex/mandibular series/CT
- Most non-condylar fractures are open: give penicillin or clindamycin; consult oral/maxillofacial surgery
- Open fractures get antibiotic prophylaxis

Orbital fracture

- Red flags: orbital pain, globe injury, diplopia, proptosis (retrobulbar hematoma), limited ocular movement (entrapment), ↓visual acuity
- Management: CT for associated injuries, ophthalmology or ENT depending on the injury
- Blowout fracture of orbital floor can cause infraorbital paresthesia

HIGH YIELD

- Le Fort I, II, III: nose, palate, face
- Le Fort III can cause CSF rhinorrhea
- Incise and pack nasal septal hematomas
- Most common site of mandibular fracture is condyle
- Face fx usually not isolated; look for other fx/intracranial injury
- Most common orbital fx = floor
- Orbital fx involving sinus requires antibiotics
- A facial fracture is rarely isolated; look for the others

Neck Trauma

Penetrating Trauma

- Definition: injury has penetrated through the **platysma** muscle
- Zone Classifications of Neck:
    - **Zone I:** border includes the sternum and clavicle to the cricoid cartilage
    - **Zone II:** border includes the **cricoid** to the **angle of the mandible**. **Most common area of penetrating injury**
    - **Zone III:** border includes the angle of the mandible to the base of the skull
- **HARD signs** of injury: unstable vital signs, **vascular injuries** include arterial bleeding, bruit/thrill, expanding hematoma, hypotension, pulse/neurological deficit, and signs of **aerodigestive tract injury** include a bubbling wound, severe hemoptysis and severe hematemasis.
- Tx: early intubation when necessary, transfer immediately to the **operating room** for exploration

**Fun Fact: Mnemonic for HARD signs of vascular injuries in penetrating neck trauma that need to go to the OR: HARD BRUIT. H: Hypotension, A: Arterial bleeding, R: Rapid expanding hematoma, D: Deficit (pulse/neurological deficit) and bruit/thrill!*

- **SOFT signs** of injury: **hoarse voice**, stridor, subcutaneous emphysema
- Tx: **CT angiogram** with possible **scope** (esophagoscopy/bronchoscopy); if patient becomes **unstable → operating room**.

Blunt Neck Injuries

- Immediate **red flags** to further investigate: **neck seatbelt sign, clothesline injury, steering wheel** to neck, **dashboard** to the neck
- Possible fractures of concern include the hyoid, thyroid cartilage, cricoid cartilage, and cricotracheal separation (worst prognosis)
- **Signs**: look for signs of **pseudoaneurysm, carotid artery dissection, and tracheal injury**. These may include ecchymosis, hematomas, odynophagia, and stridor
- Tx: if patient is stable → CT Angiogram. **Unstable → intubate** or consult **ENT for airway** (possible tracheostomy)

Fun Fact: **Blunt neck trauma + neurological findings = carotid artery dissection until proven otherwise! Also remember that the neurological deficits may be delayed.*

Chest Trauma

Aortic Dissection

- Most patients with this will die in the field. 80% that do make it to the hospital do not do well
- Consider this diagnosis when: 1) mechanism is high speed deceleration; 2) retrosternal/interscapular pain; 3) dyspnea; 4) new harsh systolic murmur (acute valvular damage); 5) pulse deficits (shearing of ligamentum arteriosum)
- If stable, get a portable CXR. If very stable, get a CT angio of the chest. Ultimately, will need to go to OR with blood pressure control with beta blocker
- Pearl: exam is usually unremarkable, so must have high clinical suspicion.
- Classic board review question: CXR findings: 1) mediastinal widening*; 2) obscured aortic knob*; 3) loss of AP window; 4) rightward displaced NGT; 5) displaced left main bronchus; 6) wide paratracheal stripe; 7) wide paraspinous stripes; 8) left apical pleural cap (* most sensitive findings)
- Always remember 1/3 of all CXR can be normal

Cardiac Contusion

- Consider this diagnosis when: 1) mechanism is high speed deceleration; 2) tachycardia; 3) dysrhythmias; 4) abnormal heart sounds or JVD; 5) chest trauma with cardiogenic shock
- Treatment: supportive care
- Most common EKG finding: sinus tachycardia

Pulmonary Contusion

- Consider this diagnosis when: 1) direct chest wall trauma; 2) hemoptysis; 3) chest pain and dyspnea; 4) chest seatbelt sign; 5) decreased pulse oximetry; 6) ARDS-like picture; 7) CXR with infiltrate/consolidation
- Treatment: repeat CXR in 6 hours (can be delayed presentation), supportive care
- Most common complication: pneumonia

Flail Chest

- Multiple rib fractures (segments in >3 adjacent ribs)
- Associated with pulmonary contusions – usually the reason these patients do poorly
- Paradoxical motion during respirations
- Treatment: intubate, chest tube

Sternal Fracture

- Associated with myocardial contusion and mediastinal hematoma
- Make sure to get a lateral CXR
- Treatment: supportive

Rib Fractures

- Pearl: >50% not evident on CXR
- Fractures of lower ribs (#9-11) can lacerate the liver or spleen
- 1st and 2nd rib fractures are associated with significant vascular and bronchial injuries

Hemothorax

- Consider this when: 1) decreased breath sounds; 2) existing pneumothorax
- Treatment: chest tube
- Fun fact: On supine CXR, blood will layer out when there is ~100mL. If upright CXR, blunted CPA with 200-300mL.
- Indication for OR thoracotomy: 1) unstable, 2) initial chest tube output > 1500mL, 3) chest tube output > 200mL/hr, 4) persistent air leak

Pneumothorax

- Consider this when: 1) decreased breath sounds; 2) chest pain; 3) shortness of breath
- Treatment: if small ptx, 100% NRB O2 with repeat CXR. If intubating and + ptx, then chest tube (to prevent positive pressure ventilation-induced

tension ptx). After chest tube placed and ptx is not resolving, then check tube malfunction or bronchial tear
- Decubitus CXR is most sensitive

Tension Pneumothorax

- Consider this when: 1) severe dyspnea; 2) distended neck veins; 3) deviated trachea
- Treatment: needle thoracostomy, followed by chest tube
- Do not wait for the CXR!

Pericardial Tamponade

- Beck's triad: hypotension, muffled heart sounds, JVD
- Treatment: If stable, to OR. If dead, ED thoracotomy

Penetrating Trauma

- Indication for ED thoracotomy: penetrating chest trauma with witnessed loss of vitals
- Incision is done at the 5th ICS

Abdominal Trauma

General Principles

- If unstable → OR; if stable → CT/serial exams/etc
- NO CT IF UNSTABLE
- Give blood in shock, even if nl Hgb/Hct
- Look for: Penetrating vs. Blunt injury
- Injury subtypes: diaphragmatic, solid organ, hollow viscus, retroperitoneal

Penetrating Injuries

- Abdomen = nipple to pubic symphysis
- *Gun shot wound (GSW) = small bowel injury; Stab wound (SW) = liver injury
- *80% GSWs associated with significant intraabdominal injury vs. 20% SWs
- Tx: OR/consult vs. US/CT/XR
- *Local wound exploration = surgical procedure, not just a gloved finger!
- *Indications for OR: unstable, peritonitis w/ +FAST, evisceration, transabdominal GSW

Diaphragmatic Injuries

- Red Flags: motor vehicle accidents (MVA) and SW common, shortness of breath/orthopnea, chest pain, abdominal pain, nausea/vomiting, worse lying down, bowel sounds in chest
- Tx: OR/consult
- **Blunt**: MVA, L > R, delayed dx, multiple injuries
    - Think of fat bus driver in MVA hitting belly on steering wheel
- **Penetrating**: GSW/SW, L > R, delayed dx, can be isolated injury
    - Think of thin punk getting stabbed/shot
- *Diaphragm can be injured anywhere from *nipple to navel*
- **XR findings**: blurred/elevated hemidiaphragm, hollow viscus (gastric bubble, air fluid level) in chest, mediastinal shift away from hernia, atelectasis on side of hernia
- *Pathognomonic on XR = coiling of NG tube in thorax
- *CXR/CT suck for dx (miss ~50%), gold standard for dx is laparoscopy/otomy

Solid Organ Injuries

- Red Flags: abdominal pain, nausea/vomiting, seatbelt sign, shock, low rib fx, Kehr sign (referred pain to L shoulder from diaphragm irritation)
- Tx: US vs. CT, consult, admit vs OR
- *Spleen injuries > Liver

Hollow Viscus Injuries

- Red Flags: MVA w/ seatbelt sign, abdominal pain, nausea/vomiting, peritonitis
- Tx: consult, serial exam, admit vs OR
- *CT is not good for dx
- *Delayed presentation common
- ***Bike handlebar → duodenal/pancreas injury**
- ***Lap belt → small bowel injury**
- XR findings: pneumoperitoneum
- Diagnostic peritoneal lavage (DPL) falling out of favor; use DPL when pt unstable + no U/S or equivocal FAST
- When DPL considered positive? Rule of 10s:
    - +DPL if >**10**ml gross blood/bile/feces after cath insertion
    - If no gross contents, instill **1,000**ml NS then aspirate; +DPL if >**10,000** RBCs in penetrating or >**100,000** RBCs in blunt

Retroperitoneal Injuries

- Red Flags: sudden deceleration, flank pain/ecchymosis, multisystem trauma
- Tx: CT with IV contrast
- Retroperitoneal organs: aorta, IVC, kidneys, pancreas, ascending/descending colon
- *Cullen's sign: periumbilical ecchymosis
- Grey Turner sign: flank ecchymosis

HIGH YIELD

- 3 blunt abdominal injuries hard to dx on CT: diaphragm, pancreas, bowel
- Diaphragm and hollow viscus injuries often delayed presentation
- Bike handlebar = duodenal/pancreas injury
- CT to dx retroperitoneal injury (not U/S!)
- If pt unstable NO CT!

Genitourinary Trauma

Look for: genital, bladder/urethral, and renal injury

Scrotal/Testicular Injuries

- Red Flags: straddle injury, hematuria, scrotal ecchymosis/hematoma, testicular TTP
- Tx: doppler U/S, consult

Penile Injuries

- Penile fx: having sex → crack/pain → flaccid "eggplant" penis
- Penile amputation: reimplant possible up to 8-12hr
- Tx: consult

Bladder/Urethral Injuries

- Red Flags: pelvic fx, gross hematuria, blood at meatus, urinary retention, high riding prostate, perineal bruising
- Tx: NO FOLEY, RUG (retrograde urethrogram) for urethral injury, CT cystogram for bladder injury, consult
- *Bladder/Urethral injuries typically in males, but when occurs in females, may present as vaginal bleeding

Urethral Injuries

- **Anterior urethral injury** = distal to urogenital diaphragm (just distal to prostate)
    - What: blood/urine extravasation externally or into soft tissue
    - Clues: straddle injury, hematuria. swollen penis/scrotum
    - Complications: fistula, stricture
    - RUG → small amount extravasation, likely filling of bladder
- **Posterior urethral injury** = proximal to urogenital diaphragm
    - What: blood/urine extravasation into pelvis
    - Clues: pelvic fx, distended bladder, nl penis/scrotum, high riding prostate
    - Complications: impotence, incontinence
    - RUG → large amount extravasation into pelvis
- *So, w/ anterior urethral injury something will be obviously wrong on exam (visible trauma), whereas w/ posterior urethral injury it's not as obvious

Suprapubic Catheter

- When: need to decompress bladder + can't pass foley
- Red Flags: urethral injury/stricture + urinary retention
- Contraindication: empty bladder, prior radiation/surgery to lower pelvis

Bladder Rupture

- Red Flags: **pelvic fx** + gross hematuria, suprapubic pain, urinary retention
- Tx: Retrograde cystogram, consult
- 2 types: intraperitoneal (worse prognosis) → OR vs extraperitoneal → no OR

Renal Injuries

- Red Flags: high-injury blunt, hematuria, flank pain, Cullen's/Grey Turner sign, inferior rib fx, spinal transverse process fx
- Tx: CT w/ IV contrast, consult
- *ALL ureteral injuries are operative
- Majority of blunt renal injuries nonoperative
- *Renal injury rarely an isolated injury
- For renal avulsion, have up to 12hr to revascularize

HIGH YIELD

- In GU, it's all about pelvic fx, obvious genital trauma (eg straddle injury), and the flanks
- GU injuries can occur without hematuria
- Pelvic fx + hematuria = RUG vs CT cystogram
- Anterior urethral injury = abnl penis; Posterior urethral injury = nl penis

- Testicular trauma = doppler U/S
- Penile fx/amputation = consult
- Most blunt renal injuries are nonoperative

Spine Trauma

- Look for: spine fx, spinal cord injury (SCI), neurogenic vs. spinal shock
- Tx: XR/CT/MRI, spinal precautions, neurosurgery consult

Cervical Spine Injuries

- NEXUS criteria to clear C-spine: no midline cervical tenderness to palpation (ttp), no focal neuro deficits, alert, no intoxication, no distracting injury
- *NEXUS mnemonic = **Cervical PAIN** = cervical midline ttp, Pain (distracting), Altered mental status, Intoxicated, Neuro deficit
- Reading C-spine XR:
    - Lateral view: Anterior/posterior spinal line and spinal laminar line should be smooth
    - Open mouth view: C1 and C2 lateral edges should align, look at odontoid for fx

Unstable Cervical Spine Injuries

- *Unstable spine fx = ↑ risk for spinal cord injury (SCI)
- *Unstable C-spine fx mnemonic = **Jefferson Bit Off A Hangman's Tit**:
- **Jefferson fx** = C1 burst fx 2/2 axial load
    - Obvious on CT; on open mouth XR, C1/C2 lateral edges do not align
- **Bilateral facet dislocation**: facets are articulating joints of spine that allow flex/extend
    - Lateral XR shows complete dislocation of spine
- **Odontoid fx**: Type 1 = odontoid tip; Type 2 = odontoid neck; Type 3 = odontoid body
    - Type 2 and 3 are unstable
- **Atlanto-occipital/axial dislocation**: lateral XR widening of C1/C2 and predental space
    - Usually obvious on XR; poor outcome
- **Hangman fx** = C2 pedicular fx 2/2 hyperextension
    - Occurs in judicial hangings with noose in front of neck
    - If you have a high C-spine injury, you're "well hung" (aka dead) if you have an erection
- **Teardrop fx** = anteroinferior cervical vertebral body fx
    - Hyperflexion > hyperextension

Lumbar Fractures

- Red Flags: fall from height, axial loading, lap belt injury, back pain, step-off, neuro deficit (L4,L5,S1)
- Tx: XR/CT/MRI, spinal precautions, neurosurgery consult
- Denis 3 spinal columns: anterior (anterior half of vertebral body), middle (posterior half of vertebral body), and posterior (posterior to vertebral body)
- **Wedge fx**: compression fx of anterior column
- **Burst fx**: vertebral body crushed into multiple fxs; involves anterior/middle columns
- **Chance fx**: flexion-distraction injury; transverse fx through anterior/middle/posterior columns; assoc w/ lap belt injury
- *50% spinal fxs are at T11-L2 level
- *If you find a spinal fx, look for another (often pts have multiple spinal fxs)
- *Steroids remain controversial! Currently no consensus

Spinal Cord Injury

- *When it comes to spinal cord think of it like a car: the motor is in the front (anterior horns contain motor) and the antenna/GPS are in the back (posterior horns contain sensory and posterior columns contain proprioception)
- **Central Cord Syndrome**: hyperextension → UE > LE motor deficit
    - Red Flags: elderly; "Centenarian Clipped his Chin now w/ Cape distribution"
- **Anterior Cord Syndrome**: hyperflexion → bilateral motor paralysis and no pain below level of injury; pt can feel, just no pain
    - You *flex* your neck *anterior*ly
- **Brown-Sequard Syndrome**: penetrating injury → half of spinal cord injured → half motor/proprioception loss, other half pain/temp loss
    - "Hot knife cuts muscle and Half of cord → paralysis on side muscle cut and opposite side can't feel hot knife"
- *Useful dermatomes: C6 = six shooter (first dorsal web space), C7 = middle, C8 = pinky, T4 = teat pore (nipple), T10 = belly butTEN (umbilicus), L1 = inguinal
- **Cauda Equina Syndrome**: compression of cauda equina
    - Red flags: saddle anesthesia, ↓ rectal tone, urinary retention (PVR > 50-100ml), overflow urinary incontinence, fecal incontinence, BLE neuro deficits

Neurogenic vs. Spinal Shock

- Neurogenic shock ("warm" shock) = sympathetic nervous system damaged → parasympathetic nervous system overflow → hypotension, bradycardia, flushing (warm/dry skin)

- Spinal shock = not really shock, more like spinal "STUN" = no circulatory involvement
    - Loss of reflexes, "stun" is over when bulbocavernosus reflex returns

HIGH YIELD

- Jefferson Bit Off A Hangman's Tit
- Central cord = centenerian/cape
- Anterior cord = car's motor broken, but GPS/position intact
- Brown-Sequard = half/half/half with a hot knife
- Cauda equina = LBP + neuro deficit + bowel/bladder sx
- Lap belt associated w/ Chance fx
- Neurogenic SHOCK vs. Spinal STUN

Soft Tissue Trauma

Look for: compartment syndrome, high-pressure injection, tendon injury, amputation

Compartment Syndrome

- Red Flags: 6 Ps = POOP (pain out of proportion), paresthesia, pallor, paralysis, pulseless, poikilothermia
- Tx: measure compartment pressure, fasciotomy
- When to do fasciotomy: compartment pressure >30 mmHg *or* if Δ measurement (diastolic BP – compartment pressure) <30

High-Pressure Injection Injury

- Red Flags: grease/oil/paint injection, small benign-looking entrance wound
- Tx: OR

Tendon Injury

- Tx: XR to r/o FB or fx, consult all *flexor* tendon lacerations
- Laceration overlying MCP is human bite until proven otherwise
- **Mallet finger**: extensor tendon disruption w/ avulsion
- **Boutonniere deformity**: extensor tendon slip at PIP → PIP flexion and DIP extension
- **Jersey finger**: FDP avulsion → can't flex DIP

Amputation

- Reimplant contraindications: severely crushed/mangled, prolonged ischemia roughly >6hr, fingertip amp w/o phalanx exposure
- Tx: consult orthopedics/hand surgeon

- *Never place amputated part in direct ice/water; wrap w/ saline soaked material, place in bag, *then* place bag in ice

HIGH YIELD

- POOP = compartment syndrome; remember 30 mmHg
- All high-pressure injections go to OR
- All flexor tendon lacs need hand surgeon
- Almost all amputations need consult

Trauma in Special Populations

Look for: pregnant, geriatric, intimate partner violence, pediatric trauma

Trauma in Pregnancy

- Look for: placental abruption, uterine rupture, fetal-maternal hemorrhage, preterm labor/ROM
- Red flags: MVA, uterine contractions, abd pain, vag bleed, abnl FHR
- Tx: type/screen blood, fetal heart monitor/tocodyanomometer, left lateral decubitus position, U/S, consult OB
- *Normal FHR = 120-160
- *Minor trauma can cause fetal death
    - Think of uterus as tennis ball and placenta as a chip inside the tennis ball…even a light squeeze can break the chip…so even in minor trauma, must r/o abruption
- *Stabilize mom FIRST; Mom can lose 2L blood before vital signs become abnl; Give RhoGam if Rh(-)
- Perimortem C-section rules:
    - Must be *witnessed* arrest
    - Make sure fetus viable >24wk (gravid uterus >4 finger breadths above umbilicus)
    - Should take 4-5min

Geriatric Trauma

- How: FALLS most common, MVA
- *β-blockers mask tachycardia, ↓ reserves (comorbidities, ↑ mortality)

Intimate Partner Violence

- Red Flags: hx of “fall” or “clumsiness”, fingernail scratches, bite marks, cigarette/rope burns, strangulation/restraint bruises, inconsistent mechanism, vague/minor complaints
- Tx: screen, consult
- *Pregnant women = highest risk
- *Ensure safety of kids
- *Screen for SI/HI

HIGH YIELD

- Minor trauma can cause fetal loss
- Stabilize mom FIRST
- Normal VS in elderly can be bad
- Always think intimate partner violence in pregnant trauma

Blast Injuries

- Blast Injury Types
  - Primary = blast wave overpressure
  - Secondary = shrapnel
  - Tertiary = thrown by air movement into things
  - Quaternary = anything else (burns/smoke/crushed/radiation)
- Look for: pulmonary barotrauma (blast lung), tympanic membrane perforation, delayed intraabdominal injuries, compartment syndrome
- *Blast lung = bilateral central patchy opacities in butterfly pattern
- *Blast injury causing tympanic membrane perforation → CXR to look for blast lung
- *Blast lung = most common cause of death
- *Explosion info/context vital part of hx