Surgery

PreTest Surgery Qbank
NBOME practice assessment
Boards & Beyond
FM/ IM cheat sheet (tons of IM on surgery)
Jane's Cheat sheet
Molly's study slides
Online Med Ed

Topic	%
Endocrine/Breast	5–13%
Fluids	5 - 12%
Gastrointestinal	26–35%
Hepato/Biliary	13–20%
Hernias	5-13%
Infections	4–8%
Skin/Subcutaneous Tissues	4 - 8%
Trauma	5–12%

Preoperative evaluation

- **Informed consent**
  - Risks of not undergoing/ refusing procedure & benefits (most important)
  - Explain brief diagnosis
  - Indications for procedure
- **Surgical prophylaxis**
  - Protection from post-op GI bleed: **PPi, H2 blockers**
  - Protection from post-op atelectasis: i**ncentive spirometry, coughing, smoking cessation, ambulation**
  - Protection from DVT: **LMWH, sequential compression devices, early ambulation**
  - Protect from wound infection: shower with chlorhexidine scrub, never use razor, skin prep in OR, pre-op Abx < 24 hours
  - Prevent ventilator associated pneumonia: **head of bed > 30 degrees,** hand washing, oral hygiene, avoid gastric overdistension
  - Prevent periop adrenal crisis in patients on chronic steroids: stress dose 100 mg preoperatively, continue q8 hours, taper off
  - Malignant hyperthermia: give dantrolene
  - Abx:
    - Cardiac, neuro, ortho, vascular surgeries "clean" Ancef (cafazolin) → clindamycin or vanco
    - GI, GU, gyn: broad coverage
-

Indications for select preoperative tests		
ECG	CAD, arrhythmia Asymptomatic with MACE (major adverse cardiovascular event) > 1%	
CXR	Hx of cardiopulmonary dz, undergoing upper abdomen/ thoracic surgery	
Hgb	Hx of anemia, blood loss Undergoing major surgery	
Coagulation & platelets	Hx of abnormal bleeding, anticoagulant use, liver disease, malignancy, spinal anesthesia	
Cr and electrolytes	Hx of CKD, cardiovascular risk calculation On diuretics, ACE inhibitor, ARB	

- **Malignant hyperthermia**
  - Caused by inhaled anesthetics and succinylcholine
  - Hypermetabolic phenomenon, genetic mutation in RYR in skeletal muscle
  - Xs muscle contraction, heating, respiratory/ metabolic acidosis and hyperkalemia
  - Caffeine halothane contracture test is screening
  - Dantrolene uncouples excitation-contraction in muscle cells
- **Screenings**
  - Smoker > 30 pack years= CT chest
  - Smoker any # of years= US
  - Smoking → AAA and MI, atherosclerotic disease
  - HTN → aortic dissection and strokes

SUTURE

- Tissue adhesives with steri trip= port sites
- Delayed closure secondary intention- abscess
- multilayer= tension or motion
- Single lay closure=
- Staples

RUQ	LUQ

Gallbladder, Liver, pneumonia dx : US	Stomach, spleen, pancreas, pneumonia
RLQ	**LLQ**
Diverticulitis, colon cancer, ovarian torsion, ectopic pregnancy	

Gastrointestinal

- **Next steps**
  - **Barium enema** → hirschsprung disease
  - **CT abdomen**
  - **CT angiography** → chronic mesenteric ischemia
  - Colonoscopy
  - Nuclear scintigraphy → meckel scan, T99 technetium, pertechnetate (recurrent intussusception)
  - EGD → ingestion of acid/ alkali
  - Diagnostic paracentesis (cell count and diff) → r/o spontaneous bacterial peritonitis (fever, pain, mental status change), PMN > 250
  - Cytology→ concern for malignancy
  - LDH →
  - Fluid pH → acidic (< 7.3)= infection, malignancy, rheumatoid effusion
  - Ascites bilirubin→ perforated biliary duct or bowel.
  - Urgent surgical exploration→ if complicated SBO
  - MR angiography → acute mesenteric ischemia
  - Abx (rifaximin) → bacterial overgrowth syndrome
  - Mesenteric angioplasty → chronic mesenteric ischemia
  - Restrict dairy → lactose intolerance (frothy/ watery diarrhea)
- **Surgical procedures**
  - **Nissen fundoplication** = GERD tx, sew fundus around LES
    - Complications: damage to CN X → dysphagia in 12 weeks post-op
      - Gas-bloat syndrome: cannot belch, resolves over time with simethicone and avoidance of pop
    - Work-up: scintigraphic gastric emptying scan for gastroparesis
  - **Colonoscopy**
    - Positive Occult GI bleed, asymptomatic anemia
    - Can suggest iron supplementation
  - **Small bowel evaluation**
    - Inconclusive EGD and colonoscopy → video capsule endoscopy or deep enteroscopy
    - Tx: NG tube and resuscitation → surgery
  - **Upper endoscopy**
    - Upper GI symptoms
  - **Hemorrhoidectomy**
    - Symptomatic hemorrhoids

        - Thrombosed hemorrhoids
    - **Flexible sigmoidoscopy**
        - Evaluate rectum to sigmoid colon, fix sigmoid volvulus
    - **Gastrectomy**
        - Loss of pyloric sphincter function during bypass procedure → rapid emptying of gastric contents into duodenum → fluid pulled into the GI tract → hypotension, ANS reflexes, release of VIP
        - Diarrhea, nausea, cramps after earring
        - Tx: dietary modification
- **Aortoenteric fistula**
    - Massive GI bleed from ruptured AAA/ after aortic surgery
    - Most common compilation of colectomy
- **Refeeding syndrome**
    - Hx of gastric outlet obstruction/ anorexia → severe malnutrition → tube feeding
        - Low Phosphate
        - Low Potassium
        - Carbohydrates (tube feeding) → increased insulin secretion → uptake of K, P, Mg → P depletion for glycolysis (ATP 2,3 DPG)
        - Weakness, arrhythmia
    - Tx: monitor labs, repletion of electrolytes
- **Esophagus**
    - **Achalasia**
        - Motility disorder, progressive dysphagia, substernal discomfort
    - **Esophageal atresia**
        - Infant with excessive salivation, coughing and choking at first feeding
        - Dx: nasogastric tube coils in esophagus
    - **Tracheoesophageal fistula**
        - Air goes into the stomach with each breath, reflux of gastric contents moves into trachea
        - Work-up: evaluate for VACTERL abnormalities
    - **Esophageal perforation**
        - Widened mediastinum + crepitus
        - Hx of bisphosphonate therapy, boerhaave syndrome, trauma, endoscopy
        - Dx: esophagography/ barium
        - Tx: max 2 rounds of balloon dilation → stent placement
    - **Zenker diverticulum**
        - Halitosis, dysphagia, vomit
        - Weakness to killian triangle/ dehiscence (between cricopharyngeus muscle and thyropharyngeus (constrictors) muscles
        - Dx: barium swallow esophogram
    - **Foreign body**
        - Signs: sharp objects, drooling, inability to swallow, button battery, magnets
        - Risk of hemorrhage, perforation

        - Dx: imaging (xray, CT) → barium esophagography (several months after ingestion of corrosive agent)
        - Tx: immediate endoscopic removal
    - **Mallory-weiss syndrome**
        - Linear laceration of mucosa due to hematemesis,vomiting, retching, straining, sudden increase in intra abdominal pressure
        - Dx: upper endoscopy
        - Tx: self-limited
    - **Boerhaave's syndrome**
        - Full thickness perforation due to forceful vomiting, hematemesis
        - Subcutaneous emphysema
        - Dx: CXR, esophagography
        - Tx: nasogastric suction, IV Abx, surgical repair
    - **Plummer vinson syndrome**
        - Iron deficiency anemia
        - Esophageal webs= dysphagia to solid and liquids
        - Tx: endoscopic dilation
        - Increased risk of SXX

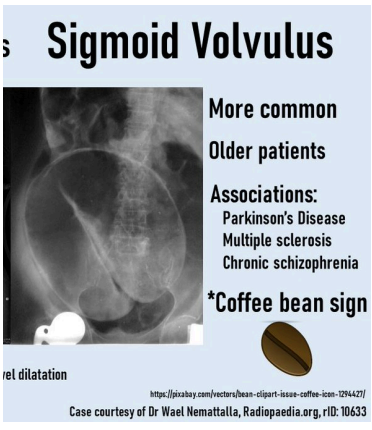
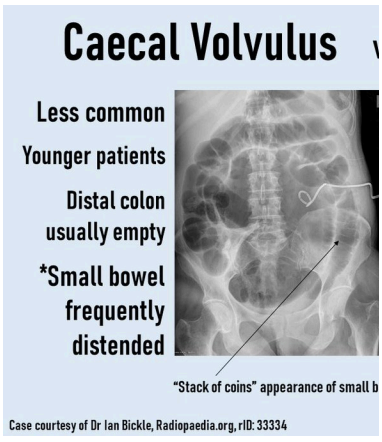
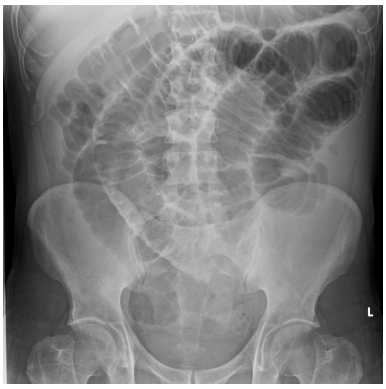
Types of Esophagitis

Type	Risk Factors	Endoscopic Findings	Histologic Findings	Notes
HSV	• Immunocompromised: eg, cancer patients, HIV patients, transplant recipients • Previous infection with HSV 1 or 2	• Well-circumscribed shallow, "punched-out" or "volcano-like" ulcers	• Multinucleated giant cells with ground glass nuclei and eosinophilic inclusions (Cowdry type A inclusion bodies)	• Often presents with concurrent herpes labialis or oropharyngeal ulcer(s)
CMV	• Immunocompromised: primarily seen in AIDS patients with a CD4+ count ≤ 50 cells/mcL who are not receiving HAART therapy	• Linear, longitudinal ulcers that are typically deeper than HSV ulcers	• Large cells containing eosinophilic intranuclear, and frequently basophilic intracytoplasmic, inclusions	• Can cause gastritis, enteritis, or colitis • Oral ulcers are rare
Candida	• Immunocompromised: eg, HIV patients with a CD4+ count < 100 cells/mcL, transplant recipients, patients receiving chemotherapy, patients taking inhaled steroids	• White, mucosal plaque-like lesions	• Yeast cells, pseudohyphae, and true hyphae	• Oropharyngeal disease (thrush) is often seen on examination, although absence does not preclude the diagnosis
Eosinophilic	• Male sex • Possibly increased risk with antibiotic and antacid use • Strong association with atopy	• Stacked, circular rings • Strictures • Linear furrows • White papules	• Eosinophil-predominant inflammation	• Often presents with food impaction (54% of patients) • May have an elevated serum IgE level
Pill-induced	• Recent oral medication use: eg, bisphosphonates, potassium chloride, NSAIDs, antibiotics (eg, tetracyclines)	• Discrete ulcers with normal surrounding mucosa	• Nonspecific inflammatory changes	• Often a diagnosis of exclusion in patients with persistent symptoms (>1 week)
Radiation-induced	• History of thoracic radiation • More likely if underlying esophageal disease (eg, GERD)	• Mucositis • Ulcers (acute) • Strictures (late)	• Epithelial thickening • Chronic inflammatory changes • Submucosal or muscularis fibrosis	• Acute: within 2–3 weeks of radiation • Late: 3–6 months after radiation
Reflux	• Hiatal hernia, obesity, nocturnal reflux, tobacco use, male sex	• Erythema • Ulcers: typically distal and irregularly shaped or linear	• Nonspecific inflammatory changes	• May lead to complications: eg, Barrett esophagus, strictures, adenocarcinoma

- Stomach & duodenum
- **Small intestine**
    - **Ischemic bowel**
        - Pain out of proportion to exam, soft abdomen but patient is writhing/ not moving very much
        - r/o drug seeking

    - **Intussusception**
        - Telescoping of bowel
        - Abdominal pain, bloody currant jelly stool, palpable sausage shaped abdominal mass
        - Dx: US
        - Tx: contrast or **air enema,** surgical resection
    - **Meckel's diverticulum**
        - Painless bleeding
        - Ectopic gastric mucosa → acid leads to further bleed
        - T99 scan
    - **Small bowel obstruction**
        - Mechanical obstruction of small intestine
        - Postop surgical adhesions, hernia, malignancy
        - Abdominal pain, vomit
        - Dx: upright xray “stacked coin” appearance
        - Tx: NG tube, bowel rest
    - Hernia
        - < 1 cm= observe
        - > 1.5 cm, closure failure, bowel incarceration, severe symptoms = surgical closure
- **Appendix**
    - Appendectomy → appendicitis
    - Interval appendectomy → Abx and wait couple weeks, then perform appendectomy if there is no resolution.
    - **Appendicitis**
        - Rovsing's sign: pain increased with pressure on left side
        - McBurneys: pain over appendix
        - Psoas sign: leg extension causes pain
    - Dx: CT
        - In pregnancy → graded compression US
- **Colon, rectum & anus**
    - **Gastrointestinal bleeding**
        - Vomiting blood= tip of nose to ligament of trietz, NG tube → Look then Upper GI endoscopy
        - Melena= tarry stools from digested blood → upper GI endoscopy
        - Red blood per rectum= pass NG tube and aspirate gastric contents → if blood to upper endoscopy exclude
            - Hemorrhoids
            - If blood loss > 2 ml/min → angiogram to embolize bleed
            - If blood loss < 0.5 ml/min → colonoscopy
            - Red-cell study → look for puddling → angiogram
            - Colonoscopy if old
            - T99 scan if bleeding in child

        - Massive upper GI bleed → endoscopy. Tx: angiographic embolization
    - **Post-Op Ileus**
        - Multi-modal pain control
    - **Mesenteric ischemia**
        - Hematochezia, fever, abdominal pain
        - Tx: expectant management if not full thickness, heparin infusion
    - **Clostridium difficile**
        - History of taking antibiotics → develops profuse diarrhea and cramps, fever, leukocytosis
        - Tx: oral fidaxomicin or vancomycin
        - If fulminant C diff with hypotension, shock, megacolon, ileus → oral vancomycin and IV metronidazole
        - Refractory C diff → fecal transplant, surgical intervention
        - Fecal enema= effective for C diff
    - **Sigmoid volvulus**
        - **Sigmoid= Slow & untwISt by endoScopy**
        - Progressive abdominal distension, hemodynamically stable
        - Sigmoid twists on mesentery → gas accumulation, slowly progressive
        - Dx: xray with dilated, inverted U-shape loops
        - Tx: endoscopic detorsion via flexible sigmoidoscopy (if no perforation)
            - If perforation → emergent laparotomy with sigmoid colectomy
    - **Cecal volvulus**
        - **Cecal= aCute= surgiCal**
        - Tx: emergency laparotomy and resection of right colon

Sigmoid volvuus	Cecal volvulus	Small bowel obstruction
		

    - **Intra Abdominal adhesions**
        - Most common cause of mechanical small bowel obstruction
    - **Perforated colon**

        - Free air under diaphragm in upright cxr, pain after colonoscopy
        - Remove that part of the colon with 5cm margins. Make anastomoses.
    - **Diverticulitis**
        - LLQ, fever, leukocytosis +/- urinary urgency
        - Dx: CT with fat stranding
        - Tx: outpatient Abx (metronidazole + ciprofloxacin), clear liquid, bowel rest
    - **Toxic megacolon**
        - Infectious colitis, C. diff, ulcerative colitis
        - SIRS criteria, bloody diarrhea
        - Dilated colon with loss of haustral patterns
    - **Pouchitis**
        - Ulcerative colitis with total proctocolectomy with formation of ileal pouch → inflammation of surgically created pouch
        - Symptoms of UC flare: facel urgency, bloody diarrhea, pain
    - **Surveillance following surgical resection of colon cancer**
        - Stage I – colonoscopy in 1 year and then repeat every 3-5 years
        - Stage II and III – colonoscopy in 1 year then repeat every 3-5 years, annual CT of chest and abdomen +/- pelvis, periodic tumor marker eval (CEA)
        - Stage IV – individualized (unlikely to be tested)
    - **Follicular occlusion**
        - **Hidradenitis suppurativa**
            - Multiple recurrent painful nodules, intertriginous area
        - **Perianal abscess**
            - Fever, pain, tender bulge at anal verge
        - **Perianal crohn disease**
            - Fistulas, fissures, abscesses
            - Painful ulcers with defecation
        - **Pilonidal disease**
            - Young males with sedentary lifestyles
            - Fluctuant mass 4-5 cm cephalad to the anus, mucopurulent or bloody discharge
- **Anorectal disease**
    - **Hemorrhoids**
        - **External hemorrhoids**: pain, pruritus, bright blood → hemorrhoidectomy if symptomatic
        - **Thrombosed external hemorrhoid**: palpable, tender mass below dentate line
            - Tx: sitz baths (decrease sphincter pressures) and analgesics
            - Elliptical incision effect in 48-72 hours, self-resolving
            - Hemorrhoidectomy: conservaitve tx failures
        - **Internal hemorrhoids=** painless bleeding, above dentate line
            - Tx: dietary, lifestyle modification → **rubber band ligation** → **hemorrhoidectomy**

- **Anal fissue**
  - Young women, pain and blood with defecation
  - Intense fear of pain, avoidance of BM
  - Exam under anesthesia
  - Tx: stool softeners, nitro, botox, dilatation, lateral internal sphincterotomy
    - CCB, diltiazem ointment, lidocaine
    - Refractory: surgical intervention
- **Crohn's disease**
  - Affects anal area. Fissure, fistula, small ulceration
  - Failure to heal= crohns
  - Tx: surgery do not tuch the anus. Drain fistula with setons. Remicade helps healing
- **Ischiorectal abscess/ perirectal abscess**
  - Febrile, pain with sitting/ BM
  - Abscess lateral to anus be rectum and ischial tuberosity
  - Watch closely → necrotizing fasciitis
- **Fistula-in-ano**
  - Arises from ischiorectal abscess, migration from anal crypts
  - Cordlike tract felt
  - r/o necrotic or draining tumor
- **SCC of anus**
  - HIV+, fungating mass, mets inguinal nodes
  - Tx: nigro chemoradiation 5 weeks, no surgery

- **Acute abdomen**
  - **Acute abdominal pain**
    - Due to perforation, obstruction, ischemia, unstable→ emergent laparotomy
    - Stable patient with non-acute abdominal pain → CT
    - **Perforation**
      - Sudden onset, constant, generalized and very severe pain
      - Reluctant to move, protects abdomen due to peritoneal irritation
      - Dx: free air under diaphragm in upright xray
      - r/o mimics: MI (EKG, troponin), lower lobe pneumonia (Cxr), PE
      - Surgery: exploratory laparotomy
      - Ex: perforated peptic ulcer, perforated diverticulitis
    - **Inflammatory**
      - Slow, several hours, constant, starts ill-defined area with radiation
      - Peritoneal signs
      - Fever, leukocytosis
      - Tx: Abx
    - **Ischemic**
      - Severe pain w/ blood in lumen
  - **Acute pancreatitis (see below)**
  - **Biliary tract disease (see below)**

- **Ureteral stones**
  - Colicky flank pain radiating to inner thigh/ scrotum
  - Urinary urgency/ frequency, hematuria
  - Dx: CT
  - Tx: tamsulosin, fluids, pain relief, stent
- **Acute diverticulitis**
  - Fever, WBCs, LLQ pain, peritoneal irritation
  - Dx: CT
  - Tx: NPO, IV fluids, abx, drainage if abscess
  - Surgery: > 2 episodes should have removal of affected area

Hepato-Biliary

- **High yield**
  - Porcelain gallbladder → **cholangiocarcinoma**
  - Dx of Gallbladder issues → US
  - Tx of gallbladder issues → cholecystectomy
  - Woman on OCPs→ hepatic adenoma
  - Regenerative nodules → liver injury
  - AFP elevated, weight loss, hepatitis, Hep B or Hep C → HCC
  - 1 or multiple lesions with iron deficiency → liver metastasis
  - Older men with exposure to toxins → hepatic angiosarcoma
  - Jaundice, pruritus, light-colored stools, dark urine, PSC → cholangiocarcinoma
  - Branches of celiac artery: common hepatic, left gastric, splenic artery
  - Murphy's sign → gallbladder pain with inspiration
  - Abdominal US → ascites (screen q 6 months)
  - Jaundice→ hemolytic, hepatocellular, obstructive
- **Liver**
  - **Hepatic metabolic dysfunction**
    - Massive tumor burden → loss of liver synthetic function → ammonia accumulation
      - Asterixis, hepatic encephalopathy
      - Coagulopathy
      - Hypoalbuminemia
  - **NAFLD**
    - Nonalcoholic fatty liver disease
    - Obesity and insulin resistance
    - Can lead to cirrhosis and HCC
  - **Liver lesions**
    - **Hepatic adenoma**
      - Young women on OCPs with RUQ pain
      - Usually asymptomatic
        - < 5 cm stop OCP
        - > 5 cm surgical resection

- Complications: rupture and hemorrhagic shock
- Pathology: soft, yellow and homogenous

■ **Hepatic hemangioma**
- Most common benign liver lesions. Asymptomatic.
- Large lesions can rupture

■ **Focal nodular hyperplasia**
- Young women
- Firm, tan lesion with fibrous septa and central stellate scar

■ **Hemangioma**
- Most common benign solid liver lesion
- US: homogenous mass
- NO LIVER BIOPSY= bleeding
- Histology: pedunculated surface with brown sponge-like interior
- Next steps:
  - < 5: no further imaging
  - > 5: repeat MRI in 6-12 months
    - If growth is < 3 mm= no further imaging
    - If growth > 3mm = repeat in 6-12 months

■ **Hepatocellular carcinoma/ primary hepatoma**
- Alcohol abuse or chronic viral illness
- Progressive, subacute RUQ pain, decompensated
- Hep B or Hep C
- Dx: imaging, pathology: exterior fibrous capsule with areas of necrosis interiorly
- Tx: hepatectomy

■ **Metastatic cancer to liver**
- More common than primary liver neoplasms
- Elevated CEA, colon cancer
- Tx: resection, radioablation

○ **Pyogenic liver abscess**
- Complication of biliary tract disease, acute ascending cholangitis
- Fever, leukocytosis, tender liver
- Dx: US/ CT
- Tx: percutaneous drainage

○ **Amebic abscess**
- Men > women travel to mexico, immigrant
- Dx: serology
- Tx: metronidazole

- **Gallbladder**
  - **Procedures**
    - **#1 US**: any presentation with gallbladder, cholecystitis, any RUQ pain
    - #2 **HIDA scan**: nuclear test that shows no gallstones, shows how bile fills biliary system over time
    - **Cholecystectomy:** performed after ERCP in gallstone pancreatitis

- **MRCP:** diagnostic non-invasive picture of gallbladder issues
- **ERCP**: invasive test / therapeutic gallstone/ tumor stuck in duct somewhere and patient is put under

Management of gallstones	
Gallstones without symptoms	• **No treatment** required in most patients
Gallstones with typical biliary colic symptoms	• Elective laparoscopic cholecystectomy • Possible ursodeoxycholic acid in poor surgical candidates
Complicated gallstone disease*	• Cholecystectomy within 72 hr
*Acute cholecystitis, choledocholithiasis, gallstone pancreatitis.	

- **Hemobilia**
  - Rare upper GI bleed as a compilation of hepatic and biliopancreatic interventions
- **Cholelithiasis**
  - Cholesterol stones > pigmented stones (bilirubin, infection)
    - Hyperlipidemia is risk factor for cholesterol stones
- **Gallstone ileus**
  - Gallstone in bowel lumen
  - RLQ pain, small bowel obstruction
  - Xray: air in biliary tree
  - CT: fistula between gallbladder and duodenum
- **Choledocolithiasis**
  - RUQ pain, elevated WBC, elevated bilirubins
  - Dx: US
  - Tx: ERCP (EGD with special scope) dilated bile duct
- **Acute cholecystitis**
  - **RUQ pain + leukocytosis + fever**, lasts LONGER (hours)
  - Gallstone in cystic duct
  - Obstruction is triggered by fatty foods
  - ADMISSION
  - Tx: laparoscopic cholecystitis
- **Acalculous cholecystitis**
  - Recent surgery/ trauma/ prolonged fasting
  - Fever, leukocytosis and RUQ

        - Caused by bile stasis/ sludge
        - Tx: cholecystostomy
    - **Biliary colic**
        - Stone temporarily occluded cystic duct → colicky pain in RUQ, radiates to shoulder, beltlike to back
        - Self limited ~ 30 minutes → discharge with outpatient surgical followup
        - Tx: anticholinergics, elective cholecystectomy
    - **Sphincter of Oddi dysfunction**
        - Post cholecystectomy colic due to dyskinesia and stenosis → functional biliary disorder
        - Recurrent RUQ pain, normal vitals, elevated ALP
        - Dilated common bile duct
        - Triggers: opioids can cause sphincter contraction
        - Dx: manometry is the gold standard
    - **Acute ascending cholangitis**
        - Dilation of common and intrahepatic bile ducts, inflammation of biliary ductal system
        - Associated with stones, malignancy, biliary stenosis, OSC
        - **Charcot's triad: RUQ, fever, jaundice**
        - Reynolds pentad: Charcot's + confusion and hypotension, tachycardia and leukocytosis
        - Labs: everything elevated (bilirubin, WBC, ALP, ALT, AST)
        - Tx: ERCP, ABx with enteric coverage
    - **Primary sclerosing cholangitis**
        - Asymptomatic, fatigue, pruritus, Hx of IBD
        - Acute cholangitis = Cholestatic liver injury, high ALP, high bilirubin
        - Imaging: beads on a string bild dict on cholangiography
        - Histology: obliterated small bile ducts, concentric onion-skin pattern
        - Complications: biliary stricture, cholangitis, gallstones, cholangiocarcinoma, colon cancer, cholestasis
    - **Primary biliary cholangitis**
        - Autoimmune response to intrahepatic bile ducts → cholestasis
        - Common in middle-aged women
    - **Functional gallbladder disease**
        - Biliary symptoms with normal labs, episodes > 30 min and is recurrent
        - Dx: HIDA
        - Tx: cholecystectomy resolves 90% of cases, low fat diet
    - **Jaundice**
        - **Hemolytic jaundice**
            - Elevated INDIRECT bilirubin
            - Determine what is eating up the cells
        - **Obstructive jaundice**
            - Both direct and indirect bilirubin
            - High ALLP

- Dx: US for dilated bile duct; large thin-walled distended gallbladder with malignant obstruction (courvoisier-terrier sign)
- ERCP if stones, sphincterotomy and remove stone
- CT for tumor → MRCP → ERCP for ductal neoplasm

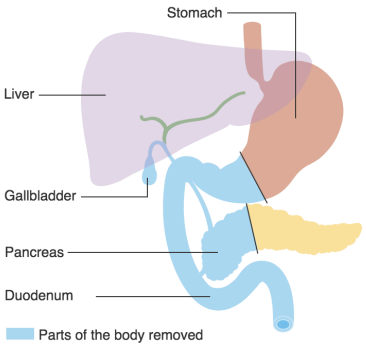
■ **Ampullary cancer**
- Anemia, blood in stools, malignant obstructive jaundice
- Dx: endoscopy

■ **Pancreatic cancer (see below)**

- **Pancreas**
  - **Annular pancreas**
    - Ring like pancreas around duodenum → duodenal obstruction (vomit, pain, early satiety)
  - **Pancreatic divisum**
    - Dorsal and ventral pancreatic duct → recurrent acute pancreatitis
  - **Acute pancreatitis**
    - Common cause: Alcohol abuse > **gallstones** > idiopathic
    - Need ⅔ criteria: HPI, pancreatic enzymes 3x ULN, pancreatitis imaging
    - Tx: pain control and antiemetics
      - I GET SMASHED:
        - Idiopathic
        - Gallstones #1, ethanol, trauma
        - Scorpion bite, mumps, autoimmune, steroids, HLD, hypercalcemia, ERCP, drugs
          - drugs= didanosine, corticosteroids, valproic acid, azathioprine, loop and thiazide diuretics
    - **Acute edematous pancreatitis**
      - EtOH, gallstones, heavy metal intake
      - Elevated amylase/ lipase in serum and urine
      - Elevated Hct
      - Tx: NPO, NG suction, IV fluids
    - **Acute hemorrhagic pancreatitis**
      - Arises from edematous
      - Lower Hct
      - Ranson's criteria: leukocytosis, hyperglycemia, low calcium, lower Hct, BUN up, metabolic acidosis, low PO2
      - Tx: ICU → death, daily CT
      - Abx: penems, quinolones, metronidazole → drainage
    - **Pancreatic abscess**
      - Pancreatitis → 10 days later develop fever and leukocytosis
      - Tx: percutaneous IR drainage/ open surgical drainage
    - **Necrosectomy**
      - Necrotic pancreas. Dead tissue delineated ~ 4 weeks. Material is scooped out, repeat until cleared out
    - **Pancreatic pseudocyst**

- Sequelae of pancreatitis/ pancreas injury → pancreas juices accumulate in lesser sac → pressure on organs → early satiety, vague discomfort
- Hx of ETOH use, recurrent pancreatitis
- CT: encapsulated, fluid-filled mass with thick, fibrous capsule
- Complication: spontaneous infection, duodenal, biliary obstruction, pseudoaneurysm, ascites, pleural effusion
- Tx: endoscopic drainage (if symptoms), IV Abx if infection
- Dx: CT or US
- Tx: < 6cm present for < 6 weeks= observed
    - >6cm or > 6 weeks can rupture/ bleed → drainage endoscopically +/- cytology

        - Symptoms: Epigastric pain radiating to back, N/V, fever, dehydration, shock
        - Complications: pseudocyst, chronic pancreatitis, high mortality
        - Work-up: amylase, lipase x3 uln, WBC
        - Imaging: US, CT, abdominal x ray (sentinel loops)
        - Tx: NPO, IVF, NGT if vomiting, post pyloric tube feeds, PPI, analgesics (not morphine), alcohol withdrawal prophylaxis, **PENEM** abx
    - **Chronic pancreatitis**
        - Recurrent abdominal pain, vomit, steatorrhea, diabetes“burned out pancreas”repeated pancreatitis
        - Hx: smoking, alcohol, family history
        - Tx: pancreatic enzymes if insufficiency, pain difficult to control
        - Surgery: MRCP show obstruction/ dilatation, drainage
    - **Peripancreatic fluid collection**
        - Few weeks after pancreatitis → can become pseudocyst
        - Most common complication of pancreatitis
        - Tx: drainage, aspiration
    - **Post-ERCP pancreatitis**
        - Inflammation of bile duct → pancreatitis after ERCP
        - Dx: CT (fat stranding, looks like a chicken finger)
        - Tx: fluids, pain management
    - **Gallstone pancreatitis**
        - Stone stuck near sphincter of oddi
        - Tx: wait till pain controlled, ERCP, laparoscopic cholecystectomy
    - **Pancreatic cystadenocarcinoma**
        - Asymptomatic, cystic enlarging masses
        - Dx: ERCP → MRCP if contraindicated
        - Tx: surgical resection (pancreaticoduodenectomy/ whipple)- remove head of pancreas, duodenum, gallbladder, common bile duct



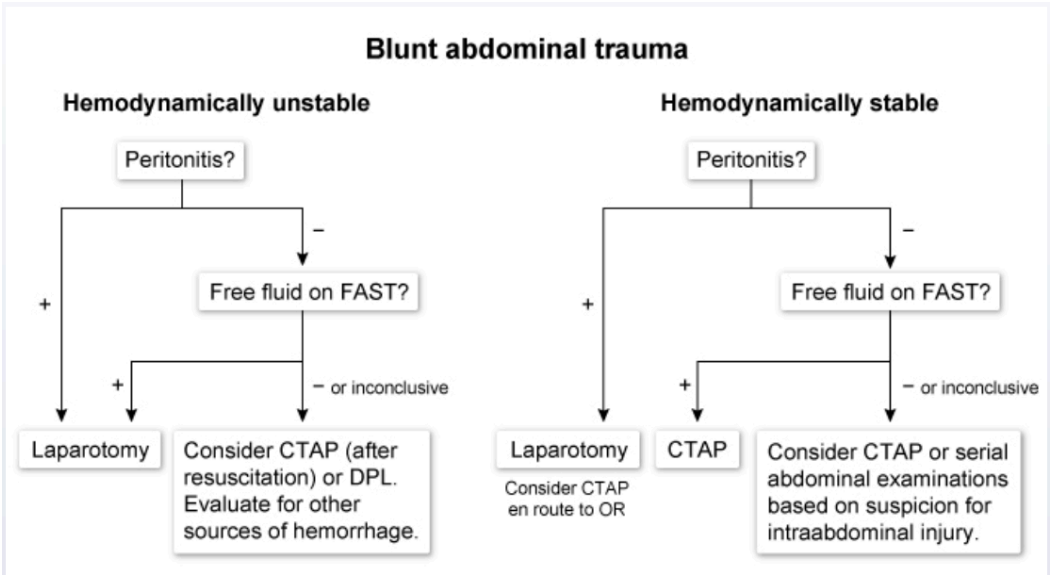
- **Spleen**
  - Splenic infarction

Urology

- **Ureteral injury**
  - Can happen accidentally during a procedure.
  - Clues: bump in Cr, responsive to fluid resuscitation
- **Urethral injury**
  - Trauma can cause it
  - Blood in urethral meatus, ecchymosis, unable to void
  - High riding or absent prostate
  - DO NOT stick tubes up there.
  - Dx: retrograde urethrogram
- **Bladder injury/ rupture**
  - Blunt force injury, gross hematuria, suprapubic tenderness
  - Small urine output, abdominal distension
  - Days after → pancreatic injury presents
  - Dx: retrograde cystopgraphy
- **Renal cell carcinoma**
  - Tx: surgical partial or radical nephrectomy

Trauma & critical care

- **Next steps:**
  - **Diagnostic peritoneal lavage (DPL)** → reduce intra abdominal hemorrhage with questionable bedside US
  - **Decompressive laparotomy** → compartment syndrome
  - **Emergent airway (Cric)** → apnea
  - **Needle decompression** → tension PTX
  - **Chest tube placement** → pleural effusion, hemothorax, PTX (after needle decompression)
  - **Pericardiocentesis** → cardiac tamponade (beck triad)
  - **Pulmonary artery catheterization** → PCWP
  - **Transthoracic echocardiography (TTE)** → cardiac tamponade
  - **Compressive dressing** → control bleeding

- **Fluoroscopic swallowing study** → pharyngeal or esophageal injury
- **Urgent cricothyrotomy** → secure airway
- **CTA** → PE, hemodynamically stable cardiac/ pulm issues, AVM, aortic injury
- **Fasciotomy** → compartment syndrome
- **Urgent angiogram and thrombolysis** (tpa and continuous heparin infusion): severe frostbite with no pulses
- **Professional sitter at bedside** → delirium → soft restraints
- **Catheter angiography** → replaced with MRA
- **MRA** → carotid artery dissection/ horner's syndrome
- **CT head** ⇒ CVA, head trauma from an elderly fall, concussion, neurologic changes
- **Duplex US of neck** → carotid stenosis
- **C-spine radiography** → fracture, trauma → replaced with cervical spine CT
- **FAST exam** → MVA unstable trauma patient, blunt abdominal trauma
- **Rigid bronchoscopy** → aspirated foreign bodies (can breath on one side)
- **Back blows** → total airway obstruction
- **Cervical spine xray** → base of skull fracture
- **Emergent craniotomy** → acute epidural hematomas
- **Lumbar puncture** → meningitis, contraindicated with uncal herniation
- **Tube thoracostomy** → hemothorax in stable patients
- **Open thoracostomy** → massive hemorrhage
- **Retrograde urethrography**→ pelvic injury and posterior urethral injury at bulbourethra membrane
- **Retrograde cystography** → pelvic injury with bladder trauma
- Transthoracic echocardiography → chest trauma with arrhythmia
- 

- **High yield**
  - Neuroleptic malignant syndrome → central dopaminergic receptor blockade → AMS, lead-pipe rigidity, autonomic instability, renal failure

- High-voltage electrical injury: muscle necrosis, compartment syndrome, rhabdomyolysis
- AAA, tearing pain, wide mediastinum, double lumens → tx: labetalol
- Fall and hit to head → subdural hematoma
- Delirious & Agitated elderly person → give **haloperidol**
- Subdural hematoma → crescent shaped lesion that crosses suture lines
- Subarachnoid hematoma → acute, worst HA ever, intensity following brain gyri
- Epidural hematoma → lens-shaped
- **Aortic dissection** → tearing chest pain, high blood pressure

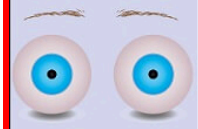
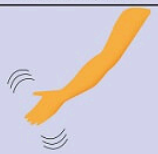
- **Mass transfusion**
  - Whole blood OR pRBC + FFP
  - Tranexamic acid, follow Calcium
  - Avoid hypothermia: warm OR > 30C, warmed IV
  - Anesthesia: ketamine (maintains BP), propofol (reduces SVR), succinylcholine or rocuronium if muscular relaxation needed
  - Hemorrhagic shock: vasopressin or NE
  - If going to OR, get ancef ready to go
  - **Transfusion reactions associated with hypotension**

Reaction	Onset*	Cause	Clinical features
Anaphylaxis	Seconds to minutes	Recipient anti-IgA antibodies	• Shock, angioedema/urticaria & respiratory distress
Transfusion-related acute lung injury	Minutes to hours	Donor antileukocyte antibodies	• Respiratory distress & noncardiogenic pulmonary edema • Bilateral pulmonary infiltrates
Acute hemolysis	Minutes to hours	ABO incompatibility	• Fever, flank pain, hemoglobinuria & DIC
Bacterial sepsis	Minutes to hours	Bacterial contamination of donor product	• Fever, chills, septic shock & DIC

- **Transfusion related acute lung injury**
  - PMNs react to transfused blood → damage to lung microvessels
  - Risks: smoke, alcohol, critical illness
  - Inflammatory pulmonary edema, dyspnea, hypotension, tachycardia
  - Tx: respiratory supportive care

- **Transfusion related circulatory overload**
  - Respiratory distress < 6 hours after transfusion
  - HTN develops with lots of fluids
  - Tx: diuretics
- **ABCs**
  - **Airway:** can patient make noise, speak sentence, no accessory muscle use
    - Urgent expanding hematoma → cutaneous emphysema
    - Emergent airway= apneic, gurgling
      - **Emergent cricothyroidotomy**= method of choice for those who cannot be intubated
    - **Emergency tracheostomy**= done in OR, not urgent
    - **Nasotracheal intubation**= cannot be done in facial
    - **Orotracheal intubation** = method of choice in respiratory distress
  - **Breathing**
    - ventilation= CO_2 → adjust TV and RR
    - Oxygenation = PEEP and FiO_2
      - Bag-Valve mask → Endotracheal intubation → cricothyrotomy (ED) → tracheostomy (OR)
  - **Circulation**
    - Vitals → Shock
      - Systolic < 90
      - Pale, cool, diaphoretic
    - MAP= CO x SVR
      - CO= HR x SV
      - SV= preload and contractility
      - HR either too fast or too slow
      - Proload= volume down (hemorrhage) or obstruction (tension PTX or pericardial tamponade)
      - Contractility= CHF, MI, myocardial contusion
      - SVR high = sepsis, anaphylaxis, anesthesia, spinal trauma
  - **Disability**
    - GCS
  - **Exposure/ Environment**
  - Imaging: Head w/o contrast, Chest and abdomen xray and CT with contrast
- **Glasgow coma scale**
  - Best eye response (4)
    - 4= spontaneous/ normal
    - 3= opens to voice
    - 2= opens to pain
    - 1= no response
  - Best verbal response (5)
    - 5= normal, AOx3
    - 4= confused
    - 3= word salad

        - 2= makes no sense
        - 1= no response
    - Best motor response (6)
        - 6= follows commands
        - 5= moves to localized pain, pushes you away
        - 4= flex or withdrawal from pain
        - 3= abnormal flexion (decorticate)
        - 2= abnormal extension (decerebrate)
        - Lowest score= 3
        - highest= 15
    -

Behaviour	Response
 Eye Opening Response	4. Spontaneously 3. To speech 2. To pain 1. No response
 Verbal Response	5. Oriented to time, person and place 4. Confused 3. Inappropriate words 2. Incomprehensible sounds 1. No response
 Motor Response	6. Obeys command 5. Moves to localised pain 4. Flex to withdraw from pain 3. Abnormal flexion 2. Abnormal extension 1. No response

- **Head trauma**
    - **Intracranial hemorrhage**
        - Closed skull fractures need to be repaired if depressed > 1 cm, frontal sinus involvement, pneumocephalus, gross cosmetic deformity, wound infection
        - CSF leakage → rhinorrhea or otorrhea
        - Tx: t**ranexamic acid** = antifibrinolytic that reduces intracranial bleed
            - Sedation reduces metabolic demand
            - Mannitol reduces ICP
- **Chest trauma**
    - If high risk mechanism or unstable → eFAST, Chest CT, ECG, chest tube when indicated
    - If low risk mechanism and stable, get a CXR, ECG
    - Complications
        - Bronchial rupture
        - Cardiac tamponade
        - Diaphragmatic injury
        - Hemothorax

        - Myocardial and pulmonary contusion
        - Thoracic aortic injury
        - Tracheobronchial injury
    - **Cardiac tamponade**= Hypotension, JVD, muffled heart sounds
        - Next step: pericardiocentesis
        - Pulsus paradoxus= decrease in 10 mmHg BP with inspiration
    - **Rib fractures** → get CT scan abdomen
        - Prevent pulmonary complications= adequate **analgesia** to help patient breath
    - Tension PTX
        - Crepitus & extrapulmonary air
        - Dx: bronchoscopy
        - Tx: tube thoracostomy → persistent leak= tracheobronchial injury

Evaluation and Management of Chest Tubes and Mechanical Ventilation		
Scenario	**Likely Diagnosis**	**Initial Management**
Persistent large air leak from a chest tube that was placed following blunt thoracic trauma	• Tracheobronchial injury	• Bronchoscopy
No breath sounds in the left lung following endotracheal intubation	• Right mainstem intubation	• Reposition the endotracheal tube
Patient develops hypotension and worsening oxygenation while receiving mechanical ventilation with a high positive end-expiratory pressure	• Pneumothorax due to barotrauma	• Chest tube placement
An intubated patient develops a new fever, worsening oxygenation, and/or increased oropharyngeal secretions	• Ventilator-associated pneumonia	• Cultures and empiric antibiotics

- **Blunt abdominal trauma**
    - Dx: FAST (focused assessment with sonography for trauma) + hypovolemic shock → CT if stable enough
        - Free fluid in abdomen= splenic laceration (most common)
        - Large free fluid= abdominal aortic dissection
        - Fluid but no shock= bladder rupture
        - Bowel perforation = bowel contusion, injured mesenteric vasculature
    - Management:
        - Stable? nonoperative, serial Hgb, embolization
        - Unstable (vitals, free air)? Resuscitation → exploratory laparotomy, potential splenectomy
    - Splenic injury (laceration)
- **Pelvic trauma**
    - **Pelvic injury**
        - Urethral injury common → placement of suprapubic catheter to allow urine to bypass injured urethra

        - Posterior urethral injuries more common
        - Tx: surgical intervention
    - **Bladder rupture**
        - Fluid and dullness to percussion
        - Inability to void
        - Increased BUN/ Cr
        - Dx: retrograde cystography
    - **Urethral injury**
        - Dx: retrograde urethrogram
        - Anterior urethral injury: straddle injuries, direct blows, instrumentation, penile fracture. Hemodynamically stable with hematuria, blood at urethral meatus
        - Posterior urethral injury: MVA, perineal hematoma and high-riding prostate on DRE
- **Hemorrhage**
    - Patient losing blood
    - Flat veins, low Hgb, high HR
    - Dx:
        -
        - FAST-US (focused assessment with sonography for trauma)
    - Tx: Apply pressure, go to OR, give fluid and blood
        - Give aggressive crystalloids → dilute clotting factors → coagulopathy
        - 1:1:1 ratio of packed RBCs, plasma, platelets
        - Permissive hypotension (prevent rebleeding/ clot
- **Hypovolemic shock (classes)**

Classification of Hypovolemic Shock				
	Class I	**Class II**	**Class III**	**Class IV**
Blood loss (mL)	Up to 750	750-1500	1500-2000	> 2000
Blood loss (% total volume)	Up to 15%	15-30%	30-40%	> 40%
Pulse rate	< 100	> 100	> 120	> 140
Blood pressure	Normal	Minimal decrease	Decreased	Significantly decreased
Pulse pressure	Normal	Narrow	Narrow	Unobtainable/very narrow
Hourly urine output	> 0.5 mL/kg	> 0.5 mL/kg	< 0.5 mL/kg	Minimal
Mental status	Slightly anxious	Mildly anxious	Anxious	Confused/lethargic

- **Tension pneumothorax**
  - Crushed IVC → decreased preload and blood return to heart
  - Engorged veins/ JVD, decreased breath sounds and hyperresonance
  - Dx: clinical (no need to get CXR- tracheal deviation)
  - Tx: needle decompression/ thoracostomy
- **Cardiac tamponade**
  - Accumulation of blood in the pericardial space
  - Early complication of CABG
  - Signs: hypoperfusion, obstructive shock, decreased CO, cool extremities, low voltage QRS
    - Beck triad: Hypotension, JVD, muffled heart sounds
  - CXR: enlarged cardiac silhouette
  - ECG: electrical alternans, low QRS
  - Pulmonary catheterization: high PCWP
  - Dx: FAST= ECHO
  - Tx: pericardiocentesis
  - Management: IV fluids, drainage
- **Papillary muscle rupture**
  - Complication of myocardial infarction 3-5 days post MI → acute mitral valve regurgitation
- **IV septum rupture**
  - Complication 3-5 days post MI → elevated right ventricle pressure, increased O2 saturation in RV
- **Abdominal Compartment syndrome**
  - Penetrating abdominal trauma, pelvic trauma, rupture AAA, peritonitis, hematoma, sepsis, perforated appendicitis
  - Increased peak airway pressures, decreased venous return and decreased CO, increased SVR, reduced GFR, decreased portal venous flow
  - Intracranial pressure increases → decreased cerebral perfusion pressures
  - Red Flags: Pallor, paresthesia, pulselessness, paralysis, poikilothermia, pain
  - Next steps: measure pressure (via indirectly in bladder) > 0 mmHg is bad
  - Tx: remove bandage → measure→ drain → true compartment syndrome needs laparotomy
    - Supportive management: hemodynamic stabilization (fluids, transfusions), percutaneous drainage, ventilation
    - Time to Fasciotomy correlated to outcomes. < 4-6 hours to avoid necrosis
- **Leg/ arm compartment syndrome**
  - Fractures → swelling in an anatomic space, increasing swelling/ pain
  - Pain out of proportion to physical examination, worse with passive stretching, tight wood-like muscles
  - Chronic compartment syndrome: young athletes in Lower extremities. Pain and swelling worse with exercise
- **Orbital compartment syndrome**
  - Tx: orbital decompression

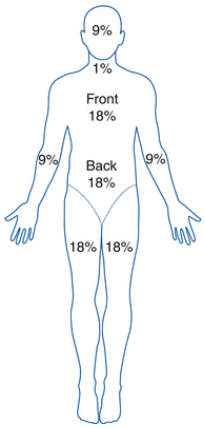
    - Tight “hard induation” eye, RAPD, proptosis
- **Femoral neck fracture**
    - If patient is unstable → echo, cardiac markers, CXR…wait up to 72 hours to stabilize
    - If stable → hemiarthroplasty
- **Burns**
    - **Facts**
        - Alkali burns are more serious bc body cannot buffer the base, burns for longer
        - How is myoglobinuria treated: avoid renal injury. HAM
            - H= hydration and IV fluids
            - A= alkalinize urine with IV bicarbonate
            - M= mannitol diuresis
        - Inhalation injury: cricothyroid junction is narrowest in kids → emergency airway access
    - **Classification**
        - Primary degree= epidermis only
        - Secondary degree= partial-thickness/ epidermis with some dermis
        - Third degree= all layers including entire dermis

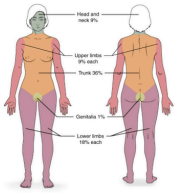
	Injury	Appearance	Treatment
Primary	Epidermis	Painful, dry, red	Keep clean, neosporin, pain meds
Secondary	Epidermis + dermis	Painful Blisters, swollen, mottled, weeping surfaces. Superficial second degree: blanching Deep second degree: non-blanching	remove blisters, Silvadene ointment, dressings
Third	Dermis	Painless (no nerve endings left), charred, dried leather Reduced pulses	early excision of eschar and skin graft - Split thickness skin graft - Escharotomy, incision through burned skin

    - **Rule of nines**
        - **TBSA** (total body surface area) is calculator using rule of 9’s → TBSA and depth of burn determine severity
        - **Parkland formula:** V= TBSA burn % x weight (kg) x 4/ 2= volume in 8 hours

- Estimates volume of crystalloid for initial resuscitation, ½ volume given in first 8 hours
- Only use formula when > 20% TBSA partial/ total thickness
- Crystalloid given through 2 large bore venous catheters
- Rule of 10's: determine hourly IVF rate: TBSA x 10 (patients 40-80kg)

Adult body	% of total
Part	BSA
Arm	9%
Head	9%
Neck	1%
Leg	18%
Anterior trunk	18%
Posterior trunk	18%



Parkland Formula		
	**"Rule of 9s"**	• Head = **9%** • Chest = **18%** • Back = **18%** • Upper extremities (**18%**): ◦ Right arm (anterior and posterior) = 9% ◦ Left arm (anterior and posterior) = 9% • Lower extremities (**36%**): ◦ Right leg (anterior and posterior) = 18% ◦ Left leg (anterior and posterior) = 18% • Perineum = **1%**
	Parkland burn formula	• **% BSA** (body surface area affected) **x weight** (kg) **x 4** (mL/kg) ◦ 1/2 administered in **first 8 hours** ◦ 1/2 administered in **next 16 hours**

- **Next steps:** burn center referral
  - > 20% TBSA if partial-thickness, > 10% partial thickness in kids/ elderly
  - > 5% TBSA if full-thickness
  - Any burns with inhalation injury, trauma, electrical burns, burns of facem hands, feet, perineum
    - Fluorescein → for eye burns
    - Bronchoscopy → inhalation
  - Labs: carboxyhemoglobin
- **Treatment**
  - Superficial: Keep clean, neosporin, pain meds
  - Partial-thickness: remove blisters, Silvadene ointment, dressings
  - Full-thickness: early excision of eschar and skin graft
  - Prophylaxis: **tetanus**
  - Initial management should include <u>fluid resuscitation, dry dressings of the wounds, analgesia and tetanus prophylaxis</u>.
  - Fluid management during the first 24 hours is critical
    - **Lactated ringers=** Colloid, D5W and 5% albumin at 0.5 cc/kg/% BSA
  - Topical ointments
    - Mafenide acetate: CA inhibitor → metabolic acidosis
    - Silver sulfadiazine: transient leukopenia
    - Bacitracin → yeast rash
    - Sodium hypochlorite → irritation. No not use to neutralize an acid chemical burn (causes exothermic reaction)
    - Calcium gluconate gel: use in acid burns (hydrofluoric)
  - Nutrition
    - **Enteral nutrition**: large burns

        - The amount of fluid necessary during the first 24 hours can be estimated by the **Parkland formula: Body weight (kg.) X (% of body burn) X 4= total Liters of fluid over 24 hours**
            - Two thirds are given during the first 8 hours.
            - Take half the value and divide by 8 hours= fluid rate/ hour
        - The goal is to maintain a urine output of 30-50 cc/hr.
        - **Debridement** of wounds to remove all necrotic and infected material
        - Skin **grafting** with autographs if possible, or allografts if requirements exceed available donor sites for autographs.
    - **Hypermetabolic syndrome**
        - Protein catabolism, weight loss, severe electrolyte abnormalities, muscle weakness later on
        - INTERMITTENT Tachy, HTN, fever, hyperglycemia, lean
    - **Burn shock**
        - Loss of fluid from intravascular space ⇒ leaking capillaries that require crystalloid infusion
    - **High-voltage electrical injuries**
        - Causes muscle necrosis, rhabdomyolysis, compartment syndrome, AKI
        - Increase IV fluids (parkland formula underestimates fluid requirements)
        - Administer sodium bicarb to cause metabolic alkalosis → excrete myoglobin
        - Fasciotomy for compartment syndrome
        - IV bolus mannitol
    - **Carbon monoxide poisoning/ Carboxyhemoglobin**
        - Administer FiO2 100%
    - **Pseudomonas infection**
        - Cultures: GNR

- **Wounds and wound healing**
    - **High yield:**
        - **Vitamin C deficiency**: poor wound healing, gingivitis, petechiae
        - **Tissue trauma=** causes fever

Complication	Physical Examination Findings	Treatment
Superficial wound dehiscence	• Skin and subcutaneous tissue defect, but fascia remains intact	• Local wound care, including packing the wound or negative pressure wound therapy
Fascial dehiscence	• Skin, subcutaneous tissue, and fascial defect • Can present with a large volume of serosanguinous drainage from the wound because of leakage of peritoneal fluid	• Urgent surgical exploration and repair
Evisceration	• Bowel and possibly other intra-abdominal organs protrude from the incision	• Cover the bowel with moist gauze, place an occlusive dressing over the defect • Emergent surgical exploration and repair

    - **Osteomyelitis**
        - Unstable → empiric Abx
        - Stable → MRI

Transplants

- Prophylaxis:
    - Fluconazole = cover fungal if lung and liver transplant
    - TMP-SMX= renal transplant for pcp prophylaxis
    - Solid organ transplantation= inactivated flu vaccine, TMP-SMX, ganciclovir, fungal prophylaxis

Nutritional support

- *You want to start enteral nutrition within 24-48 hours per actual protocol (but in the hospital we actually start ~5 days). If the patient is unable to tolerate enteral nutrition (various reasons such as injury to GI tract, vomiting) you start TPN at day 5-7. NG tube is a temporary way to feed the gut. PEG (G-tube) is for someone extended to need TF for a longer period of time.*
- *Diet graduation for non-complicated post op patient that can tolerate EN feeding: NPO > Clear Liquid Diet (CLD) > Full Liquid Diet (FLD)> Soft Foods > Regular Diet*
- Due to a hypercatabolic state, critically ill patients (ICU) have increased energy expenditure and protein requirements. In such patients, early nutritional support can prevent malnourishment and improve overall outcomes.
- *Normal bowel sounds and passing gas/ stool are not required for initiation of EN because they are indicative of contractility rather than mucosal integrity and absorptive capacity*
- *Closest way to feed like normal*
- When feasible, it is the **optimal form of nutrition** for critically ill patients and has multiple clinical benefits when initiated early <48 hr
    - Reduction in infections (pneumonia)
    - Possible reduction in mortality
    - Maintain gut integrity
    - Preventing atrophy of gut- and mucosa- associated lymphoid tissues
- EN formules can be tailored to provide various amounts of carbohydrates (both simple and complex), protein, fatty acids, vitamins, minerals, and electrolytes
- **Routes for GI Feeding: PO, NG feeding, gastrostomy, jejunostomy**
    - Tube feeds can be initiated at a low rate (ie trickle feeding) and progressively increased as tolerated by the patient
    - **Percutaneous endoscopic gastrostomy (PEG)**
        - Endoscope is placed in the stomach, which is then inflated with air
        - A needle is passed into the stomach percutaneously
        - Wire is passed through the needle traversing the abdominal wall
        - Gastrostomy is then placed by using the Seldinger technique over the wire
    - **Total parenteral nutrition**
        - Administered via enteral venous catheter (vs peripheral venous catheter) because the high osmotic loading is damaging to peripheral veins

        - Typically **used only for patients with contraindications to EN (intestinal discontinuity, prolonged ileus)** because early initiation may increase the risk of infection (central line associated bloodstream infection) and lead to prolonged ICU and hospital stays
        - Common indications for TPN
            - NPO > 7 days
            - Enterocutaneous fistulas
            - Short bowel syndrome
            - Prolonged ileus
        - Complications
            - Line infection
            - Fatty infiltration of liver
            - electrolyte/glucose problems
            - Pneumothorax during placement of central line
            - Loss of gut barrier
            - Acalculous cholecystitis
            - Refeeding syndrome
            - Hyperosmolality
        - PO feedings should start after flatus or stool after a laparotomy (usually post-op days 3-5)

Fluids/ electrolytes and acid-base balance

- **Next steps**
    - Respiratory acidosis → rapid sequence endotracheal intubation
    - Reduce cerebral blood flow → Hyperventilation, CPP= MAP- ICP
    - Mass effect → Decompressive craniectomy
    - Increased osmolality → Hypertonic fluid and mannitol, Reduce ICP
    - Everything is Crystalloid except albumin
        - ICU patients need albumin if lots of fluid resuscitation and develop edema
- Hypernatremia
    -
- Hyponatremia
    - D5W + ½ NS
- Hypokalemia
- hyperkalemia

Fluid	Contents	Clinical use	Adverse outcomes
Normal saline	154 mEq Na and Cl	Isotonic Volume resuscitation	
½ NS	77 mEq Na and Cl	hypotonic	

Lactated ringers (crystalloids)	130 mEq Na 109 mEq Cl 28 mEq lactate 4mEq K 3 mEq Ca	Isotonic Lactate converted to bicarbonate → can cause alkalosis if used as maintenance fluid. Given to prevent muscle breakdown Volume resuscitation	Hypothermia + Acidosis + (non anion gap hyperchloremia metabolic acidosis) + Coagulopathy= Increased mortality. DONT GIVE IN HYPERKALEMIA
Plasmalyte			
D5W	5% dextrose (50g) in H2O	Free water deficit	Hyperglycemia
Dextrose 5% in ½ NS		Maintenance hydration	
Albumin 5% or 25%	COLLOID	Hepatorenal syndrome Spontaneous bacterial peritonitis Volume replacement	
3% saline	hypertonic	Severe symptomatic hyponatremia	

Type of Acid-Base Disorder	Acute (Uncompensated) pH	Acute (Uncompensated) Pco_2 (Respiratory Component)	Acute (Uncompensated) Plasma HCO_3^{-a} (Metabolic Component)	Chronic (Partially Compensated) pH	Chronic (Partially Compensated) Pco_2 (Respiratory Component)	Chronic (Partially Compensated) Plasma HCO_3^{-a} (Metabolic Component)
Respiratory acidosis	↓↓	↑↑	N	↓	↑↑	↑
Respiratory alkalosis	↑↑	↓↓	N	↑	↓↓	↓
Metabolic acidosis	↓↓	N	↓↓	↓	↓	↓
Metabolic alkalosis	↑↑	N	↑↑	↑	↑?	↑

Coagulation and transfusion

- **Next steps**
  - Patient going into surgery/ risk of hemorrhage/ trauma → type and cross blood
  -
- **High yield**
  - 1:1:1 ratio of packed RBCs, FFP plasma, platelets
  - Therapeutic PT= 2-3.0

Product	Composition	Clinical use
Whole blood	Everything	Combat
pRBCs	Packed RBCs 1 unit - 300 mL No platelets or clotting factors Can be mixed with NS to infuse faster Citrate / EDTA→ chelates calcium	Universal donor: O negative Watch for hypocalcemia
Platelets	6-10 units from single donor	Replace platelets when < 10K
FFP	Fresh frozen plasma	Replace clotting factors Universal donor AB

Cryoprecipitate	Replace fibrinogen, Vwf, some clotting factors	Vwf disease +/- DDAVP

- **DVT**
  - Prevented with injectable LMWH heparin
  - Risk factors: pregnancy, cancer, bed-ridden
- **Heparin-induced thrombocytopenia**
  - Older patient undergoes surgery and develops leg swelling a 5-10 days later
  - Dx: US, low platelets
  - Tx: non-heparin anticoagulant, Direct thrombin inhibitors, fondaparinux, direct factor xa inhibitors, warfarin
- **Transfusion reactions**
  - **Acute hemolytic transfusion reaction**
    - Due to mismatched ABO incompatibility, due to clerical error
    - Occurs in minutes to hours after transfusion → intravascular hemolysis
      - Flank pain, renal failure, hemoglobinuria, fever
      - DIC
  - **Anaphylactic transfusion reaction**
    - Seconds- minutes of transfusion initiation
    - Angioedema and respiratory distress
    - Due to IgA
  -

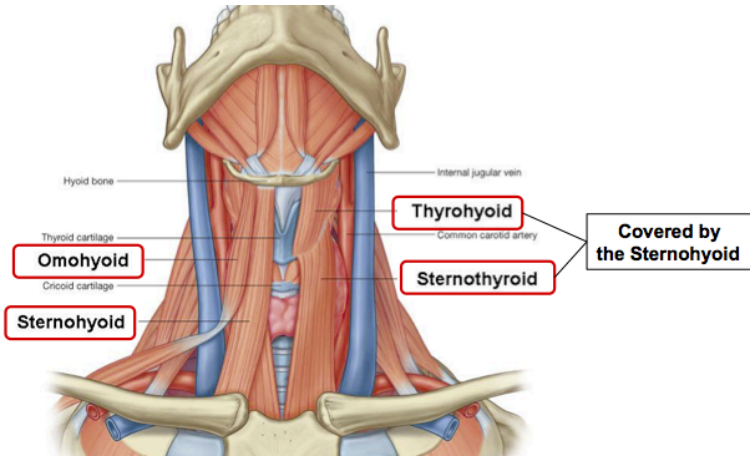
Endocrine

- **Next steps**
  - **Thyroid US:** solid or cystic thyroid nodule
  - **FNA**: cytology, diagnostic test of choice for thyroid nodule→ FN rate 5%
  - Core needle Biopsy: follicular carcinoma
  - **I 123 scintiscan**: hot or cold thyroid nodule, multiple nondiagnostic FNAs / nodule + thyrotoxicosis with low TSH
  - **Thyroid suppression test**: diagnostic/ therapeutic administration of thyroid hormone, can eliminate up to half of benign thyroid nodules
  - Thyroidectomy in toxic multinodular goiter, compressive symptoms, cosmetic deformity, cannot rule out malignancy
  - Workup for thyroid CA: **FNA, US, TSH, calcium, CXR +/- Iodine scan**
  - Lateral cervical LN: selective neck dissection
  - Central cervical LN: central neck dissection
  - Pentagastrin stimulation: medullary carcinoma
  - Parathyroidectomy → primary hypercalcemia
- **High yield**

    - Hot nodule: increased iodine uptake= functioning/ hyperfunctioning nodule
    - Cold nodule: minimal I uptake, non-functioning
    - Most common cause of thyroid enlargement: multinodular goiter
    - Plummer's disease: toxic multinodular goiter
    - Treatment for patient with hx of radiation, thyroid nodule, negative FNA: remove nodule
    - Lateral aberrant thyroid in PTC: metastatic PTC to LN
    - Lab value to follow after thyroidectomy: CALCIUM
    - Post-op thyroidectomy dyspnea → hematoma, B/L recurrent laryngeal nerve damage
    - Most common cause of hypercalcemia = hyperparathyroidism
    - Hypotension, shock, GI pain= primary adrenal insufficiency
- **Thyroidectomy**
    - Anatomy
        - First branch off EXTERNAL carotid artery= **superior thyroid artery**
        - Branch of the thyrocervical trunk= **Inferior thyroid artery**
        - Venous drainage of thyroid= superior, middle and inferior thyroid vein → brachiocephalic vein
        - Thyroid lobe appendage from hyoid bone to isthmus= **pyramidal** (seen in 50% of people), drained by delphian LN
        - Thyroid **isthmus**: connects Left and Right thymus lobes
        - Paired nerves: **recurrent laryngeal nerve** (innervate the laryngeal ABductors and cause hoarseness if unilateral; airway obstruction in bilateral); **superior laryngeal nerve** (damage causes deeper/ quiet voice, cannot hit high pitches).
    - Indications: **biopsy proven malignancy**
        - Thyroid nodules (~5% population)
            - Ddx: multinodular goiter, adenoma, hyperfunctioning adenoma, cyst, thyroiditis, carcinoma, lymphoma, PTH carcinoma
            - 3 main non-thyroidal neck masses
                - Inflammatory: abscess, lymphadenitis
                - Congenital lesions: thyroglossal duct cyst (midline), branchial cleft cyst (lateral)
                - Malignant lesion: lymphoma, mets, SCC
            - Malignancy
                - History: FMHx, MEN2, young age, male > female
                - Signs: single nodule, cold nodule, increased Calcitonin, LNs, hard/ immonle nodule, EUTHYROID
                    - 25% cold nodules are malignant
                    - Association with Ras gene family and RET proto-oncogenes
                - Symptoms: voice change (vocal cord prolapse), dysphagia, discomfort, rapid growth
                - Most common site of Mets: **PULMONARY**

- Treatment algorithm:
    - < 1.5 cm with no history: thyroid lobectomy and isthmectomy; near-total thyroidectomy, total thyroidectomy
    - > 1.5 cm, cervical LN or Hx of radiation: total thyroidectomy
    - Positive cervical LN do not affect prognosis

- **Thyroid cancer:**
    - 80% is **papillary thyroid carcinoma** = POPULAR
        - Common in 30-40 yo women
        - Psammoma bodies, spread by lymphatics→ lung
        - Good Iodide uptake, 95% 10 year survival
        - **P's=** popular, psammoma, palpable LN, positive Iodine uptake, positive prognosis, postoperative I scan, Pulmonary mets
        - Tx: surgical resection
    - **Follicular carcinoma**
        - Rubbery, encapsulated nodule, spreads hematogenously→ Bone
        - Male < female 1:3
        - Good Iodine uptake, 85% 10 year survival.
        - Need a biopsy for Dx→ capsular and blood vessel invasion
        - Tx: total thyroidectomy
        - F's= far away mets (bone by blood), Female, no FNA dx, Favorable prognosis
    - **Medullary carcinoma**
        - Associated with Men2→ screen for pheochromocytoma and hyperparathyroidism (RET proto-oncogene)
        - Dx: FNA → Histology: amyloid. LN involvement correlated to poorer prognosis.
        - Secretes **calcitonin**, poor iodine uptake
        - Stimulation test= pentagastrin → increases calcitonin
        - Spreads LN and hematogenously
        - Tx: total thyroidectomy and median/ modified LN dissection
        - M's: MEN2, aMyloid, Median LN dissection, Modified neck dissection if lateral nodes positive
    - **Hurthle cell carcinoma**
        - Cancer of hurthle cells arise from follicular cells. No iodine uptake
        - FNA can see cells, biopsy required for dx
        - Lymphatic spread > hematogenous
        - 80% 10 year survival
    - **Anaplastic/ undifferentiated carcinoma**
        - Commonly arises from follicular CA
        - Seen in women > men, 2% thyroid CA

        - Histology: giant cells, spindle cells
        - Poor iodine uptake, dismal prognosis
        - Dx: FNA (large tumor) → ddx: thyroid lymphoma
        - Small tumors → total thyroidectomy + XRT/ chemo
        - Airway compromise → debulking surgery, tracheostomy, + XRT/ chemo
    - Procedure: central horizontal incision → elevate flaps above the strap muscles, preserve anterior jugular veins. Up to hyoid, down to sternum. Divide the raphe of strap muscles. Joll's triangle dissected out. Preserve superior laryngeal nerves. Divide thyroid veins/ arteries upper/ lower pole and ligate. Preserve parathyroid glands and nerves. Carefully divide Berry's ligament
    - Landmark for superior laryngeal nerve: tracheoesophageal groove near cricothyroid.
    - Post-op: thyroid hormone replacement, suppress TSH
        - Post-op Iodine scan, treat residual CA with ablative doses of Iodine
    - 

- Benign thyroid disease
    - **Graves disease**
        - Most common cause of hyperthyroidism
        - Auto-Ab to TSH receptors
        - Female > male 6:1
        - Most specific finding: exophthalmos
        - Dx: increased T3, T4, anti-TSH receptor Ab, decreased TSH, global uptake of iodine
        - Tx:
            - Medical blockade: iodide, propranolol, PTU (propylthiouracil- inhibits incorporation of iodine into T4-T3 via peroxidase oxidation block, inhibits peripheral conversion of t4→ T3), methimazole (blocks incorporation of iodine ~ PTU only, Lugol's solution (KI)
            - Radioiodine ablation (most popular)
            - Surgical resection: B/L subtotal thyroidectomy
                - Indication: suspicious nodule, noncompliant to medications, pregnant, child, refused radiotherapy

        - Complications: hypothyroidism
    - **Toxic multinodular goiter**
        - Plummer's disease
        - Multiple thyroid nodules with 1+ producing thyroid hormone → hyperthyroidism, can be triggered by amiodarone
        - Localized by iodine scan
        - Tx: remove hyperfunctioning nodule with lobectomy or near total thyroidectomy
    - **Acute Thyroiditis**
        - Painful, swollen, thyroid with fever. Skin erythema, dysphagia
        - Due to bacteria (strep or staph) → thyroglossal fistula/ anatomic variant
        - Tx: Abx, drainage, needle aspiration for culture, remove fistula
    - **Subacute thyroiditis/ De Quervain's thyroiditis**
        - Glandular swelling, tenderness, after URI, elevated ESR
        - Due to viral infection
        - Tx: NSAID +/- steroids
    - **Chronic thyroiditis**
        - Hashimoto's thyroiditis
            - Autoimmune
        - Riedel's thyroiditis
            - Benign inflammatory enlargement with fibrosis; painless thyroid
            - Tx: surgical tracheal decompression, hormone replacement
- **Parathyroid**
    - 4 parathyroids, located posterior and lateral to the thyroid, below the inferior thyroid artery
    - Ectopic thyroid glands commonly located in the thymus, carotid sheath, behind esophagus
    - Superior parathyroid → 4th pharyngeal pouch
    - Inferior parathyroid → 3rd pharyngeal pouch
    - Blood supply: inferior thyroid artery
    - Chief cells produce PTH → increase calcium levels from bone breakdown, Gi absorption (in duodenum and proximal jejunum), kidney resorption. Decrease serum phosphate
    - Vitamin D increases intestinal absorption of calcium and phosphate
- **Primary adrenal insufficiency**
    - Hx of fatigue, weight loss, abdominal pain, anorexia, GI disturbances
    - Stress → Adrenal crisis → severe hypotension, shock
    - Eosinophilia, hypoglycemia
    - Tx: rapid volume repletion, glucocorticoid replacement
- **Primary Hyperparathyroidism**
    - Parathyroid adenoma
- **Secondary hyperparathyroidism**
    - Due to CKD → decreased P excretion (calcium-phosphate complexes in blood), decreased formation of Vit D → reduced intestinal absorption

    - PTH increases Ca, cannot overcome disruption → increased bone turnover
    - Osteitis fibrosa cystica: renal osteodystrophy, fractures, subperiostial resorption
- **Endocrine tumors**
    - Carcinoid syndrome
    - Gastrinoma
    - Medullary thyroid cancer
    - **Pheochromocytoma**
        - episodic headache, sweating, and tachycardia. Can also present with paroxysmal hypertension or treatment-resistant hypertension
        - Alpha blockade with phenoxybenzamine
        - Followed by beta blockade with propranolol to control hypertension
        - Pre-op tx: alpha blockade before beta blockade

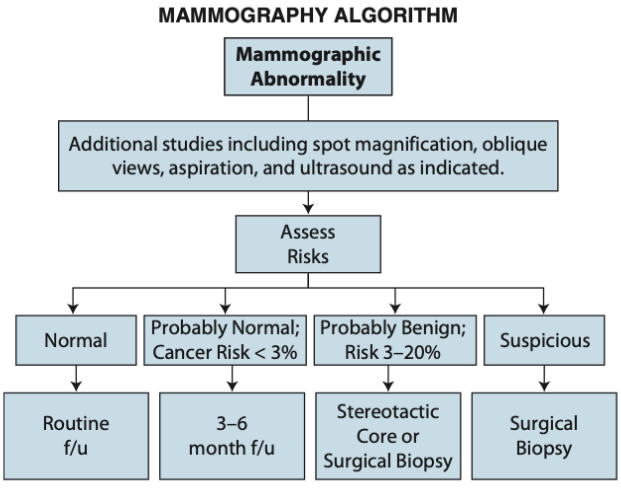
Breast

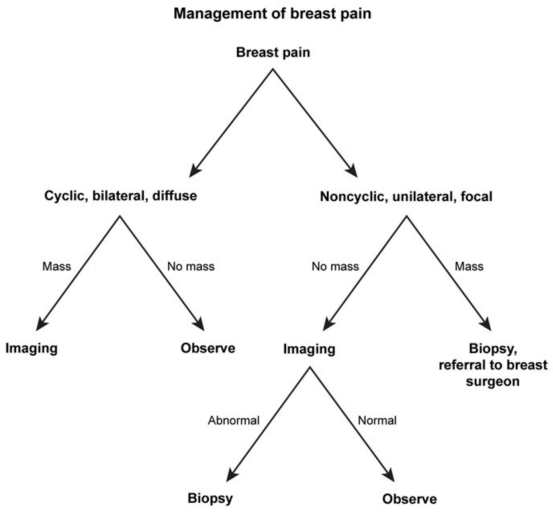
- **Next steps**
    - **Tests for breast cancer:** mammogram, US, MRI
    - Breast exams: 1 week after menstrual period
    - **FNA:** determine if there is malignancy
    - **Needle localization biopsy:** done by a radiologist. Checked with mammogram to ensure mass is excised
    - **Core needle**
    - **Lumpectomy**
    - **Chemotherapy**
    - **Hormonal therapy:** ER, PR+ cancer
    - **Aspiration:** breast abscess in lactating and young female
    - **Core biopsy:** malignancy in breast detected on mammogram, irregular border mass
    - **Stereotactic biopsy**: mammotome or need localization biopsy on non-palpable mass seen in mammogram.
    - **Excisional biopsy**: resectable lesion from a core biopsy proven malignancy or a bothersome fibroadenoma
        - Indications: persistent after aspiration, solid, blood, suspicious lesion, bloody niple discharge, ulcer or dermatitis
    - Radiation: triple negative breast cancer in tumor free surgical margins
    - **Chemotherapy**: try to reduce a tumor fixed to chest wall before mastectomy, Triple negative breast cancer
    - **Lumpectomy and sentinel LN biopsy**: early stage breast cancer needs breast conservation
    - **Hormonal therapy**: ER+/ PR+ breast cancer
    - **Simple / total mastectomy:** remove breast, nipple and skin
    - **Radical mastectomy:** resect entire breast and muscle, LNs

- **Mammogram**: breast mass > 40, paget disease (dimpling of breast, BILATERAL mammogram), every year/ every other year > 40 yo (masses more visible in elderly due to fatty replacement)
  - OBSERVATION IS NOT AN OPTION IF >30yo!! Needs workup
  - Low BI-RADS score = ultrasound for possible cyst
  - High BI-RADS score = biopsy or excision
  - spiculated= cancer
- **US**: breast mass < 30
  - Ultrasound can tell if solid or cystic
  - Good for determining fibroadenoma/ cysto-sarcoma phyllodes
  - In young women high likelihood of breast cyst
  - Non-cystic lesions may be followed with mammogram or biopsy

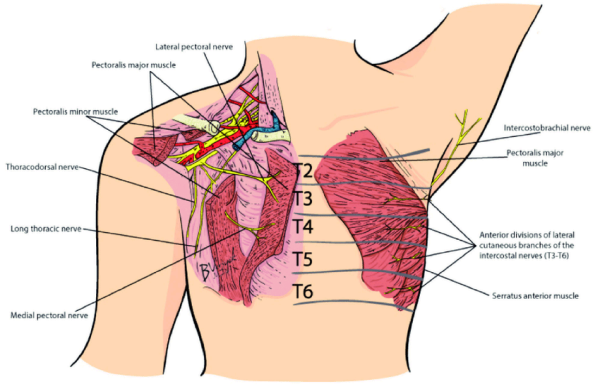
TYPES OF MASTECTOMY

Simple or total mastectomy	Removal of breast tissue, nipple-areola complex, skin.
Extended simple mastectomy	Removal of breast tissue, nipple-areola complex, skin & level I axillary nodes.
Modified radical mastectomy	Removal of breast tissue, nipple-areola complex, skin & level I, II axillary LNs.
Halstead's radical mastectomy	Removal of breast tissue, nipple-areola complex, skin, pectoralis major & minor &level I, II, III axillary LNs.
Extended radical mastectomy	Radical mastectomy + removal of internal mammary LNs.
Super radical mastectomy	Radical mastectomy + removal of internal mammary LNs, mediastinal & supraclavicular LNs.





- **High yield**

- **Anatomy**
  - 4 nerves: long thoracic, thoracodorsal, medial pectoral, lateral pectoral
    - Long thoracic: lateral chest wall, inn serratus anterior → winged scapula
    - Thoracodorsal: lateral to long thoracic on latissimus dorsi
    - Medial pectoral: lateral to pectoralis minor muscle, lateral to lateral pectoral nerve (goes thru pec minor and major)
    - Lateral pectoral nerve: medial to medial pectoral nerve
    - Preserve the intercostobrachial nerve: sensory nerve that traverses axillary
  - Vein that marks upper limit of axilla: axillary vein
  - Lymphatic drainage of axilla: lateral = axillary LLN, medial= parasternal nodes, runs with internal mammary artery
  - Rotter's nodes: nodes bw pectoralis major & minor
  - Suspensory breast ligaments= cooper's ligaments
  - 

- **Risk factors:**
  - Female
  - 1st degree family history of breast or ovarian cancer, particularly premenopausal
  - Personal history of atypical ductal hyperplasia or lobular carcinoma in situ (LCIS)
  - Early menarche/late menopause
  - Nulliparity
  - Hormone receptor therapy use

TABLE 17-2. ANDI Classification of Benign Breast Disorders

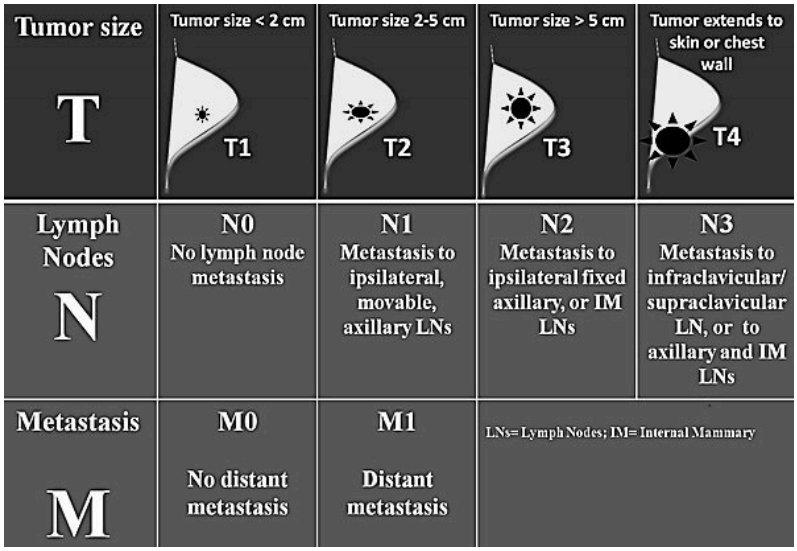
	Normal	Disorder	Disease
Early reproductive years (age 15–25 years)	Lobular development Stromal development Nipple eversion	Fibroadenoma Adolescent hypertrophy Nipple inversion	Giant fibroadenoma Gigantomastia Subareolar abscess Mammary duct fistula
Later reproductive years (age 25–40 years)	Cyclical changes of menstruation Epithelial hyperplasia of pregnancy	Cyclical mastalgia Nodularity Bloody nipple discharge	Incapacitating mastalgia
Involution (age 35–55 years)	Lobular involution Duct involution Dilatation Sclerosis Epithelial turnover	Macrocysts Sclerosing lesions Duct ectasia Nipple retraction Epithelial hyperplasia	— Periductal mastitis — Epithelial hyperplasia with atypia

ANDI = aberrations of normal development and involution.

- **Inflammatory**
  - **Mastitis**
    - Etiology: *Staphylococcus aureus* or *Streptococcus* spp.
    - Most commonly occurs during early weeks of breast-feeding
    - Focal tenderness with erythema, Warmth of overlying skin, Fluctuant mass occasionally palpable
    - Diagnosis:
      - Ultrasound to localize an abscess
      - If abscess is present, incision & drainage → Gram stain and culture → antibiotics
    - Treatment: Prevent engorgement of breast, Continue breast-feeding and recommend use of breast pump as an alternative
  - **Inflammatory breast carcinoma**
    - "Mastitis that does not improve with abx"
    - Invasive disease on presentation
  - **Fat necrosis**
    - Firm, irregular mass of varying tenderness
    - Predisposing factors: history of local trauma in ~50% of patients; previous radiation
    - PE: irregular mass without discrete borders that may or may not be tender; later collagenous scars predominate
    - Diagnosis & Treatment: excisional biopsy with pathologic evaluation for carcinoma
- **Benign breast lesions**

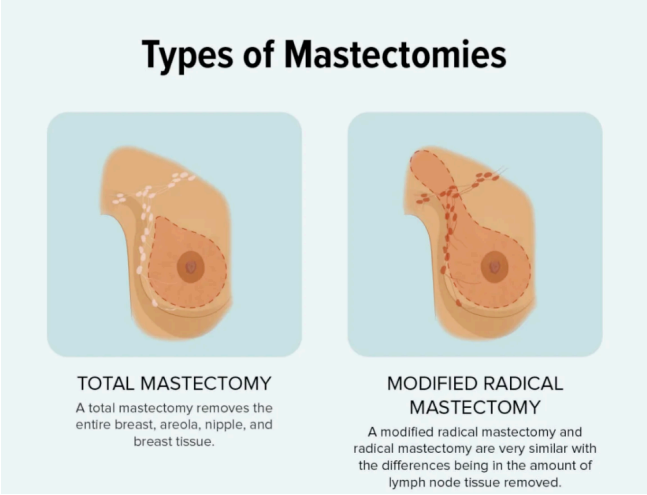
- **Intraductal papilloma**
  - Bloody discharge
  - Excision to r/o atypia
- **Fibroadenoma**
  - Young women with firm, mobile mass, increased size with estrogen therapy/ pregnancy
  - Whorl-like pattern
  - Tx: excision
- **Fibrocystic changes**
  - Young women with BILATERAL breast tenderness, hormonal. Fluctuates with menses
  - PE: Discrete areas of nodularity within fibrous breast tissue
  - Diagnosis: aspiration or biopsy with pathologic evaluation
  - Treatment
    - Absence of a persistent mass: conservative management – NSAIDS, OCPs, danazol or tamoxifen; avoid caffeine, tobacco, cola drinks
    - If single dominant cyst: aspirate fluid
    - Atypical ductal or lobular hyperplasia: must be excised
- **Mammary duct ectasia/ plasma cell mastitis**
  - Inflammation and dilation of mammary ducts
  - Presentation: non cyclical breast pain with lumps under nipple/areola with or without a nipple discharge
  - PE: palpable lumps under areola, possible nipple discharge
  - Dx: clinical, excision biopsy required to rule out cancer
  - Treatment: Excision of affected ducts
- **Phyllodes tumor**
  - Variant of fibroadenoma but indistinguishable from fibroadenoma by ultrasound or mammogram; Rare breast masses characterized by large, multilobular shape
  - Dx: biopsy with pathologic evaluation
  - Treatment: wide local excision
- **Intraductal papilloma**
  - *Most common cause of unilateral bloody nipple discharge*
  - A benign local proliferation of ductal epithelial cells; unilateral serosanguineous or blood nipple discharge
  - PE: Subareolar mass and/or spontaneous nipple discharge; radially compress breast to determine which lactiferous duct expresses fluid
  - Diagnosis: evaluate resected specimen
  - Treatment: excise affected duct
- **Gynecomastia**
  - Development of female-like breast tissues in males; at least 2 cm of excess subareolar breast tissue
  - Treatment: treat underlying cause

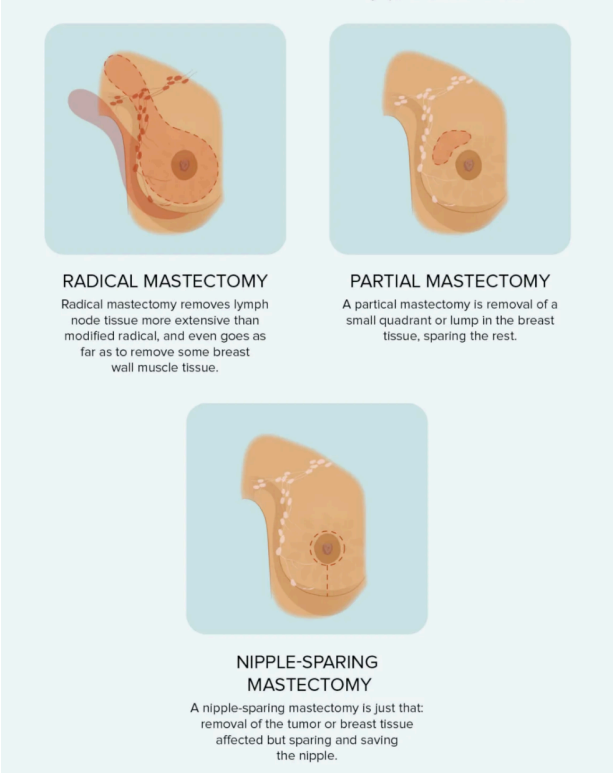
- **Breast cancer**
  - Risk factors= NAACP
    - Nulliparity, menses < 13 yo, menopause > 55, cancer in family, pregnancy > 30 yo
    - increased exposure to estrogen, nulliparous, early menarche, older menopause, BRCA 1, BRCA2
  - Physical risk factors: CHAFED LIPS
    - Cancer in breast, hyperplasia, atypical hyperplasia, female, elderly, DCIS, LCIS, inherited genes, papilloma, sclerosing adenosis
    - Most develop in outer quadrant
  - 12% lifetime risk, 75% of cases are sporadic
  - Protective factors: breastfeeding, exercise, < 30 yo pregnancy
  - Young women: fibroadenoma
  - Older woman: carcinoma
  - Suspicious findings: mass, microcalcification, stellate/ spiculated
  - **TNM Staging**



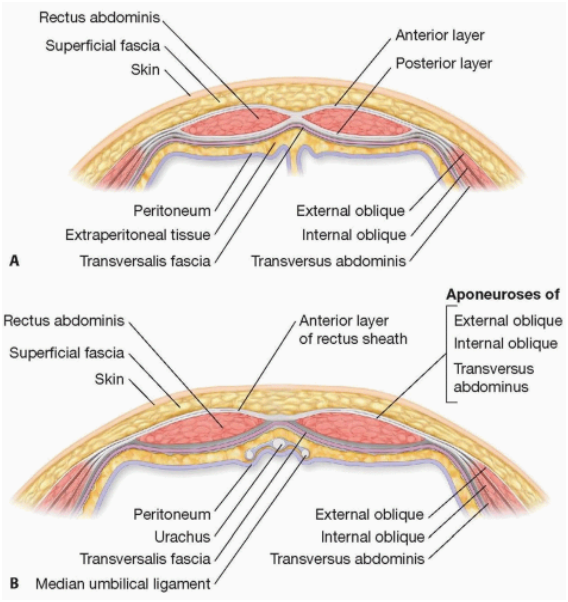
  - **Invasive ductal carcinoma**
    - Most common invasive breast cancer; most common in perimenopausal and postmenopausal women
    - Ductal cells invade stroma in various histological forms
    - Skin retraction- tumor cells of cooper's ligaments
  - **Invasive lobular carcinoma**
    - 2nd most common type of invasive breast cancer
    - Originates from terminal duct cells, has a high likelihood of being bilateral
    - Ill-defined thickening of breast, lacks microcalcifications, often multicentric
  - **Paget's disease of breast**
    - 2% of all invasive breast cancers
    - Presentation: tender, itchy, nipple, with or without a bloody discharge with or without a subareolar palpable mass. Peau d'orange
    - Diagnosis: biopsy shows Paget's cells in epidermis

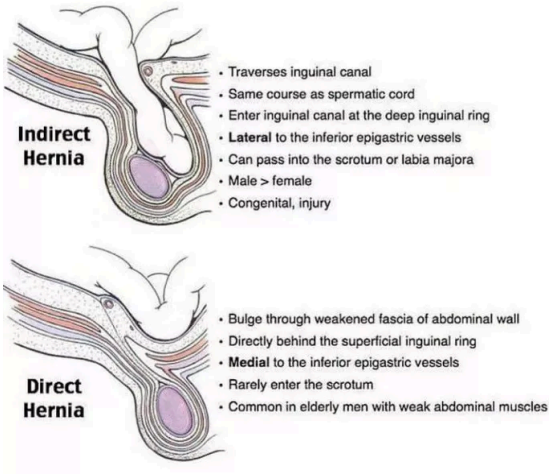
        - Treatment: Radical mastectomy
    - **Inflammatory carcinoma**
        - Frequently presents as warmth, erythema, (blockage of efferent lymphatic ducts causing edema→) “peau d’orange”, induration, and nipple retraction
        - Diagnosis: Skin biopsy shows dermal lymphatic invasion
        - Treatment: Chemotherapy followed by surgery and/or radiation, depending on response to chemotherapy
    - **Treatments**
        - Premenopause, node +, ER negative= chemotherapy
        - Premenopause, node +, ER positive= chemotherapy + tamoxifen
        - Premenopause, node negative, ER positive= tamoxifen +/- chemotherapy
        - Postmenopause, node positive, ER += tamoxifen +/- chemotherapy
        - Postmenopause, node positive, ER negative= tamoxifen +/- chemotherapy
        - Early invasive (stage 1-2): mastectomy + axillary sentinel LN bx
            - Lumpectomy, sentinel lymph node biopsy, and adjuvant radiation therapy
        - Locally advanced breast cancer (stage 3)
            - Mastectomy with axillary lymph node dissection for pathologically confirmed nodal disease
        - Advanced breast cancer
            - Systemic and palliative treatment
            - Possible mastectomy for palliation and relief from foul discharge and pain


Types of Mastectomies
TOTAL MASTECTOMY
A total mastectomy removes the entire breast, areola, nipple, and breast tissue.
MODIFIED RADICAL MASTECTOMY
A modified radical mastectomy and radical mastectomy are very similar with the differences being in the amount of lymph node tissue removed.


RADICAL MASTECTOMY
Radical mastectomy removes lymph node tissue more extensive than modified radical, and even goes as far as to remove some breast wall muscle tissue.
PARTIAL MASTECTOMY
A partical mastectomy is removal of a small quadrant or lump in the breast tissue, sparing the rest.
NIPPLE-SPARING MASTECTOMY
A nipple-sparing mastectomy is just that: removal of the tumor or breast tissue affected but sparing and saving the nipple.

Hernias





- **Next Steps**
  - Valsalva, indirect or direct, indirect
  - Valsalva maneuver: dx inguinal hernias
  - US: high suspicion with a negative exam
  - Elective open inguinal hernia repair: symptomatic hernia (asymptomatic does not require repair)
  - Laparoscopic mesh repair adults with B/L inguinal hernias
  - High ligation of the sacs: infants with B/L patent processus vaginalis
- **High yield**
  - **hernia**= protrusion of peritoneal sac through the abdominal wall, due to fascial defect
  - Most common= indirect inguinal > direct inguinal
  - Indirect hernia
  - **Direct inguinal hernia**= weakness in abdominal wall (transversalis) deep to superficial inguinal ring and extends into scrotum, medial to epigastric vessels, with in hesselbach's triangle
  - **Indirect inguinal hernia**= hernia lateral to hesselbach's triangle, MOST COMMON
  - Precipitating factors= increased intra-abdominal pressure, straining, coughing, obesity
  - Tx: hernia repair (small defects more dangerous), avoid complications of strangulation
  - Pain from hernia: due to ilioinguinal nerve compression
  - **Reducible hernia:** ability to return displaced organ or tissue/ hernia to its anatomic site
  - **Incarcerated**: swollen, fixed in hernia sac, can cause intestinal obstruction
  - Strangulated: incarcerated
- **Types of hernias**

    - Sliding hernia
        - Hiatal hernia → observe if incidental/ asymptomatic → nissen fundoplication
    - Littre's hernia
    - **Spigelian hernia**
        - Hernia through semilunar line lateral to rectus muscle
    - Internal hernia
    - Petersen's hernia
    - Obturator hernia
    - **Pantaloon hernia**
        - Hernia sac straddles inferior epigastric vessels
    - Incisional hernia
    - Ventral hernia
    - Parastomal hernia
    - Port Site hernia
    - **Richter's hernia**
        - Only part of the diameter of a hollow viscus is incarcerated, no complete mechanical bowel obstruction
    - Epigastric hernia
    - Umbilical hernia
    - **Femoral hernia**
        - In the femoral canal. Vessels lateral, inguinal ligament anterior, cooper's ligaments posteriorly
        - incarcerated= hernia cannot be reduced with manual pressure
        - strangulated= necrotic tissue, should not be reduced. Blood supply cut off
    - Indirect hernia
    - **Direct hernia**
        - In hesselbach's triangle
    - Hiatal hernia
- **Hernia repair**
    - External oblique → medial and lateral crus of aponeurosis → spermatic cord/ round ligament + ilioinguinal nerve
    - Divide transversalis fascia to exposure femoral canal
    - Femoral repair: mesh is fixed to cooper's ligament

Infections & Postoperative issues

- **Next step:**
    - **Lateral neck x-ray:** epiglottitis
    - **ASO titers:** acute rheumatic fever
    - **Sputum gram stain and culture:** pneumonia
    - **Lower extremity ultrasound:** DVT
    - **ABI**: peripheral artery disease (highest ankle/ highest brachial)
    - **CT chest**: pulmonary embolism

    - **PT/INR**: warfarin therapeutic range
    - **CT abdomen/ pelvis without contrast:** retroperitoneal hematoma
- **High Yield:**
    - Osteomyelitis in healthy: Staph aureus → Nafcillin/ oxacillin/ cefazolin
    - Osteomyelitis in SCD: salmonella, staph aureus → MRSA coverage, cephalosporin (ceftriaxone, cefotaxime)
    - Most common post-op cause of fever > 48 hours post-op= **UTI**
    - 1-2 days post abdominal surgery= atelectasis (prevented by incentive spirometry)
    - 4-6 days post-op= DVT
    - 7 days post-op= drug fever
    - Revascularization surgery → emboli to feet and heart, other organs
    - Post-Op fever (5W)

      Screening the postsurgical patient with the "5Ws" mnemonic is a helpful way to consider the most common causes of postsurgical fevers.
      - **Wind**-pulmonary causes of fever (e.g., pneumonia, pulmonary embolism, and aspiration)
      - **Water**-urinary tract infection
      - **Wound**-wound infection
      - **Walk**-venous thromboembolism
      - **Wonder drugs**-drug-related fever (e.g., antibiotics and heparin)

        ■
- Anesthesia
    - Emergence from anesthesia
        - 15 min after extubation
        - Gag reflex
    - Delayed emergence
        - Drug effect: preop infection
        - Prolonged anesthesia
        - Metabolic disorder: hypo/hyperglycemia
        - Neurologic disorder, seizure, stroke
    - Malignant hyperthermia
        - Hypermetabolic state
    - Postextubation laryngeal edema
        - Hypercarbin and hypoxic respiratory failure, stridorous
- **Pain control**
    - Nonopioids (NSAIDS, tylenol) + regional anesthesia
    - Add opioids as needed
        - IV → oral in short course 3-5 days
        - If opioid user, avoid but do short course if necessary
- **FEVER**
    - > 100.4
    - Due to tissue trauma, blood transfusion, infection, venous thromboembolism
    - Release of IL-6, IL-1, TNFa, IFNy
    - Commonly seen < 6 hours after surgery (open surgeries)

Timeline and Differential Diagnosis of Postoperative Fever		
Classification	**Timeline (Time from Surgery)**	**Differential Diagnosis**
Immediate	• Within hours (typically < 6 hours)	• Tissue trauma (most common) • Anaphylaxis • Blood products • Malignant hyperthermia
Acute	• 24 hours to 1 week	• Catheter site infection • Myocardial infarction • Nosocomial infection • Surgical site infection (most commonly due to *C. perfringens* or group A *Streptococcus*) • Venous thromboembolism (eg, deep vein thrombosis [DVT], pulmonary embolism [PE])
Subacute	• 1 week to 1 month	• Catheter-site infection • *Clostridioides difficile* • Drug fever • Surgical site infection • Venous thromboembolism
Delayed	• > 1 month	• Surgical site infection (due to indolent organisms) • Viral infections

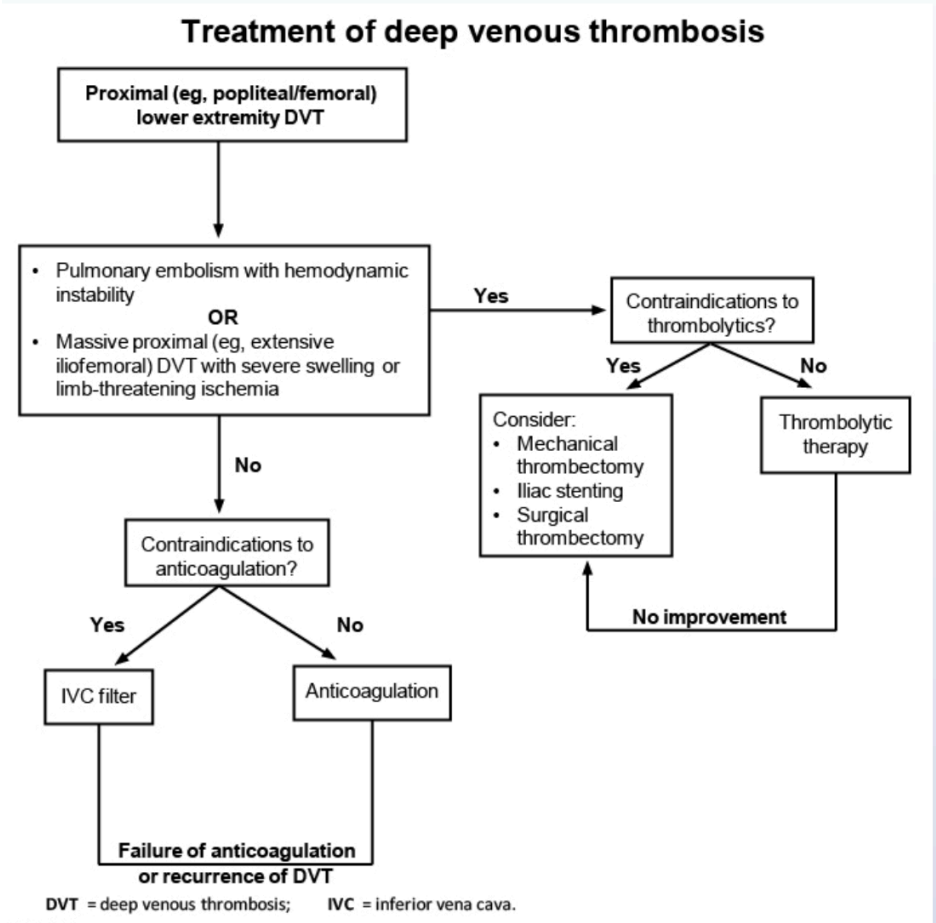
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Acute (postoperative days 1-7)	• Atelectasis	• Rule out all other causes • Chest radiograph can show atelectatic lung	• Incentive spirometry, ambulation, chest physiotherapy
	• Pneumonia	• Chest radiograph, sputum culture, respiratory symptoms	• Antibiotics
	• Venous thrombosis	• Ultrasound of lower extremities	• Heparin
	• Pulmonary embolism	• Tachypnea, tachycardia, ECG with right heart strain, arterial blood gases, CT pulmonary angiography, ventilation-perfusion scan, pulmonary angiogram	• Heparin, possible inferior vena cava filter
Subacute (postoperative weeks 1-4)	• Deep infection (abscess near surgical site)	• Imaging based on symptoms and type of surgery performed • Often a CT scan	• Variable based on size, location • Prefer minimally invasive percutaneous drainage to open drainage
	• Soft tissue infection	• Physical exam, wound culture	• Antibiotics, possible drainage
Delayed (postoperative >4 weeks)	• Viral infection	• Exclude all other causes	• Variable

- **SIRS (systemic inflammatory response syndrome)**
    - Tachycardia, tachypnea, fever, leukocytosis
    - SIRS criteria > 2/ 4
        - Temp > 38 or < 36

        - Tachypnea > 20
        - HR > 90
        - Leukocytes < 4K or > 12K
    - Sepsis= SIRS + source of infection
- **Sepsis**
    - Sources: pneumonia, diabetic foot infection, wound
    - Early interventions:
        - Aggressive fluid resuscitation in 3 hours
        - Blood culture + Broad spectrum Abx in 1 hour
- **Urinary tract infections**
    - E coli, klebsiella, proteus, candida
    - Most common nosocomial infection
    - Tx: Abx (bactrim), ciprofloxacin, check culture and sensitivity
    - Change foley more often (every 3 days?)
- **Central line infections**
    - Signs: unexplained hyperglycemia, fever, AMS, hypotension, tachy, shock
    - Central line associated bloodstream infection=
        - Central line > 2 days in place
        - + blood culture
        - No other sources of infection
    - Change central when infected → send for culture, IV Abx, place new central line in different spot
    - Increased risk with TPN central line
- **Wound infection**
    - Infection of operative site on POD 5-7
    - Pain at incision site, erythema, drainage, induration, fever
    - Tx: remove skin sutures/ staples, r/o dehiscence, pack wound open, culture, Abx
    - Common bugs: Staph aureus, E coli, enterococcus
    - Bugs that cause infection in first 24 hours: Strep, clostridium (bronze-brown weeping wound)
- **Peritoneal abscess**
    - Tx: drainage, Abx with gram negative coverage
- **Anastomotic leakage**
    - Peritonitis
    - Occur in 1st week of surgery
    - Confirmed with gastric infusion of methylene dye
    - Tx: Abx and surgical closure
- **Necrotizing fasciitis**
    - Tx: surgical exploration & debridement
- Gas gangrene
- **Revascularization surgery**
    - “Trash foot “= embolization of atheroscloerotic debris to smaller vessels
    - Self-resolves
- **Warfarin necrosis**

    - Anticoagulation therapy complication
    - Occurs after a loading dose
    - Occurs in breast, extremities, trunk
    - Spreads over hours
- Hidradenitis suppurativa
- Pseudomembranous colitis
- **Pneumonia**
    - uncomplicated= sterile exudate in pleural smass
    - complicated= infection= empyema, parapneumonic inflammation
    - Both complicated & uncomplicated tx= Abx
- **Empyema**
    - Pus and bacteria in pleural space
    - Tx: 2-4 weeks of Abx and drainage (chest tube)
- **Lung abscess**
    - Cavitary lesion with air-fluid level
    - Foul smelling sputum and symptoms develop days-weeks
- **Surgical injuries**
    - **Nerve trauma**
        - **Long thoracic** = winged scapula
        - **Intercostobrachial nerve=** radical mastectomy and axillary LN dissection
        - **Phrenic nerve injury during CABG**= paradoxical movement of abdomen
- Post-op infections
    - Risks: old, chemo, immunosuppressed, obesity
- **DVT**
    -



Risk Factors for Surgical Site Infection	
Patient Factors	• Advanced age • Chemotherapy and/or radiation therapy • Concurrent infection at another site • Immunosuppressive drugs (eg, infliximab) • Malnutrition • Obesity • Peripheral artery disease and/or venous insufficiency • Smoking • Systemic glucocorticoids • Uncontrolled diabetes
Procedural Factors	• Emergency surgery • Inadequate antibiotic prophylaxis • Inadequate sterile procedures (eg, site preparation, hand hygiene) • Open surgical approach • Surgery for malignancy

Skin and Subcutaneous Tissues

- **Next steps:**
  - **Measure ABI, consult vascular surgery for bypass:** PVD
  - **Biopsy wound:** longstading wound with recent changes, look for malignant transformation to SCC (Marjolin's ulcer)
  - Swab and culture, start Abx:
  - **Debride and regraft wound:** necrotic, ulcerated skin. Excision.
  - **excision biopsy:** greatest diameter of lesion + margins on either side. Do measurement before cutting
  - Simple repair: single layer closure
  - Intermediate repair: layered closure 1+ deeper layer of SQ, fascia
  - Complex repair: more than layered closure (debride, scar revision, underreaming)
  - Flaps: Z-plasty. Excision and flap/ tissue rearrangement
- **High yield**
  - Over Exuberant wound healing at sites of surn, surgery, piercing→ **keloid**
  - Brown recluse spider bite
  - Benign or malignant → anatomic site → excision size. Coding goes based on origin (sebaceous cyst= skin, lipoma= SQ), cosmetic if no indication like pain, drainage, infection.
  - Breslow depth
    - In situ lesions → surgical margin 0.5-1 cm
    - Lesion < 1mm → surgical margin= 1cm
    - Lesion 1.01-2mm → surgical margin 1-2cm
    - Lesion > 2mm= 2cm margin
  - Step on nail → staph aureus or pseudomonas > tetanus
- **Skin cancer**
  - **50% BCC**
    - Upper face, timetable measured in years, does not metastasize
    - Local invasion "rodent ulcer"
    - Waxy, raised +/- ulcer
    - Biopsy the edge, 1mm margin
    - Tx: mohs surgery
  - **25% SCC**
    - Lower lip and rest of body, measured in months, mets to LN
    - Sample LN if surgical margins are positive. Margins must be 0.5 -2cm
    - Tx: excision, radiation
  - **15% Melanoma**
    - Sporadic or arises from pigmented lesion
    - ABCDE
    - prognosis= depth of invasion. Breslow depth. > 4mm = poor prognosis
    - Metastatic malignant melanoma
      - Goes everywhere. Masquerader
      - Unpredictable time course

        - Disseminated melanoma
            - Incurable.
            - Tx: IFN improves survival time. Molecular genetics determine tx
- **Critter Bites**
    - **Black widow**
        - Local and systemic toxin effects → muscle pain, abdominal rigidity, muscle cramps
    - **Brown recluse spider bite**
        - Small papule →days to weeks later develop deep skin ulcer → necrosis
    - **Lyme disease**
        - Arthritis, arrhythmia, facial palsy, erythema migrans
    - **Snakebites**
        - Severe local pain, swelling, discoloration
    - **Animal bites**
        - Puncture wounds
            - Irrigation, debride devitalized tissue, remove foreign bodies
            - Suture
            - TdAP, tetanus IG
            - Abx: amoxicillin/ clavulanic acid (normal pet), rabies (if voracious animal)
- **Cellulitis**
    - Most commonly due to Staph aureus
    - Purulent cellulitis + sepsis = MRSA → parenteral vancomycin
    - non-purulent= MSSA → vancomycin
- **Necrotizing fasciitis**
    - Surgical debridement
    - Polymicrobial
    - Risks: DM, alcoholism, PVD, IVDA

	Acute Infectious Lymphangitis	Sporotrichosis
Causal organism(s)	*Streptococcus pyogenes* and methicillin-sensitive *Staphylococcus aureus*	*Sporothrix schenckii*
Risk factor	Recent cutaneous abrasion	Gardeners (spores are traumatically introduced into the skin via a thorn prick)
Timeline of development	Within several days	Within several weeks
Clinical features	Tender and erythematous streaks proximal to the wound Tender lymphadenopathy in regional lymph nodes	Local pustule or ulcer with nodular lymphangitis
Treatment	Cephalexin	Itraconazole

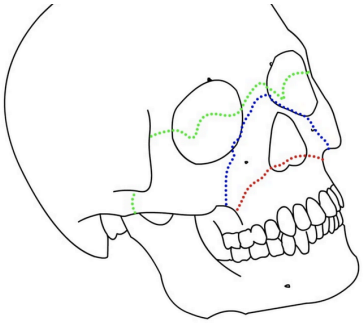
Neurosurgery

- Next steps
    - Brain bleed → CT scan shows bleed → urgent surgical decompression
    - Ischemic stroke → anticoagulation

    - Peritumoral edema with central necrosis → glucocorticoids
    - CSF analysis / lumbar puncture → obstructive hydrocephalus
    - Emergent laminectomy and decompression → spinal epidural abscess
- **Epidural abscess**
    - Staph aureus, HIV, old age, spinal surgery, IVDA
    - Triad: fever, severe back pain, neuro changes, elevated EST
    - Dx: MRI contrast, Blood and aspirate culture
    - Tx: surgery laminectomy and decompression, ABx
- **Brain tumors**
    - Primary tumors from bone, liver, lung, melanoma, breast
    - Tx: multimodal, surgery, radiation, chemo
        - Decrease ICP with steroids!

Orthopedics

- Le fort fractures
    - Le fort I= only maxilla
    - Le fort II= maxilla, nasal bones, medial aspect of orbits
    - Le fort III= complete craniofacial disjunction of maxilla, zygoma, nasal bones, cranial bones



Schematic representation of Le Fort fractures:
Red dotted line: Le Fort 1
Blue dotted line: Le Fort 2
Green dotted line: Le Fort 3

- **Fat embolism syndrome**
    - Pelvic and long bone fractures (closed)
    - Dyspnea, petechial rash
- **Acute limb ischemia**
    - Pallor, pulseless, paresthesias, cool, pain
    - Risk of embolism from thrombus → give IV heparin
    - Next steps: ABI, CT legs
    - Tx: surgical bypass graft
    - If thrombus from heart → get an ECHO

ENT

- Congenital neck masses

- Thyroglossal duct cyst
    - Midline at hyoid, tongue movement retracts mass
    - Tx: surgical removal of cyst, hyoid and tract
- Branchial cleft cyst
    - Anterior edge of sternocleidomastoid muscle
- Cystic hygroma
    - Base of neck, large ill-defined mass. Extend into mediastinum
    - Dx: CT

Cardiothoracic

- **CABG**
    - 3 vessel disease
    - Internal mammary artery/ internal thoracic a. > saphenous vein
    - Avoid nitrates in RCA infarcts
    - Complications
        - Cardiac surgery postpericardiotomy fibrinous pericarditis
        - Few days: MI-postinfarction fibrinous pericarditis
        - Few weeks: dressler's syndrome
        - Renal failure: elevated Cr after cardiac surgery
    - Post MI
        - Vfib most common cause of death
        - Papillary muscle rupture
        - Ventricular free wall rupture= becks triad of cardiac tamponade and rapid decompensation
        - Interventricular septal rupture: bubble study, cath shows pressure equal b/w chambers
- **Pericarditis**
    - Pleuritic CP worse with supine, improved with sitting
    - Tx: NSAIDS
- **Endocarditis**
    - Dx: TTE w/ blood cultures
    - Tricuspid regurg= staph aureus
        - dental= viridans
        - Prosthetic valve= epidermidis
    - Complications: intravascular hemolysis= reduced haptoglobin, low Hgb, indirect hyperbilirubinemia
    - Abx prophylaxis: cyanotic CHD and prosthesis

Leg pain that is better at night with "shiny" extremities-**varicose veins.**
Leg pain that is worse at night in a 60 pack year smoker-**Peripheral Arterial Disease.**
Leg pain that is relieved with leg elevation-**varicose veins.**
Pathophysiology underlying varicose veins-**incompetent valves.**
Next best step in the management of an individual with leg pain with activity-**Ankle Brachial Index.**
NBS in the mgt of an individual with leg pain relieved with leg elevation-**Doppler Ultrasonography.**
Lesioned artery with no erections, buttock/thigh/calf pain-**aorta and its branches (iliac arteries. Leriche syndrome).**
Lesioned artery with "upper" calf pain with activity-**superficial femoral artery.**
Lesioned artery with "lower" calf pain with activity-**popliteal artery.**
Calf pain in an individual with a hx of fullness behind the knee-**Baker's cyst (ruptured).**
Sudden onset leg pain in the setting of an irregularly, irregular interval-**Acute Limb Ischemia.**
Leg pain that is better when shopping at Walmart-**Lumbar Spinal Stenosis.**
NBS in the management of sudden onset calf pain with an Afib hx-**Heparin.**
Shiny skin w/o hair above the medial malleolus-**Stasis dermatitis from varicose veins.**
Ulcer beneath the toes with no sensation in a guy with CKD-**ulcers secondary to diabetic neuropathy.**
Painful ulcer beneath the toes in a long time smoker-**ulcers secondary to PAD.**
Painless ulcer above the medial malleolus in a 70 yo F-**ulcers secondary to venous incompetence.**
ABI is 1.5 in a patient with a foot ulcer-**diabetes (vessels are calcified).**
First step in the treatment of an individual with leg pain relieved with rest-**Supervised walking program.**
Drug shown to improve walking distance in the setting of PAD-**Cilostazol (PDE inhibitor).**
PAD in a 25 yo Japanese female with high BP and elevated ESR/CRP-**Takayasu Arteritis.**
NBS in the treatment of a patient with varicose veins-**leg elevation and use of compression stockings.**
Leg pain with PE revealing a tortuous, palpable "cord"-**Superficial thrombophlebitis (NSAIDS and warm compresses, no heparin).**
Unilateral leg swelling and tenderness in a pregnant woman, woman on OCPs, truck driver-**DVT.**

Given the following parameters what is the most likely diagnosis?
Old guy, abdominal bruit, elevated renin/A1/A2-**renal artery stenosis.**
Young lady, abdominal bruit, elevated renin/A1/A2-**fibromuscular dysplasia**.
45 yo M with hypokalemia, metabolic alkalosis, and decreased renin activity-**Conn Syndrome (primary hyperaldosteronism).**
Buffalo hump, purple striae-**Cushing's syndrome.**
New onset Afib and proptosis-**Hyperthyroidism.**
35 yo F with no risk factors-**OCP use (most common cause)**
20 yo F with elevated arm pressures and chronic leg claudication-**coarctation of the aorta.**
30 yo M with episodic HTN, diaphoresis, and tachycardia-**pheochromocytoma (don't forget the MEN2A and 2B syndromes).**
35 yo chronic drinker POD #2 s/p appendectomy-**ETOH withdrawal.**

Post-Operative complications

- **Surgical site infection**
    - Procedural factors: emergency surgery, malignancy, open surgery, inadequate site preparation , inadequate hand hygiene
    - Risk factors
        - Malnutrition, hypoalbuminemia, obesity
        - Glucocorticoids, immunosuppressive drugs
        - Chemotherapy, radiation
        - SMOKING
        - Uncontrolled diabetes, PAD, venous insufficiency
- **Anesthesia**

    - **Metabolic acidosis**
        - Infusion of excess NA → nonanion gap metabolic acidosis= hyperchloremic acidosis
        - Chloride and bicarn exchanged, drives intracellular shifting of HCO3
- **Hematoma**
    - If in the neck → promptly drain via immediate wound exploration
- **Postoperative delirium**
    - Common in elderly with dementia who are given haloperidol
        - Muscular rigidity, AMS, autonomic dysregulation, fever
        - Due to central dopamine receptor blockade, dopamine antagonism in nigrostriatal pathway → lead-pipe rigidity
- **Malignant hyperthermia**
    - Exposure to anesthesia (**succinylcholine**, inhaled gasses like **halothane**) → hypermetabolic crisis with sustained muscle contraction, tachycardia, hyperthermia, Myoglobulinemia, fever, diaphoresis, cyanosis, hypercarbia
    - Occurs shortly after induction, high mortality 24 hours later
        - Watch for neuroleptic malignant syndrome in hx of psychotic disorders
        - Hx of serotonin syndrome with myoclonus, SSRI/ MOAs, linezolid
        - Watch for peaked T waves - hyperkalemia from rhabdomyolysis
    - Inhaled anesthetic and depolarizing paralytic agent → issues in people with skeletal muscle calcium channel genetic defects
    - Tx: IV dantrolene (CCB, sarcoplasmic reticulum), oxygen, correct acidosis, cooling blankets
        - Dantrolene: inhibits Calcium release from sarcoplasmic reticulum
- **Endocrine complications**
    - **Acute adrenal insufficiency:**
        - **Adrenal crisis:** stressor → HA, n/v, confusion, fever, hypotension, skin hyperpigmenation, cyanonis
    - **Myxedema coma**
        - Hypothyroidism with stress → confusion, hypothermia, hyporeflexia, bradycardia, respiratory depression
    - **Thyroid storm**
        - Sudden onset confusion, delirium, agitation, anxiety, tachycardia, N/V
- **Bacteremia**
    - 30-45 minutes of invasive procedures, chills, temp spike > 104F
    - Next steps: get blood cultures x 3, start empiric Abx
    - Signs: wound pain, high fever, gas gangrene
- **Postoperative fever 101-103 F**
    - Causes: atelectasis, pneumonia, UTI, deep venous thrombophlebitis, wound infection, deep abscesses
- **Atelectasis**
    - Most common source is post-op fever on first day PO.
    - Work-up: do CXR, improve ventilation (deep breathing, postural drainage, incentive spirometry)

    - Tx: bronchoscopy
- **Pneumonia**
    - 3 days post off id atelectasis not resolved
    - Fever, cxr lung infiltrates
    - Dx: sputum culture, treat with Abx
- **Diaphragmatic paralysis**
    - Phrenic nerve injury/ viral/ neurologic disease, idiopathic
    - Dyspnea on exertion and orthopnea
    - Dx: sniff test= paradoxical movement of diaphragm
- **UTI**
    - Fever on POD 3
    - Work up with urinalysis, cultures
- **Deep thrombophlebitis**
    - Fever on POD 5
    - Dx: Doppler US
    - Tx: anticoagulant with heparin and bridge to warfarin
- **Wound infection**
    - Fever POD 7
    - Erythema and tenderness
    - Tx: Abx if cellulitis, drain if abscess
    - Dx: sonogram
- **Deep abscesses**
    - Fever, POD 10-15
    - Dx: CT scan
    - Tx: percutaneous radiologically guided drainage
- **Postoperative urinary retention**
    - Increased risk with hernia repair
    - Prolonged anesthesia, opioids, anticholinergics
    - suprapubic/ lower abdomen discomfort, tachycardia, HTN (sympathetic stimulation)
    - Dx: portable bladder US
    - Tx: urinary cath
        - Give neostigmine or any cholinergic agonist

Procedures

- Percutaneous transluminal angioplasty
- Endarterectomy
- Compression stockings

ADVICE

- OnlineMedEd sheets: https://drive.google.com/drive/folders/1yguXOh0fUfaKoioIEUreFuQWdIiAMeFY?usp=sharing

- This comat honestly sucks, not going to lie. It's really hard to find time to study with the surgery work schedule and I think having it early on in third year was hard for me because I'm still trying to find that balance of work and studying without being completely exhausted and burnt out --- That being said, my biggest recommendation is the sat/sun before the rotation starts look at how many questions there are in whatever q banks you plan to use and how many hours you need to spend watching videos and split it all between the 4 weeks. See how much you have to do every day so that you do a little at a time and don't feel overwhelmed.
- **Q banks - uworld, comquest, combank**
- **Videos - divine intervention, doctor high yield, emma holliday, OMED**
    - **OMED: General & Trauma were sufficient**
- Keep in mind this comat is extremely comprehensive - you will see questions from everything: Derm, Endo, Cardio, GI, GU, Breast, Trauma/Acute Care, etc. I got tons of questions on what fluids to give (5% dextrose vs sodium bicarb vs normal saline vs LR, etc)
- Some of the questions are extremely detailed - for example, knowing different types of colorectal procedures (hemicolectomy, hartmann, low anterior resection)
- Know management and next steps - what imaging would you do, etc.
- Know complications from procedures - i.e. total thyroidectomy can cause hypocalcemia (what does this look like, signs and symptoms, management)
- Warfarin reversal and side effects
- Paraphimosis
- Hypocalcemia causes from anesthesia
- Carcinoid tumor at appendix management
- Appendicitis management
- Secal bascule
- TNM breast cancer staging
- Pneumobilia and dilated loops of bowel = gallstone ileus
- Tetanus management
- UC vs IBD vs Diverticulitis/osis treatment and diagnostics
- Know what ASA is and the different grades
- Plummer Vinson Syndrome
- Hemorrhoid & Anal fissure diagnosis & management
    - Determine degree of damage. Determine when to operate and what type of surgery. Know pectinate line.
- Hernia diagnosis & management
    - When to use mesh. Strangulated vs incarcerated
- Thyroid masses diagnosis & management
- Breast Cancers
    - Tip: Keep age range in mind when studying breast pathologies
    - Benign vs Malignant
    - Which imaging to order (US vs MRI vs mammo)
    - When to get FNA vs Core Needle Biopsy vs Surgery

    - Type of cancer. What type of removal: biopsy, mastectomy, complete mastectomy. Know quadrants and what is most likely in which quadrant. Orange peel skin and what it indicates.
- Hepatobiliary pathologies!
    - MRCP vs ERCP vs HIDA = which one is the next best step based on the question stem?
    - Know indications for surgery and imaging choices. Know when to pick HIDA over MRCP. Know urgent vs emergent vs elective.
- Nutrition. Determine if a patient needs nutrition supplementation and what type aka peg, TPN, NG tube
- What is the best first step after someone gets bitten by a snake?
- Pain due to ectopic pregnancy vs due to ovarian cyst rupture? …Look at bHCG value
- Glasgow coma scale. Eyes=4, verbal= 5, movement= 6
- Parkland formula, know how to calculate BSA and how much fluid to give (adult and kid)
- Most common cause of SBO= ADHESIONS
- How to manage/ work up bleeding rectum
- ABx to give in diarrhea
- When to use steroid taper when undergoing surgery (people with adrenal insufficiency)
- Pheochromocytoma treatment for surgery
- Breast cancer work up: BRCA, mammogram, core needle biopsy
- Perforated diverticulum: sigmoidectomy w/ anatomoses
- 1-2 TNM staging questions (colon cancer invades submucosa, no mets, 2 + LN= T3N1)
- Urine output that means good IV fluid resuscitation
- serum measurement for good osmolairt: BUN, K, Na, Mg, albumin?
- Analgesia vs. anesthesia (purpose of each: ketorolac, propofol)
- When to use ANCEF